JNU SOLVED PAPERS

Solved Paper 2015

SECTION A

1. **If a country's nominal GDP is constant, then which of the following statements about it would be correct?**

(a) It is impossible for the real per capita GDP to rise in such circumstances.

(b) The real per capita GDP can rise if and only if the country's population is shrinking and prices are falling.

(c) For the real per capita GDP to rise, it is sufficient that the price level should decline.

(d) It is possible for the real per capita GDP to rise even if the country's population is increasing.

Ans. (d)

$$Real\ per\ capita\ GDP = \frac{Real\ GDP}{Population}$$

$$where, Real\ GDP = \frac{Nominal\ GDP}{Price\ Index}$$

So, if the prices are falling, then real per capita GDP can rise inspite of population growth.

2. **The GDP's (at factor cost) and population sizes of two countries A and B were identical in a particular year. Which of the following statements is then necessarily true for that year?**

(a) A and B had identical per capita incomes.

(b) A and B were equally wealthy countries.

(c) A and B had identical levels of labour

(d) Neither of the three–(a), (b) and (c) need be the case

Ans. (d) On the basis of the given information, neither of the conditions stated shall necessarily be true. Per capita income is computed on the basis of national product; wealth of a nation is determined by a number of factors; and same population size does not imply same level of labour productivity.

3. **If in an economy all production is undertaken by firms and the recorded sales of all firms in a year are less than their respective recorded costs, then which of the following statements is necessarily true?**

(a) At least some firms must have made accounting errors.

(b) The economy's GDP of that year was negative.

(c) The total purchases of intermediates by firms were more than their total sales.

(d) Neither of the above.

Ans. (c) If an economy's production costs exceed its sales then it implies that the intermediate cost exceed the firm's total sales.

4. **The two largest net exporters of capital in the world in recent years have been**

(a) Germany and Japan

(b) Germany and China
(c) China and Saudi Arabia
(d) China and Russia

Ans. (b) In recent years, Germany and China are the two largest net exporters of capital in the world.

5. If x_1, x_2, x_n are non−negative real numbers, then their
(a) Arithmetic mean $\leq$ Geometric mean
(b) Geometric mean $\leq$ Arithmetic mean
(c) Arithmetic mean $=$ 0.5 (Geometric mean)
(d) There is no fixed relationship between Arithmetic mean and Geometric mean

Ans. (b) For non−negative real numbers, geometric mean is always less than or equal to arithmetic mean. The condition for equality holds only when all the numbers are identical.

6. Let $f(x) = (log\ (x))/x$, where 0<x<1. Then for all x such that 0 < x < 1.
(a) f'(x) < 0
(b) f'(x) >0
(c) f'(x) > 0, if 0 < x < 0.5 and f'(x) < 0, if $0.5 \leq x < 1$
(d) Can't say anything about the sign of f'(x)

Ans. (b) Given

$$f(x) = \frac{\log x}{x}$$

$$\therefore f'(x) = \frac{x.\frac{1}{x} - \log x.1}{x^2} = \frac{1 - \log x}{x^2} \ldots\ldots (i)$$

Also, it is given that 0 < x < 1.

Therefore, $\log x < 0\ and\ x^2 > 0$

$$\therefore \frac{1 - \log x}{x^2}\ will\ be\ positive$$

$$\Rightarrow \frac{1 - \log x}{x^2} > 0 \Rightarrow f'(x) > 0 \quad [from\ Eq.(i)]$$

7. The binomial theorem states that
(a) $(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}$
(b) $(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k} + x^k / a^{n-k}$
(c) $(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k} - x^k / a^{n-k}$
(d) None of the above

Ans. (a) The equation given in option (a) is representative of the binomial theorem, which is defined by two parameters viz. number of trials (n) and probability of success (k).

8. The gross fiscal deficit is

(a) Total expenditure less total revenue receipts.

(b) Total borrowings less repayment of past debt.

(c) Revenue expenditures less total revenue receipts.

(d) Total expenditure less payment of interest.

Ans. (a) Gross fiscal deficit is the excess of total expenditure over total revenue receipts of a country. Symbolically,

Gross fiscal deficit = Total expenditure –Total Revenue receipts

9. The primary deficit refers to

(a) The deficit in the primary sector of the economy.

(b) The deficit in the revenue account of the budget.

(c) The deficit in the capital account of the budget.

(d) The fiscal deficit less the interest outgo in the budget.

Ans. (d) Primary deficit refers to the difference between the fiscal deficit of current year and interest payments on previous borrowings. Symbolically,

Primary deficit= Fiscal deficit –Interest payments

10. "If the fiscal deficit of an economy be 3% of GDP and if the current account deficit also be 3% of GDP in a particular year for that economy, then its aggregate saving must be equal to aggregate investment". The above statement is

(a) True

(b) False

(c) Not necessarily true

(d) Not necessarily false

Ans. (a) The given statement is true. Fiscal deficit is equal to the borrowings made by the government and current account deficit signifies the excess of imports over exports. Borrowings of government will increase money supply by 3% and the current account deficit will decrease money supply by 3%. So, the economy will be at equilibrium and $AD = AS \; or \; S = I$.

11. If some individual gets Rs. 3000 as her wage on the first day of every month and if she spends exactly Rs. 100 everyday and exhausts all her money by the end of the month, then what would be her approximate average money holding throughout the year?

(a) Rs. 3000

(b) Rs. 36000

(c) Rs. 18000

(d) Rs. 1500

Ans. (d) Her average money holding per month will be computed by the formula given below

Average money holding $= \frac{balance\ in\ the\ beginning\ of\ the\ month + balance\ at\ the\ end\ of\ the\ month}{2} = \frac{3000+0}{2} =$
$= Rs. 1500$

12. The theory of comparative advantage in a two−country, two−commodity world can only work if

(a) Labour and capital are mobile

(b) Labour is mobile and capital is not

(c) Both capital and labour are mobile

(d) Both capital and labour are not mobile

Ans. (b) The theory of comparative advantage was given by Ricardo. This theory assumes that there is only one factor of production, i.e., labour and that it is perfectly mobile in the domestic market and immobile in the international market.

13. Current account transactions of a country include

(a) Exports and imports of goods

(b) Exports and imports of goods and invisibles, including services.

(c) Exports and imports of goods and invisibles and capital flows.

(d) Exports and imports of goods and invisibles and foreign exchange reserves.

Ans. (b) Current account records all those transactions which do not cause any change in assets and liabilities satiations of the country and include exports and imports of goods and services and unilateral transactions.

14. In the long run, the steady state rate of growth of a capitalist economy

(a) Falls with the savings propensity.

(b) Rises with the incremental capital output ratio.

(c) Rises with the savings propensity but falls with the incremental capital output ratio.

(d) Falls with the savings propensity but rises with the incremental capital output ratio.

Ans. (b) In the long−run, the steady state rate of growth of a capitalist economy rises with the incremental capital output ratio. Capital output ratio is the ratio between capital employed and output generated. An incremental ratio is indicative of the fact that more output can be generated with relatively less capital. So, this will cause the rate of growth to rise.

15. Accelerator and multiplier stand for

(a) The same thing and lead to an increase in output of the economy.

(b) The same thing and cause an increase in investment and increase in output.

(c) Different things with the first causing a change in investment due to a change in output and the second causing a change in output due to a change in investment.

(d) Different things with the first causing a change in output due to a change in investment and the second causing a change in investment due to a change in output.

Ans. (c) Accelerator and multiplier both have different meanings. Accelerator measures the change in investment due to change in output.

Multiplier measures an initial change in spending to the total change in the activity which will result.

16. In practice most free trade agreements between two countries are designed to
(a) Eliminate tariffs.
(b) Eliminate tariffs and other non−tariff measures.
(c) Fully liberalize trade in goods and services.
(d) Include free movement of all goods and factors.

Ans. (c) Free trade agreements between two countries are designed to fully liberalise trade in goods and services by introducing a liberal foreign trade policy.

17. Under the Bretton Woods system
(a) Dollar and gold were both used in international transactions.
(b) Dollar and Special Drawing Rights issued by the International Monetary' Fund were both used as international currencies.
(c) Only Special Drawing Rights were used.
(d) Dollar was recognized as the international reserve currency.

Ans. (d) Bretton Woods system of exchange rate was followed prior to 1971, under which Central Bank of countries other than the United States were given the task of maintaining fixed exchange rate between their currencies and the US dollar.

18. If the exchange rate of some economy depreciates vis−a−vis US $ and if the Marshal Lerner condition is satisfied, then the current account deficit of that economy is expected to
(a) Increase
(b) Decrease
(c) Remain the same
(d) Can't say

Ans. (b) Marshall−Lerner condition ensures that devaluation improves a country's balance of trade position if the sum of the price elasticities of demand for exports and imports (in absolute value) is greater than 1. Assuming that this condition is being fulfilled, then depreciation in exchange rate will decrease the current account deficit.

19. The scatter plot of X and Y
(a) Gives little information about the actual values.
(b) Requires that a linear regression be calculated and displayed.
(c) Indicates casual direction since X is the independent variable.
(d) Has none of the above characteristics.

Ans. (d) The scatter plot of X and Y gives a knowledge about the direction of correlation between these variables. As such, it possesses neither of the characteristics discussed above.

20. A distribution of 6 scores has a median of 21. If the highest score increases 3 points, the median will become

(a) 21

(b) 21, 5

(c) 24

(d) Cannot be determined without additional information

Ans. (a) Medin is not affected by the changes in extreme values.

21. Suppose that the exchange rate of the Indian rupee appreciates by 10 per cent relative to the currencies of India's trading partners. Over the same period, inflation in India is 8 percent compared to 3 percent inflation in the trading partners. What is the change in India's real exchange rate?

(a) 5 percent appreciation

(b) 10 percent appreciation

(c) 15 percent appreciation

(d) 5 percent depreciation

Ans. (c) India's real exchange rate will appreciate by 15%. Excess of inflation in India as compared to other trading partners $= (8 - 3) = 5\%$.

Appreciation in exchange rate of Indian rupee relative to the currencies of trading partners $= 10\%$

∴ Appreciation in India's real exchange rate $= 10 + 5 = 15\%$

22. Consider the following statement. For most of the period when it was under British Crown rule, India had an export surplus and yet its foreign liabilities increased. Which of the following can be said about this statement?

(a) This is correct

(b) This was true only for the period of Company rule

(c) This is logically impossible

(d) This is logically possible but factually incorrect

Ans. (b) Under the colonial rule, India had an export surplus because most of the agricultural produce was exported to Britain to meet the growing needs of raw materials of the British industries. But its foreign liabilities also increased because this export surplus was utilized by the British rulers to meet their war expenses.

23. Which of the following statements is the only correct one?

(a) India's per capita GDP in PPP terms is lower than that of Sri Lanka and Pakistan.

(b) India's per capita GDP in PPP terms is higher than that of Sri Lanka and Pakistan.

(c) India's per capita GDP in PPP terms is higher than that of Sri Lanka but lower than that of Pakistan.

(d) India's per capita GDP in PPP terms is lower than that of Sri Lanka but higher than that of Pakistan.

Ans. (b) India's per capita GDP in PPP terms is higher than that of Sri Lanka and Pakistan. PPP stands for Purchasing Power Parity theory. This theory advocates that exchange rates between currencies are determined in the long−run by the amount of goods and services that each currency can buy.

24. The aggregate population of G7 countries is
(a) Less than that of either China or India
(b) Higher than that of China or India
(c) Higher than India's but less than China's
(d) Approximately the same as India's

Ans. (a) The G7 group is an informal group of leading industrial countries, whose leaders meet periodically to discuss economic problems and policies. The G7 nations are Canada, France, Germany, Italy, Japan, the United Kingdom and the United States. The combined population of all these countries is less than the population of either India or China.

25. Life insurance was nationalized in India in
(a) 1947
(b) 1950
(c) 1956
(d) 1973

Ans. (c) Life insurance was nationalized in India in 1956 to protect the investors and generate trust so that the rate of savings can be increased.

26. If x is any real number, then
(a) $\boldsymbol{e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots}$
(b) $\boldsymbol{e^x = x + 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots}$
(c) $\boldsymbol{e^x = x^2 + 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots}$
(d) $\boldsymbol{e^x = x^3 + 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!}}$

Ans. (a) For any real number,

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots holds\ true.$$

27. Which of the following statements is (in general) true?
(a) Marginal Cost (MC) is minimized where MC= Average Variable Cost (AVC)
(b) Average Total Cost (ATC) is maximized where $\boldsymbol{MC = ATC}$
(c) Average Variable Cost (AVC) is minimized where $\boldsymbol{MC = AVC}$
(d) Total Revenue is maximized where $\boldsymbol{MC}$ **=Marginal Revenue (MR)**

Ans. (c) Average variable cost is per unit cost of variable expenses and marginal cost is the change in total cost when an additional unit is produced. As per the relation between these two costs, AVC is minimum where $MC = AVC$.

28. If population A has a larger standard deviation than population B
(a) Population A will have a greater range than B
(b) Population A will have a smaller range than B
(c) Population A will be more skewed than B
(d) We cannot say which population has the greater range or skewness

Ans. (d) On the basis of standard deviation only, nothing can be predicted about the range or skewness.

29. If you are told a population has a mean of 25 and a variance of 0, what must you conclude?
(a) Someone has made a mistake
(b) There is only one element in the population.
(c) There are no elements in the population.
(d) All the elements in the population are 25.

Ans. (d) If the population has a mean of 25 and the variance is 0, then it follows that all the elements of the population are 25.

30. One card is drawn from a standard 52−card deck. In describing the occurrence of two possible events, an Ace and a King, these two events are said to be
(a) Independent
(b) Mutually exclusive
(c) Random variables
(d) Randomly independent

Ans. (a) The outcome of one event doesn't in any way affect the outcome of the other event. Therefore, these two events are independent.

DIRECTIONS (Q. Nos. 31−35) **Read the following passage very carefully and answer the questions that follow.**

"A multiplicity of manufacturing activities will make a kingdom or city abound in money when they are diverse and produce things necessary or useful or pleasing to people in quantities that exceed the needs of the country. There are four reasons why this is so.

First, there is greater certainty in manufacturing activity, for a manufacturer is more certain to earn from his work than a farmer or other person who tills the soil or deals in his agricultural 'produce', for the earnings of these people depend not just on human labour but on the weather−since the land sometimes needs rain, and sometimes sun –as well as other conditions. And if these conditions are not

forthcoming or the weather is bad, their work is wasted and instead of making money they lose it. But a manufacturer's earnings are always certain, provided that he keeps working.

Second, in manufacturing activities it is possible to achieve a multiplication of products, and therefore of earnings. The same cannot be done with agricultural produce, which is not subject to multiplication. If a given piece of land is only large enough to sow a hundred (bushels) of wheat, it is impossible to sow a hundred and fifty there. In manufacturing, by contrast, production can be multiplied not merely twofold but a hundredfold, and at a proportionately lower cost.

Third, the sale of manufactured products is more certain than that of agricultural produce, and this certainty of sale means a greater certainty of profit. For it is difficult to preserve agricultural produce, for a long time without its deteriorating, so it is risky to export from country to another one far away; and so it is also risky to preserve it for the future, should it not be sold immediately, manufactured products, on the other hand, can easily be preserved even for long periods, so they can easily be exported to far off lands. And since navigation –the only art in which the moderns surpass the ancients –has been so greatly facilitated that trade is carried on not merely between east and west and north and south, but even between one hemisphere and the other, and goods can be easily transported from one to the other who will deny that the sale of manufactured products is more certain and more profitable than that of agricultural produce?

Fourth and last, manufactured goods generally yield much higher earnings than agricultural produce… For all these reasons the accident of a multiplicity of manufacturing activities is more important than that of domestic agricultural surplus."

(From Antonio Serra –A Short Treatise on the Wealth and Poverty of Nations, 1613)

31. There is greater certainty in manufacturing activities than in agricultural because
(a) It is subject to increasing returns.
(b) It relies only on human labour.
(c) The manufacturing worker must always keep working.
(d) Manufacturing products are diverse.

32. Manufacturing offers the possibility of more likely profit than agriculture because
(a) The variety of manufacturing products is greater than the variety of agricultural produce.
(b) It used to be risky to export from one country to another country that is far away.
(c) Both storage and transport are easier for manufactured goods.
(d) Manufacturing products are diverse.

33. Serra believed that
(a) Agriculture and manufacturing are both subject to increasing returns.
(b) Only manufacturing is subject to increasing returns.

(c) Neither activity is subject to increasing returns.
(d) Increasing returns are not relevant in a discussion of economic activity.

34. The significance of advances in navigation for Serra is that
(a) It enables improved transport of agricultural produce to make up for losses when the weather is bad
(b) It proves that the moderns have surpassed the ancients
(c) It gets rid of the difficulty of preserving goods for the future.
(d) It makes profits from manufacturing more certain by expanding potential markets

35. According to Serra, manufacturing
(a) Generates higher value added than agriculture
(b) Is desirable only when the quantities produced exceed the needs of the country
(c) Is always in a multiplicity that exceeds the agricultural surplus
(d) Always makes a kingdom or a city abound in money

Ans. (Q. No. 31 −35) Refer to Chapter 11

(Q No. 24−28)

DIRECTIONS: (Q. Nos. 36−38) **Study the following information very carefully and answer the questions that follow.**

A salesman visits only five different cities –Pune, Bengaluru, Chandigarh, Bhopal and Lucknow.

Every year the salesman visits exactly three cities according to the following restrictions. If the salesman visits Bengaluru, the salesman also visits Pune that year.

If the salesman visits Chandigarh one year, the salesman does not visit it the next year.

In any year, the salesman visits no more than one of the cities he visited in the previous year.

36. Which of the following is a possible sequence of combinations for the salesman to visit in two successive years?
(a) Year 1: Pune, Bengaluru, Chandigarh; Year 2: Bengaluru, Bhopal, Lucknow
(b) Year 1: Pune, Bengaluru, Bhopal; Year 2: Pune, Bengaluru, Lucknow
(c) Year 1: Pune, Bhopal, Lucknow; Year 2: Pune, Bengaluru, Chandigarh
(d) Year 1: Bengaluru, Bhopal, Lucknow; Year 2: Pune, Chandigarh, Bhopal

Ans. (c) According to the restrictions given, option (c) is the logical choice.

37. If the salesman visits Pune, Bengaluru and Chandigarh in the first year, which if the following combinations must be visited in the third year?

(a) Pune, Bengaluru and Chandigarh

(b) Pune, Bengaluru and Bhopal

(c) Pune, Chandigarh and Bhopal

(d) Chandigarh, Bhopal and Lucknow

Ans. (a) The salesman will visit Pune, Bengaluru and Chandigarh in the third year.

38. If the salesman visits Pune, Lucknow and Bhopal in the first year, which of the following combinations must be visited in the eleventh year?

(a) Pune, Lucknow and Bhopal

(b) Pune, Bengaluru and Bhopal

(c) Pune, Chandigarh and Bhopal

(d) Chandigarh, Bhopal and Lucknow

Ans. (a) The salesman will visit Pune, Lucknow and Bhopal in the eleventh year.

DIRECTIONS (Q. Nos. 39–40) **Study the following information very carefully and answer the questions that follows.**

Year 1	Year 2		Year/ Item
3353748	3864617	1	Final consumption expenditure
x_a	1821099	2	Gross fixed capital formation
255126	179004	3	Change in stocks
1018907	1328765	4	Exports of goods and services
1219109	1614040	5	Imports of goods and services
5050345	x_b	6	Gross domestic product at market prices

39. The value of x_a has to be

(a) 1896799

(b) 1641673

(c) 1751521

(d) 2151924

Ans. (b) Gross fixed capital formation $= GDP_{MP}$ −(Final consumption expenditure+ Change in stocks+ Net exports) $= 5050345 - 3353748 - 255126 - (1018907 - 1219109) = 1641673$

40. The value of x_b has to be

(a) 5579445

(b) 5400441

(c) 6149995

(d) 5970991

Ans. (a) Gross domestic product at market price $= Final\ consumption\ expenditure + Gross\ fixed\ capital\ formation + Change\ in\ stock + Net\ exports(Exports - Imports) = 3846417 + 1821099 + 179004 + (1328765 - 1614040) = 5579445$

SECTION B

41. An economy's output in year 0 is 10 percent below its maximum potential output and the maximum potential output steadily increases at the rate of 5 per cent per annum after that. In such circumstances, for how many years would it be possible for that economy to maintain a 6 percent per annum rate of growth of actual output?

(a) Not possible at all
(b) 5 years
(c) 11 years
(d) 15 years

Ans. (a) The economy would not be able to maintain 6% per annum rate of growth of actual output, because the rate of growth in potential output is below the rate of actual growth rate desired.

42. In the fixed price IS–LM model, which of the following is true if we compare the effects of an increase in government expenditure (X) with that of a reduction in money supply (Y)?

(a) Both will result in an increase in output but while X will be accompanied by a rise in the interest rate Y will reduce the interest rate.
(b) X and Y will have opposite effects on output but the same effect on the interest rate
(c) X and Y will have the same effect on output but opposite effects on the interest rate
(d) X will have an adverse effect on output because ii will raise the level of the fiscal deficit while Y will result in an increase in output by reducing the interest rate

Ans. (b) The IS–LM model is used to represent the Keynesian model of equilibrium. The IS cure represents combinations of national income, (Y) and interest rate, (r) that ensures equilibrium in the commodity market. The LM curve represents combination of Y and r that ensure equilibrium in the money market.

The interaction of IS and LM curves determine simultaneous equilibrium in the product market and money market. This model is used to predict the effects of parametric changes on the economy. So, as per this model, increase in government expenditure would increase output and interest rates both but decrease in money supply would decrease the output but increase the interest rate.

43. Consider a Cournot duopoly in a homogeneous product market where firm 1's output is x and firm 2's output is y. The inverse demand function is given by $P = e^{(-x+y)}$. Costs are zero for all levels of output for both firms. At a Cournot equilibrium

(a) Each firm produces one unit of output
(b) Each firm produces two units of output

(c) Firm 1 produces one unit of output and firm 2 produces two units of output

(d) There is no Cournot equilibrium

Ans. (b) In Cournot's Duopoly Model, each producer produces equal amount of output which is equal to 1/3rd of the total possible demand. On solving the inverse demand function, the total output is found to be 6 units. Therefore, each firm will produce $6 \times 1/3 = 2$ units.

44. Let f(x) be a differentiable function defined over the interval [0, 2]. It is given that $f(0) = 1$ and $f(x) \leq 0 \rightarrow f'(x) > 0$. Then

(a) $f(x) < 0$ for some x in the interval [0, 2]

(b) $f(x) > 0$ for all x in the interval [0, 2]

(c) $f(x) = 0$ for all x in the interval [0, 1]

(d) $f(x)$ is strictly positive for all 0 < x < 1 and f(x) is strictly negative for all 1 < x < 2

Ans. (b) If f(x) is a differentiable function defined over the interval (0, 2), it being given that $f(0) = 1$ and $f(x) \leq 0 \rightarrow f'(x) > 0$, then f(x) will be greater than 0 for all x in the interval [0, 2].

45. A monopolist faces the following demand function D(P)

$D(P) = 10$ for P in the interval [0, 10]

$= 20 - P$ for P in the interval (10, 20)

$= 0$ for P in the interval $[20, \infty]$

Now suppose that the monopolist has zero variable cost of production. However, if it produces any positive amount, it must incur a fixed cost of Rs. 50. What is the optimal monopoly price?

(a) 15

(b) 10

(c) 5

(d) There is no monopoly equilibrium

Ans. (b) The profit function of the monopolist can be given by $y = (20 - P)P - 50 \ = 20P - P^2 - 50$

Differentiating this equation w.r.t. P, we get

$$\frac{dy}{dP} = \frac{d}{dP}(20P - P^2 - 50)$$

Assuming it to be a maximizing function, we get

$$20 - 2P = 0 \; or \; P = 10$$

Therefore, the optimal monopoly price will be Rs. 10.

46. If you maximize $f(x) = 2/x^3$ subject to 0 < x < 1, then the maximum value of f(x) is obtained at

(a) 0

(b) 1

(c) ½

(d) $f(x)$ has no maxima for the case 0 < x < 1

Ans. (d)

$$\frac{d}{dx} = \frac{d}{dx}(2x^{-3}) = -6x^{-4} = 0$$

$$\therefore x = 0$$

$$Now, \frac{d^2y}{dx^2} = -6(-4).x^{-4-1} = 24x^{-5}$$

Since, $\frac{d^2y}{dx^2}$ is positive, therefore the function will have no maxima for 0 < x < 1.

47. In the Simple Keynesian model, if an increase in the level of investment is accompanied by a reduction in the propensity to save, the combined effect of these would be

(a) An increase in the levels of savings and output

(b) An increase in the level of savings but a reduction in the level of output

(c) A reduction in savings but an increase in output

(d) Either a reduction or an increase in savings but a definite increase in output

Ans. (a) As per the simple Keynesian model, in an economy, ex−post investments and ex−post savings are always equal. So, increase in the level of investments, accompanied by a reduction in propensity to save would increase the level of savings and output. Increased investments would increase the income of the consumers and correspondingly their savings will also increase. Also, decreased MPS will lead to an increase in consumption expenditure and therefore to meet the increased demand the output will also increase.

48. In the AD−AS model, the level of aggregate demand can influence the level of output

(a) If and only if aggregate supply has a positive relationship with the price level

(b) If and only if the price level is constant

(c) If and only if aggregate supply is not invariant with changes in the price level

(d) If and only if aggregate supply is invariant with changes in the price level

Ans. (a) In the model,

Aggregate demand = Aggregate supply

The level of aggregate demand can influence the level of output only if aggregate supply has a positive relationship with the price level.

In the graph, with changes in AD, the output levels also change because AS curve has a positive slope.

49. If you integrate $e^x + xe^x$ over the interval [0, 1], you get

(a) 1
(b) 0
(c) ½
(d) e^1

Ans. (d)

$$\int_0^1 (e^x + xe^x)dx = \left[e^x + e^x \times x - \int 1.e^x\,dx\right]_0^1$$

$$= [e^x + xe^x - e^x]_0^1 = xe^x$$

On substituting $x = 1$, we get

$$1.e^1 = e^1$$

50. Which of the following functions has a degree of homogeneity not equal to unity?
(a) $Q = 100K^{1/4}L^{3/4}$
(b) $Q = 20K^{0.5}L^{0.5}$
(c) $Q = K^2 + 2KL + L^2$
(d) $Q = \left(K^2 + 2KL + L^2\right)^{1/2}$

Ans. (c) $Q = K^2 + 2KL + L^2$ has a degree of homogeneity not equal to unity.

51. Suppose a consumer's preferences over commodities 1 and 2can be represented by the utility function $U(x_1, x_2) = min\{x_1, x_2\} + max\{x_1, x_2\}\ where\ x_1, x_2 \geq 0$. The prices of the two commodities are 1 and 2 respectively and the consumer's income is 150. Which of the following is true?
(a) At the optimum, the consumer should consume 150 units of commodity 1 and none of commodity 2
(b) At the optimum, the consumer should consume 75 units of commodity 2 and none of commodity 1
(c) At the optimum, the consumer should consume 50 units of commodity 1 and 50 units of commodity 2
(d) At the optimum, the consumer should spend equal amounts on the two commodities

Ans. (a) At the optimum, the consumer should consume 150 units of commodity 1 and none of commodity 2, as this consumption bundle gives the consumer the maximum satisfaction of 150 units.

$$U(x_1, x_2) = \min(150, 0) + \max(150, 0) = 0 + 150 = 150\ units$$

52. Consider the following optimization problems
1. Maximize f(x, y) subject to $x - 2y = 1\ and\ 3x + 2y = 11$
2. Minimize f(x, y) subject to $x - 2y = 1\ and\ 3x + 2y = 11$

Which of the following is true?

(a) **The two problems have the same solution**
(b) **The solutions to the two problems are different**
(c) **Neither of the problems has a solution**
(d) **Nothing can be said about the solutions to the problems unless the objective function is completely specified**

Ans. (d) The objective function (Z) is not specified. Therefore, nothing can be said about the solutions to the problems.

53. **If units of good 1 are measured on the horizontal axis and its price is p per unit whereas units of good 2 are measured on the vertical axis and its price is q per unit, the slope of the budget line is then given by**

(a) **p/q**
(b) **–p/q**
(c) **q/p**
(d) **–q/p**

Ans. (a) Slope of a budget line is the same as the 'price−ratio' of two goods. So,

Slope of budget line= Price ratio

$$= \frac{Price\ of\ good\ 1\ (p)}{Price\ of\ good\ 2\ (q)} = \frac{p}{q}$$

54. **There are three commodities –the first commodity has a negative price, at −1 per unit; the second commodity is priced at +1 per unit while the third is priced at +2 per unit. Income of the person is Rs. 100 per day. Then which one of the following is not true?**

(a) **An individual may afford to consume positive amounts of each per day**
(b) **An individual may afford to consume any amounts of goods 2 and 3 per day**
(c) **Any individual may afford to consume (0, 0, 60)**
(d) **An individual may afford to consume (20, 0, 60)**

Ans. (c) If the consumer is consuming zero units of both first and second commodity and 60 units of third commodity, then it means that to consume 60 units of third commodity he will need $Rs\ 120\ (60 \times 2)$. Since the income of the consumer is only Rs. 100 per day, therefore he will not be able to consume 60 units with his given income. Therefore (c) is definitely not true.

55. **Among 25 Articles, nine are defective, six having only minor defects and three having major defects. Determine the probability that an article selected at random has major defects given that it has defects.**

(a) **1/3**
(b) **1/4**
(c) **6/25**

(d) None of these

Ans. (a) Probability that the defect is major, it being known that the article is defective

$$= \frac{Number\ of\ articles\ having\ major\ defects}{Number\ of\ defective\ articles} = \frac{3}{9} = \frac{1}{3}$$

56. The arithmetic mean of the passengers on a metro car is 60. If the number of passengers on a car has a normal distribution with a standard deviation of 20 approximately what percent of metro cars carry more than 80 passengers?

(a) $\mathbf{16}\%$
(b) $\mathbf{48}\%$
(c) $\mathbf{68}\%$
(d) $\mathbf{88}\%$

Ans. (a) 16% $(80 \times 20\%)$ of the metro cars will carry more than 80 passengers.

57. Satish is very conscious about the food he eats. He only eats rotis and dal, a cup of dal costs Rs. 2 while each roti costs Rs. 1 and Satish decides to spend only Rs. 13 per day on food. Also he decides to consume exactly 5500 calories a day; he has been told that each roti has 1000 calories while each cup of dal has 500 calories. He spends his entire money allocated on foods. Then

(a) He consumes 3 rotis and 5 cups of dal
(b) He consumes no more than 3 rotis per day
(c) He consumes no more than 5 cups of dal per day
(d) Unless we are given some more information about preferences, we cannot say what Satish does

Ans. (a) Satish's consumption is subjected to the following constraints:

$$x + 2y = 13$$

And $1000x + 500y = 5500$

The above constraints are fulfilled when he consumes 3 rotis and 5 cups of dal.

58. Let X, Y, Z be statements. Suppose we know that "if X then Y' "is true, and that "if Y then Z' " is true. We also know that Y is false. We can infer that

(a) X is true
(b) X is false
(c) Z is true
(d) Z is false

Ans. (d) If Y is false, then it can be inferred that Z is false.

59. Let X and Y be statements. If we want to disprove the claim that 'X' implies 'Y' we need to show that

(a) X is false

(b) Y is false

(c) X is true but Y is false

(d) Y is true but X is false

Ans. (c) If we want to disprove the fact that X implies Y, then we need to show that X is true but Y is false.

60. Let X, Y, Z be statements. Suppose we know that 'X' implies 'Y' and that 'Z' implies 'X'. We also know that Y is false. We can infer that

(a) X is false and Z is true

(b) X is true and Z is false

(c) Both X and Z are true

(d) Both X and Z are false

Ans. (d) On the basis of the given information, it can be concluded that both X and Z are false.

e.g. $(-2-3)(-3-4), -5 \times -7 = 35$

61. Let X and Y be statements. Which of the following strategies is not a valid way to show that implies Y?

(a) Assume that Y is false, and then use this to show that X is false

(b) Show that some statement Z implies Y, and then show that X implies Z

(c) Show that either X is false, or Y is true, or both

(d) Assume that X is false, and Y is true, and deduce a contradiction

Ans. (a) To show that some statements Z implies Y and then show that X implies Z is not a valid way to show that X implies Y.

62. Let X and Y be statements. If we know that X implies Y then we can also conclude that

(a) X is true and Y is also true

(b) If X is false then Y is false

(c) If Y is true, then X is true

(d) If Y is false, then X is false

(e) (a) and (b) both are true

Ans. (e) If X implies Y, then if X is false, Y is also false. Also if X is true, then Y will also be true. So, both options (a) and (b) hold true.

63. Let X, Y, Z be statements. Suppose we know that 'X' implies 'Y' and that 'Y' implies 'Z'. If we also know that X is false, we can infer that

(a) Both Y and Z are true

(b) Y is true and Z is false

(c) Y is false and Z is true

(d) None of the above

Ans. (d) If X implies Y, Y implies Z and if X is false, then it can be inferred that both Y and Z are false.

64. Let x, y and z be arbitrary real numbers. Then we must have

(a) $\boldsymbol{x} > y \rightarrow xz > yz$

(b) $\boldsymbol{x} > y \rightarrow \boldsymbol{x} - \boldsymbol{z} > y - z$

(c) $\boldsymbol{x} > y \rightarrow \boldsymbol{x}/\boldsymbol{z} > y/z$

(d) $\boldsymbol{x} > y \rightarrow \boldsymbol{1}/\boldsymbol{x} > 1/y$

Ans. (b) Let x, y and z be arbitrary real numbers. If x > z, then x−z > y−z. the rest of the conditions will not hold true, if Z is a negative number.

65. The mean of the following sample

X	**Frequency of X**
2	**1**
3	**2**
4	**3**

(a) 3

(b) 2

(c) 3.33

(d) 2.22

Ans. (c) Mean of the given sample can be computed with the help of the following formula,

$$Mean = \frac{\sum fx}{\sum f} = \frac{20}{6} = 3.33$$

DIRECTIONS (Q Nos. 66−70) **Study the following information very carefully and answer the questions that follow:**

Year 1	Year 2	Year 3	Year 4	Year 5	Year/ Item
4705447 600612	5411104 620370	6406834 825175	7434965 yd	ye 1153503	1. National income 2. Indirect taxes 3. Subsidies 4. Net national income at

274116 ya 32923 4738370	251446 −38000 yb	289920 yc 6488641	349625 −76830 7511795	429098 8980383 116766 8372744	market prices 5. Net factor income from abroad 6. Net domestic product at factor cost

66. The value of y_a has to be

(a) 5031943

(b) 5580175

(c) 5064866

(d) 4705447

Ans. (a) y_a is the variable used for net national income at market price which is computed as follows

$$NNP_{MP} = NNP_{FC}(National\ income) + Indirect\ taxes - Subsidies$$

$$= 4705447 + 600612 - 274116 = 5031943$$

67. The value of y_b has to be

(a) 5818028

(b) 5780028

(c) 5411104

(d) 5449104

Ans. (d) y_b is the variable used to represent NDP_{FC}

$$NDP_{FC} = National\ income(NNP_{FC}) - NFIA = 5411104 - (-38000) = 5449104$$

68. The value of y_c has to be

(a) −535255

(b) 453448

(c) −81807

(d) Cannot be determined from the given data

Ans. (c) y_c is the variable used for net factor income from abroad, which is computed as follows

$$NFIA = National\ income\ (NNP_{FC}) - NDP_{FC} = 6406834 - 6488641 = -81807$$

69. The value of y_d has to be

(a) 272795

(b) 426455

(c) 76830

(d) Cannot be determined from the given data

Ans. (d) To find the amount of indirect taxes (y_d), national income at factor cost and market price should be known. Since the national income at market price is not given, therefore the amount of $y_d$cannot be determined from the given data.

70. The value of y_e has to be
(a) 8980333
(b) 8372744
(c) 9097149
(d) 8255978

Ans. (d) y_e is the variable used to represent national income.

National income $(NNP_{FC}) = NDP_{FC} + NFIA = 8372744 + (-116766) = 8255978$

Solved Paper 2014

SECTION A

Expenditure on Gross Domestic Product (in Rs. 100 billion)				
At current prices	**2009–10**	**2010–11**	**2011–12**	**2012–13**
1. Final consumption expenditure	448	525	617	696
1.1. Government final consumption expenditure	77	89	103	119
1.2. Private final consumption expenditure	371	436	514	577
2. Gross fixed capital formation	206	241	286	307
3. Change in stocks	18	27	17	17
4. Valuables	12	16	25	27
5. Exports of goods and services	130	171	215	243
5.1 Export of goods	85	114	147	163
5.2 Export of services	45	57	68	79
6. Import of goods and services	165	205	272	311
6.1 Import of goods	136	168	235	267
6.2 Import of services	28	37	38	44
7. Discrepancies	0	3	14	32
8. Expenditure on gross domestic product	A	B	C	D

Expenditure on Gross Domestic Product (in Rs. 100 billion)				
At constant 2004–05 Prices	**2009–10**	**2010–11**	**2011–12**	**2012–13**
1. Final consumption expenditure	340	368	400	421
1.1 Government final consumption expenditure	55	58	62	66
1.2 Private final consumption expenditure	285	309	338	355
2. Gross fixed capital formation	159	177	199	200
3. Change in stocks	14	21	12	11
4. Valuables	9	13	13	18
5. Exports of goods and services	100	120	138	145
5.1 Exports of goods	66	82	96	100
5.2 Exports of services	34	38	42	45
6. Import of goods and services	133	154	187	199
6.1 Import of goods	112	127	163	174
6.2 Import of services	21	27	23	25
7. Discrepancies	−10	−15	−12	−6
8. Expenditure on goods domestic product	479	X	Y	Z

1. D (i.e., expenditure on GDP at current prices in 2012–13) is equal to

(a) 1011

(b) 1568

(c) 1633

(d) 2883

Ans. (a) As per the Expenditure approach, GDP at Current price (2012−13) = Final Consumption expenditure+ Gross Fixed capital formation + change in stocks+ Valuables+ Exports – Imports + Discrepancies

$$= 696 + 307 + 17 + 27 + 243 - 311 + 32 = 1011$$

2. Growth rate during 2012–13 has been estimated to be

(a) 12.25%

(b) 10.91%

(c) 6.50%

(d) 4.74%

Ans. (d) Growth rate of 2012−13

$$= \frac{GDP_{2012-13} - GDP_{2011-12}}{GDP_{2011-12}} \times 100$$

$$= \frac{590 - 563}{563} \times 100 = 4.7\% \ (approx)$$

3. GDP deflator during 2012–13 has been estimated to be

(a) 1.6
(b) 1.7
(c) 1.8
(d) 1.9

Ans. (b) GDP deflator

$$= \frac{GDP\ at\ Current\ Year\ Prices}{GDP\ at\ Constant\ Prices} = \frac{1011}{590} = 1.7$$

4. As compared to 2010–11, the growth rate in 2012–13 come down by

(a) 7.9% points
(b) 5.5% points
(c) 3.5% points
(d) 1.9% points

Ans. Growth rate of $2010-11$

$$= \frac{530 - 479}{530} \times 100 = 9.62\%$$

$$growth\ rate\ of\ 2012 - 13 = 4.7\%$$

∴ Fall in growth rate$= (9.62 - 4.7) = 4.98 = 5\%$ points

5. The current account deficit a current price as proportion of GDP during 2012–13 had been estimated to be

(a) 5.34%
(b) 6.74%
(c) 9.15%
(d) 11.55%

Ans. (b) Current account deficit as a proportion of GDP (at current prices)

$$= \frac{Imports - Exports}{GDP} \times 100$$

$$= \frac{311 - 243}{1011} \times 100 = 6.73\%$$

6. Investment rate (excluding valuables) at constant prices during 2012–13 has been estimated to be

(a) 14%
(b) 24%
(c) 34%

(d) 44%

Ans. (c) Investment rate

$$= \frac{Gross\ Fixed\ capital\ formation}{GDP} \times 100$$

$$= \frac{200}{590} \times 100 = 33.8 \approx 34\%$$

7. Private consumption –GDP ratio at current prices during 2011–12 has been estimated to be

(a) 50%
(b) 57%
(c) 65%
(d) None of the above

Ans. (b) Private consumption to GDP ratio

$$= \frac{Private\ consumption}{GDP} \times 100\ (at\ current\ prices)$$

$$= \frac{514}{902} \times 100 = 56.98 = 57\%$$

8. By 2012–13, in Indian economy, the degree of openness has crossed

(a) 50%
(b) 60%
(c) All of these
(d) None of the above

Ans. (d) To measure the degree of openness, following formula will be used

Degree of openness

$$= \frac{Exports + Imports}{GDP} \times 100$$

$$= \frac{145 + 199}{590} \times 100\ (at\ constant\ prices)$$

$$= 58.3\%$$

9. The inflation based on GDP deflator during 2012–13 has been estimated to be

(a) 10%
(b) 9%
(c) 8.5%
(d) 7.2%

Ans. (d) Inflation based on GDP deflator during 2012–13

$$= \frac{(GDP\ Deflator\ 2012-13) - (GDP\ Deflator\ 2011-12)}{GDP\ Deflator\ 2011-12} \times 100$$

$$= \frac{1.714 - 1.6}{1.6} \times 100$$

$$= 7.125 = 7.2\%$$

10. "At current prices, the gross fixed capital formation of the public sector has increased by 23.5% from 6.4 lakh crore in 2011–12 to 7.9 lakh crore in 2012–13, that of private corporate sector by 0'8$\%$ from 8.5 lakh crore in 2011–12 to 8.6 lakh crore in 2012–13, and the household sector by 3.9$\%$ from 13.7 lakh crore in 2011–12 to 14'3 lakh crore in 2012–13". The government expenditure to GDP ratio in 2012–13 would then approximately be

(a) 15%
(b) 20%
(c) 25%
(d) 30%

Ans. (b) Government Expenditure to GDP ratio in Government consumption expenditure 2012–13

$$= \frac{+Government\ investment\ expenditure}{GDP\ (at\ current\ prices)} = \frac{119+79}{1011} \times 100 = 19.5 = 20\%$$

DIRECTIONS (Q Nos. 11–15) **Read the following passage very carefully and answer the questions that follow.**

"The denial of the crucial role of the interest rate as equilibrator of savings and investment led directly to the Keynesian theory of employment determinants. Given the 'propensity to consume' and hence the proportion of any given income that will be spent by individual consumers (on which the size of R F Kahn's 'multiplier' depends), the level of output and employment will be a function of investment. According to the level at which investment (also consumption) stands, the level of output and employment may be almost anything between zero and full capacity output. There is at any arte no longer any unique level to which the system is necessarily tending. So far as investment consists of private investment, it will remain governed by the 'marginal efficiency of capital' (anticipated profitability), modified, on the one hand, by 'expectations' (powerfully swayed by business mood' and the like) and on the other hand by the cost of borrowing, namely the prevailing rate of interest.

Thus, was the casual emphasis of theory reversed: instead of any change in saving being translated into an equivalent shift of investment and (via income changes) the volume of savings the dependent variable.

Interest was converted virtually into a money rate –something influenced on the one hand by monetary policy (affecting the supply of money available) and on the other hand by the current attitude towards is as something worth holding (qua bank deposit e.g.) in preference to other assets (e.g. bonds). This later

constituted the famous liquidity preference –a preference powerfully influenced by expectations (or uncertainty) about future movements of interest rates (and hence of bond prices)."

From Maurice Dobb, Theories of Value and Distribution since Adam Smith, page 218 –219

11. There is no unique level of output and employment to which the economic system tends, because

(a) Investment consists only of private investment

(b) Investment determines the level of output and can vary

(c) Changes in saving are translated into an equivalent level of investment

(d) Investment depends upon the propensity to consume

Ans. (b) As per the passage, there is no unique level of output and employment in an economic system because these two factors are dependent on investment which is not constant.

12. The 'multiplier' referred to here relates to

(a) The propensity to consume which determines how much consumers spend

(b) The change in employment consequent upon a change in output

(c) The change in output consequent upon a change in investment

(d) The number that equilibrates saving and investment

Ans. (c) Multiplier in the passage refers to change in output due to change in investment.

13. Expectations

(a) Determine the prevailing rate of interest

(b) Contribute to liquidity preference

(c) Govern the cost of borrowing

(d) Determine the money supply

Ans. (b) As per the passage, liquidity preferences of people is determined by their expectations.

14. Keynes treated the interest rate as

(a) Entirely determined by expectations about the future

(b) The rate at which current savings and investment are equilibrated

(c) Reflecting both monetary policy and liquidity preference

(d) An indicator of expected profitability

Ans. (c) According to Keynes, interest rate is affected by both, the monetary policy and the liquidity preference.

15. Liquidity preference

(a) Is about holding money relative to other assets

(b) Is the difference between bond prices and interest rates

(c) Affects the supply of money

(d) Is unrelated to any of the above

Ans. (a) Liquidity preference means holding money in liquid form, as compared to other assets.

16. **The Malthusian principle of growth of human population argues that**
(a) **Population growth is constrained by the rate of growth of food production**
(b) **Human population growth has been restricted by changes in climatic conditions**
(c) **Expansion of human population leads to migration to less densely populated areas**
(d) **Historically population growth has been constrained by decline in gross fertility rate**

Ans. (a) In 1798, Thomas Robert Malthus gave his theory on population growth. In his theory, he claimed that in any country the production of foodgrains increases in arithmetic progression while the population increases in geometrical progression. As a result of this, the foodgrain availability decreases, constraining the growth of population.

17. **Suppose that the exchange rate of the Indian rupee appreciates by 10% and, over the same period, inflation in India be 8% and inflation in India's trading partners is 3%. What is the change in India's real exchange rate?**
(a) 5% **appreciation**
(b) 10% **appreciation**
(c) 15% **appreciation**
(d) 5% **depreciation**

Ans. (c) India's real exchange rate will appreciate by 15%. Excess of inflation in India as compared to other trading partners $= (8 - 3) = 5\%$

Appreciation in exchange rate of Indian rupee relative to the currencies of trading partners $= 10\%$

∴ Appreciation in India's real exchange rate$= 10 + 5 = 15\%$

18. Consider a country A whose citizens working abroad remit to the country in a particular year an amount in Local Currency Units (LCUs) that is 250 LCDs more than what foreigners working in A are remitting to their parent countries. Foreign firms operating in A repatriate profits to their home countries that exceed the profits repatriated to a by its firms operating abroad by 750 LCUs. If GDF in the relevant year is 50,000 LCUs and there are no other cross−border flows of income, the country's GNP would be
(a) **50,500 LCUs**
(b) **49,500 LCUs**
(c) **49,750 LCUs**
(d) **50, 750 LCUs**

Ans. (b) Gross National Product (GNP)= Gross domestic product + Net factor income from abroad

In the given case,

Gross domestic product = 50000 LCUs

Net factor income from abroad = Net remittance from citizens+ Net remittance from Firms = 250LCUs + (−750 LCUs)= -500 LCUs

$$\therefore GNP = 50000 - 500 = 49500\ LCUs$$

19. Which of the following is an example of pure public good?
(a) National defence
(b) Fire protection
(c) Congested highway
(d) All of these

Ans. (d) Public goods are those goods which are provided by the government and are characterized by non−excludability and non−rivalrous in consumption. So, all the above stated services fall in the category of pure public goods.

20. The free rider problem is typically known as
(a) The reluctance of individuals to contribute voluntarily for the provisioning of the public goods
(b) Journey without ticket in train
(c) Watching movie without ticket in cinema hall
(d) The reluctance of individuals to contribute voluntarily for the provisioning of the Giffen goods

Ans. (a) Free rider problem is associated with the use of public goods. Public goods are those goods which cannot be provided by the market mechanism, due to its features of 'non−rivalrous' and 'non−excludable' in consumption. It implies that once a public good is provided, then no one can be denied from its consumption and also consumption by one do not reduce quantity available for the other. E.g. a street light, once put in place, then neither could be denied or excluded from its benefits. But, these goods create the problem of 'free−riders', because no one likes to contribute towards these goods, but everyone likes to enjoy the benefits.

21. 'Club goods' are
(a) non−rivalrous and non−excludable
(b) rivalrous but non−excludable
(c) excludable but non−rivalrous
(d) rivalrous as well as excludable

Ans. (c) Club goods, also referred to as artificially scarce goods are excludable but non−rivalrous. These goods are often provided by a natural monopoly. A non−congested toll road is an example of club good. It is possible to exclude someone from using it by simply denying them access, but it is not a rival good since one person's use of the road does not reduce its usefulness for others.

22. If the quantity demanded of rice increases by 5% when the price of wheat increases by 20%, the cross−price elasticity of demand for rice would be
(a) −4
(b) −0.25

(c) 0.25
(d) 4

Ans. (c) Cross elasticity of demand measures the responsiveness in demand due to change in price of related goods. It is calculated as follows

$$E_{XY} = \frac{\%Change\ in\ demand\ of\ X}{\%Change\ in\ price\ of\ Y} = \frac{5}{20} = \frac{1}{4} = 0.25$$

23. Suppose the demand for good Z goes up when the price of good Y goes down. We can say that goods Z and Y are
(a) Complements
(b) Perfect substitutes
(c) Unrelated goods
(d) Substitutes

Ans. (a) If demand for good 'Z' goes up when price of good 'Y' falls, then this implies that Y and Z are complementary goods.

24. In the long–run, existing firms exit a perfectly competitively market, when
(a) Economic profits are zero
(b) Economic profits are greater than zero
(c) Normal profits are greater than zero
(d) They incur an economic loss

Ans. (d) In the long–run, existing firms in a perfectly competitive market exit, if they are not able to earn normal profits. In such an instance the firm starts to incur an economic loss. Economic loss refers to a situation when the firms are unable to recover the opportunity cost of the resources employed.

25. Which of the following statements is correct?
(a) The compensated demand curve of a commodity is always steeper than the ordinary demand curve of the commodity.
(b) The ordinary demand curve of a commodity is always steeper than the compensated demand curve of the commodity.
(c) The compensated demand curve of a commodity always has the same slope as the ordinary demand curve of the commodity
(d) None of the above

Ans. (a) Compensated demand curve is a demand curve that ignores the income effect of a price change, only taking into account the substitution effect. Therefore, it is steeper than the ordinary demand curve.

26. When speaking of the 'invisible hand', Adam Smith was referring to
(a) Competition of a kind that would lead an individual pursuing his private interest to serve the public interest

(b) Competition of a kind that would lead the individual pursuing his private interest to pursue private interest
(c) A situation where a person works in the public interest without showing himself
(d) None of the above

Ans. (a) Adam Smith was of the view that a firm operating for profit, without any intervention from the government, also serves the society and works for a common−cause, benefitting all.

27. The purchasing power parity exchange rate is determined by
(a) The normal exchange rate
(b) The Central Bank
(c) The relative price levels of the two countries
(d) Foreign exchange markets

Ans. (c) According to the purchasing power parity theory exchange rates between currencies are determined in the long−run by the amount of goods and services that each currency can buy. So, relative price levels in the two countries determine the exchange rate between the currencies of those countries.

28. Over the financial year 2013−14, India's foreign exchange reserves increased by more than $5 billion. This was because
(a) The country ran a surplus on the current account of its balance of payments
(b) The country ran a deficit on the budget of the Central Government
(c) The country was a net recipient of capital flows besides recording a current account surplus
(d) The country was a net recipient of capital flows which exceeded the size of its current account deficit

Ans. (d) In the financial year 2013−14, India's foreign exchange reserves increased by more than $5 billion dollars because during this period the country was a net recipient of capital flows which exceeded it's current account deficit.

29. Let us assume that the GDP of some country was Rs. 100 at current prices in 2012−13 and that was Rs. 90 in 2011−12; and that the GDP at constant 2004−05 prices was Rs. 59 in 2012−13 and that was Rs. 56.1 in 2011−12, then in GDP of 2011−12 at 2012−13 (Constant) prices would be
(a) Rs. 59.1
(b) Rs. 90
(c) Rs. 95.1
(d) Rs. 100

Ans. (c) GDP of 2011−12 at 2012−13 (constant) prices would be

$$\frac{GDP\ at\ constant\ prices\ of\ 2011-12 \times 100}{GDP\ at\ constant\ prices\ of\ 2012-13}$$

$$= \frac{56.1 \times 100}{59} = 95.08 \approx Rs.95.1$$

30. As the captain of Indian cricket team, if Sachin Tendulkar is assumed to have observed the rule of calling 'head' every time the toss was made during the five matches of the one–day series, then what is the probability of winning the toss by India in all five matches?

(a) ½

(b) 1/5

(c) $(1/2)^5$

(d) $(1/5)^2$

Ans. (c) Probability of India winning the toss in one match

$$= \frac{1}{2}$$

∴ Probability of winning the toss in all five matches

$$= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \left(\frac{1}{2}\right)^5$$

SECTION –B

31. Consider the inequality [(4/x) −5] < 6. Which of the following statements is true?

(a) $x > 5$ **is sufficient for the inequality to hold**

(b) $x > 5$ **is both necessary and sufficient for the inequality to hold**

(c) $x > 5$ **is neither necessary nor sufficient for the inequality to hold**

(d) $x > 5$ **is necessary for the inequality to hold**

Ans. (b) The given inequality $\left[\left\{\frac{4}{x}\right\} - 5\right] < 6$ will hold true only if x > 5.

DIRECTIONS (Q Nos. 32–34) **Study the following information very carefully and answer the questions that follow.**

Three individuals A, B and C are suspected of income tax evasion. They testify under oath as follows

A: B is guilty and C is innocent

B: If A is guilty then so is C.

C: I'm innocent but at least one of the others is guilty.

32. Which of the following is true?

(a) Testimony of A follows from testimony of B

(b) Testimony of B follows from testimony of A

(c) Testimony of C follows from testimony of A

(d) Testimony of A follows from testimony of C

Ans. (c) Testimony of C follows from testimony of A.

33. Assuming everybody's testimony to be true, who is innocent and who is guilty?
(a) A and C are innocent and B is guilty
(b) B and C are innocent and A is guilty
(c) C is the only innocent individual
(d) All three are innocent

Ans. (a) Assuming everybody's testimony to be true, it follows that A and C are innocent and B is guilty.

34. Assuming the innocent told the truth and the guilty told lies, who is innocent and who is guilty?
(a) A and C are innocent and B is guilty
(b) B and C are innocent and A is guilty
(c) A and B are innocent and C is guilty
(d) C is the only innocent individual

Ans. (a) Assuming that the innocent told the truth and the guilty told lies, then it follows that A and C are innocent and B is guilty.

35. An outward shift of the production possibility frontier may be caused by
(a) An increase in demand
(b) More government spending
(c) Better training of employees
(d) Productive inefficiency

Ans. (c) Outward shift in production possibility frontier will be caused by better training of employees, because training will increase the efficiency of employees and they will be able to produce more, even with the existing resources.

DIRECTIONS (Q Nos. 36–38) **Study the following information very carefully and answer the questions that follow.**

Suppose in an economy in any period t the aggregate value of output is $Y(t) = C(t) + I(t)$, the sum of aggregate consumption and investment expenditures.

36. Suppose $C(t) = 0.6Y(t) + 0.3Y(t-1)$ and $I(t) = 1000$ for all t. What is the only value of output which, once –attained in this economy, will continue to persist over time?
(a) 2000
(b) 2500
(c) 4000
(d) 10000

Ans. (d) According to the given condition,

$$Y(t) = C(t) + I(t)$$

$$\Rightarrow Y(t) = 0.06Y(t) + 0.3Y(t) + 1000$$

$$\Rightarrow 0.1\,Y(t) = 1000$$

$$\therefore Y(t) = 10000$$

Note In the long−run (t−1) tends towards t.

37. Suppose $\boldsymbol{C(t) = 0.6Y(t) + 0.3Y\,(t-1)}$ and $\boldsymbol{I(t) = 600 + 0.1Y(t)}$ for all t and $\boldsymbol{Y(O) = 40000}$. What is the rate of growth of output in the economy in period I?

(a) $\mathbf{2\%}$
(b) $\mathbf{5\%}$
(c) $\mathbf{7.5\%}$
(d) $\mathbf{12\%}$

Ans. (b) $Y(t) = C(t) + I(t)$

$$= 0.06Y(t) + 0.3Y(t-1) + 600 + 0.1Y(t)$$

On substituting the value of t as 1, we get,

$$Y = 0.6Y + 600 + 0.1Y$$

$$\Rightarrow Y = 0.7Y + 600$$

$$\Rightarrow Y - 0.7Y = 600$$

$$\Rightarrow Y = 2000$$

$$\therefore Rate\ of\ growth = \frac{2000}{40000} \times 100 = 5\%$$

38. Suppose $\boldsymbol{C(t) = 0.6Y(t) + 0.3Y(t-1)}$ $\boldsymbol{and}$ $\boldsymbol{I(t) = 2.4[Y(t) - Y(t-1)]}$ for all t. What is the rate of growth of output in the economy?

(a) $\mathbf{2\%}$
(b) $\mathbf{5\%}$
(c) $\mathbf{7.5\%}$
(d) $\mathbf{12\%}$

Ans. (b) The above equation is reducible in the same form as given in previous question. Therefore, the rate of growth in output will be 5% in this case also.

DIRECTIONS (Q Nos. 39−41) **Study the following information very carefully and answer the questions that follow.**

Suppose in economics A and B the aggregate value of output is $Y = C + G$, the sum of aggregate consumption and lump−sum government expenditures. The government imposes only lump−sum direct taxes and suppose T denotes the aggregate value of such taxes collected by the government. $C = a + bY_d$, where a is the value of autonomous consumption expenditures, b is the constant marginal propensity to consume out of income and Y_d is the aggregate value of disposable incomes in the economy. The value of b is higher in B than in A.

39. Suppose T =0 in economies A and B and the value of a is also the same in both economies. Suppose the value of G is higher in economy than in economy A. In which economy will aggregate private savings be higher?

(a) A
(b) B
(c) Will be the same in both economies
(d) More information is needed to answer the question

Ans. (b) Private savings are dependent on the rate of marginal propensity to save. Since, MPS is higher in economy B, therefore the rate of savings in economy B will be higher.

40. Suppose the values of a and G are the same in both economies. Suppose the value of T is higher in economy B than in economy A. In which economy will aggregate private saving be higher?

(a) A
(b) B
(c) Will be the same in both economies
(d) More information is needed to answer the question

Ans. (a) Since, the level of autonomous consumption and the government expenditure is same in both the economy, then the rate of savings will be influenced by the tax−rate. In economy A the tax−rate is less, therefore aggregate private savings will be more.

41. Suppose the value of G−T is the same in both economies. Suppose that the value of a is higher in economy B than in economy A. In which economy will aggregate private saving be higher?

(a) A
(b) B
(c) Will be the same in both economies
(d) More information is needed to answer the question

Ans. (c) Since, the value of G−T is the same in both economies, therefore the aggregate private savings in both the economies will be the same.

DIRECTIONS (Q Nos. 42−44) **Study the following information very carefully and answer the questions that follow.**

Suppose there is a closed economy without government expenditure or taxation in which Aggregate consumption expenditure C is the following function of aggregate income Y and the rate of interest (expressed percent) r:

$$C = 388 + 0.75Y - 15r$$

Suppose investment expenditure is given by the following function

$$I = 1863 + 0.05Y - 25r$$

42. What is the value of the slope of the IS curve for this economy?

(a) –0.0175

(b) –0.02

(c) –0.025

(d) None of the above

Ans. (d) For the equation $y = a + bx$, the slope is given by the value of b.

As we know that the slope of IS curve will be given in terms of r. Also, $Y = C + I$.

$$\therefore Y = 388 + 0.75Y + 15r + 1863 + 0.05Y - 25r$$

$$40r = 2251 - 0.2Y \; or \; r = 56.275 - 0.005Y$$

So, slope $= -0.005$

43. If the rate of interest is fixed at 15%, what is the value of aggregate income at which the values of demand and supply for goods and services are equalized in the economy?

(a) 5575

(b) 6825

(c) 7675

(d) 8255

Ans. (d) As we know that, $Y = C + I$

$$Y = 388 + 0.75Y - 15r + 1863 + 0.05Y - 25r = 11255 - 200r$$

On substituting the value of $r = 15$ in the equation, we get $Y = 11255 - 200 \times 15 = 8255$

44. Suppose, the rate of interest falls upon 15% to 6%. What is the change in the value of aggregate income at which demand and supply for goods and services are equalized in the economy?

(a) 1800

(b) 4590

(c) 2790

(d) None of these

Ans. (a) Value of Y, when $r = 6$, will be

$$Y = 11255 - 200 \times 6 = 10055$$

$$\therefore Change\ in\ Y = 10055 - 8255 = 1800$$

DIRECTIONS (Q Nos. 45–48) **Study the following information very carefully and answer the questions that follow.**

Consider a firm which is a monopolist in each of two completely segregated markets A and B. The total cost of the monopolist C is the following function of its total output $Q : C = 10 + 4Q$. The equations for the demand curves faced by the monopolist in markets A and B are $P_A = 16 - Q_A$ and $P_B = 36 - 4Q_B$ respectively.

45. What is the profit –maximizing price for the firm in market A?
(a) 4
(b) 6
(c) 8
(d) 10

Ans.

46. What is the profit –maximizing price for the firm in market B?
(a) 10
(b) 12
(c) 16
(d) 20

Ans.

47. What is the profit–maximizing level of total output for the firm?
(a) 6
(b) 10
(c) 12
(d) 14

Ans.

48. What is the maximum level of total profits which can be earned by the monopolist?
(a) 64
(b) 72
(c) 90
(d) 105

Ans. Chapter 4 (q no. 15–18)

49. If $f(x) = sin\ x^2$, then what is the value of $f'(-\sqrt{\pi})$?

(a) 0

(b) $-2\sqrt{\pi}$

(c) -2π

(d) $2\sqrt{\pi}$

Ans. Chapter 10 (152)

50. A set of 16 real numbers each number is multiplied by a positive by a positive real number. After multiplication, the variance of the resulting set of numbers is found to be 6.25 times the variance of the set of numbers before multiplication. What is the number which has used to multiply all the observations?

(a) 4

(b) 6.25

(c) 12.5

(d) None of these

Ans. Chapter 10 (153)

51. Suppose two dice are rolled. What is the probability that the sum of the points on the two dice is 8, if it is known that the sum is an even number?

(a) 1/2

(b) 5/36

(c) 1/6

(d) 5/18

Ans. Chapter 10 (154)

DIRECTIONS (Q Nos. 52–54) **Study the following information very carefully and answer the questions that follow.**

The behavior of a variable x over time is described by $dx/dt = x2 - x$ (where t is the variable denoting time).

52. Suppose at the initial point in time x has a negative value. What happens to the value of x over time?

(a) Decreases without any bound

(b) Increases and approaches 0 over time

(c) Increases and approaches 1 over time

(d) Increases without any bound

Ans.

53. Suppose at the initial point in time x has a positive value less than unity. What happens to the value of x over time?

(a) Decreases without any bound
(b) Increases and approaches 0 over time
(c) Decreases and approaches 1 over time
(d) Increases without any bound

Ans.

54. Suppose at the initial point in time x has a positive value greater than unity. What happens to the value of x over time?
(a) Decreases without any bound
(b) Decreases and approaches 0 over time
(c) Decreases and approaches 1 over time
(d) Increases without any bound

Ans. Chapter 10 (160−162)

55. What is the value of $\boldsymbol{lim\ x \lim_{x\to 0^-}\left[\frac{[x]}{x}\right]}$?
(a) $-\infty$
(b) $\mathbf{0}$
(c) −1
(d) 1

Ans. Chapter 10 (156)

56. Let f(x) $= [x]$**, where [x] denotes the greatest integer** $\leq x$**. On which of the following intervals is f a continuous function?**
(a) [−2, −1]
(b) [−2, −1]
(c) [−2, −1]
(d) None of these

Ans. Chapter 10 (155)

57. In the world of Indian stock markets, participatory notes refer to
(a) Permits given to foreign institutions investors registered to trade in Indian stock markets
(b) Derivative instruments linked to shares (equity) of Indian firms sold to outside participants
(c) Notes issued to lenders providing credit to participants in the stock markets
(d) Permits given to brokerages to trade in stock markets

Ans. Refer to chapter 6 (10)

58. If the correlation coefficient between two random variables X and Y is given by r(−1 < r < 1) and the bivariate regression coefficient of Y on X is denoted by $\boldsymbol{b_{yx'}}$**, which is greater than unity, then** $\boldsymbol{b_{xy}}$ **must be**
(a) Greater than unity

(b) Less than unity

(c) $1 - b_{yx}$

(d) $1/b_{yx}$

Ans. Chapter 10 (157)

DIRECTIONS (Q Nos. 59–60) Study the following information very carefully and answer the questions that follow.

The mean value theorem states that if f is a continuous function on [a, b] and is differentiable in (a, b) (a and b being any two real numbers), then there exists at least one real number $c \in (a, b)$ such that $f(b) - f(a) = f'(c)(b - a)$.

59. Suppose $f(x) - x^2, a = 3$ and $b = 6$. Which of the following can be taken as a value of c?

(a) 4.6

(b) 4.4

(c) 4.8

(d) None of these

Ans.

60. Suppose $f(x) - x^3, a = -1$ and $b = 2$. How many value(s) of c is/are possible?

(a) None

(b) One

(c) Two

(d) Three

Ans. Chapter 10 (163, 164)

DIRECTIONS (Q Nos. 61–65) **Study the following information very carefully and answer the questions that follow.**

	Union Budget of India at a glance (in Rs crore)	**2014–15**
1.	Tax Revenue (net to centre)	9, 86, 417
2.	Non –Tax Revenue	1, 80, 714
3.	Capital Receipts	5, 96, 083
4.	Recoveries of Loans	10, 527
5.	Other Receipts	56, 925
6.	Borrowing and other Liabilities	5, 28, 631
7.	Non –plan Expenditure on Revenue Account	11, 07, 781
8.	Of which, Interest Payment	4, 27, 011
9.	Non –Plan Expenditure on Capital Account	1, 00, 111
10.	Plan Expenditure on Revenue Account	4, 42, 273
11.	Plan Expenditure on Capital Account	1, 13, 049
12.	National GDP	1, 28, 39. 952
13.	Plan Expenditure of GDP Ratio	A

14.	Capital Expenditure of GDP Ratio	B
15.	Revenue Deficit to GDP Ratio	C
16.	Fiscal Deficit to GDP Ratio	D
17.	Primary Deficit to GDP Ratio	E

61. A is equal to

(a) $\mathbf{0.88}\%$

(b) $\mathbf{3.44}\%$

(c) $\mathbf{4.32}\%$

(d) None of the above

Ans. (c) The variable 'A' is taken to represent plan expenditure as a percentage of GDP.

$$\therefore A = \frac{442273 + 113049}{12839952} \times 100 = 4.32\%$$

62. B is equal to

(a) $\mathbf{0.88}\%$

(b) $\mathbf{0.78}\%$

(c) $\mathbf{1.66}\%$

(d) None of the above

Ans. (c) The variable 'B' is taken to represent capital expenditure as a percentage of GDP.

$$\therefore B = \frac{100111 + 113049}{12839952} \times 100 = 1.66\%$$

63. C is equal to

(a) $\mathbf{-1.66}\%$

(b) $\mathbf{0.00}\%$

(c) $\mathbf{2.98}\%$

(d) None of the above

Ans. (d) The variable 'C' is taken to represent revenue deficit as a percentage of GDP, where revenue deficit is the excess of revenue expenditure over revenue income.

$$\therefore C = \frac{(1107781 + 442273) - 986417}{12839952} \times 100$$

$$= \frac{563637}{12839952} \times 100 = 4.38\%$$

64. D is equal to

(a) $\mathbf{-0.53}\%\boldsymbol{zx}$

(b) $\mathbf{0.00}\%$

(c) $\mathbf{3.33}\%$

(d) $\mathbf{4.12}\%$

Ans. (a) The variable 'D' is taken to represent fiscal deficit as a percentage of GDP, where

Fiscal deficit = Total expenditure –Total receipts (excluding borrowings)

$$\therefore D = \frac{(1107781 + 100111 + 442273 + 113049) - (986417 + 180714 + 596083 + 10527 + 56925)}{12839952} \times 100 = \frac{1763214 - 1830666}{12839952} \times 100 = -0.525\% = -0.53\%$$

65. E is equal to

(a) $-\mathbf{3.33}\%$
(b) $\mathbf{0.00}\%$
(c) $\mathbf{0.79}\%$
(d) $\mathbf{1.32}\%$

Ans. (a) The variable 'E' is taken to represent primary deficit as a percentage of GDP, where

Primary deficit = Fiscal deficit –Interest payments

$$\therefore E = \frac{-67452 - 427011}{12839952} \times 100 = -3.85\ or\ -3.33\%\ (approx)$$

Chapter 1

Introduction to Economics

SECTION A [1 mark each]

1. Economic activities cover (2013)
(a) Only activities that result in products that are exchanged in markets.
(b) Only activities that people engage in for profit.
(c) Only activities that are or can potentially be delegated to someone else.
(d) Only activities that are entered into the national accounts.

Ans. (a) An activity which is related to the use of scarce resources is called an economic activity. These activities are classified as production, consumption, investment, exchange and distribution.

2. The optimal point on the Production Possibility Frontier (PPF) depends on (2008)
(a) Efficiency
(b) Preferences
(c) Feasibility
(d) All of these

(e) None of these

Ans. (a) The Production Possibility Frontier (PPF) refers to the graphical representation of possible combinations of two goods that can be produced optimally, with given resources and technology. Optimum production is ensured only when these resources are used efficiently.

Chapter 2

Consumer Behaviour Demand and Supply

SECTION A [1 mark each]

1. An indirect utility function (2013)

(a) Is defined over income and prices.

(b) Assumes profit maximization

(c) Is homogeneous of degree one

(d) All of the above

Ans. (a) The indirect utility function is defined as the maximum utility that can be attained, given money income and goods prices.

$$U(P_1, P_2, M) = \max U(X_1, X_2)\ s.t.\ P_1X_1 + P_2X_2 = M$$

This function is decreasing in prices and increasing in incomes and is homogeneous of degree 0.

2. The market demand function for a commodity is given as $\boldsymbol{D(p) = 1/p}$; where p is the price of the commodity. Which of the following statements about the market demand curve is correct? (2013)

(a) The price elasticity of demand for this commodity is different at different points on the demand curve and it varies from 0 to 1.

(b) The price elasticity of demand for this commodity is different at different points on the demand curve and it varies from 0 to ∞.

(c) The price elasticity of demand for this commodity is equal to 1 at any point on the demand curve.

(d) None of the above.

Ans. (b) In this instance, the market demand curve will be touching both the axis. At the point where it touches 'X−axis', elasticity will be zero and at the point where it touches Y−axis, elasticity will be infinite.

3. Which of the following represents the same preferences as

$$\boldsymbol{U(x_1, x_2) = min\{x_1, x_2\} + max\{x_1, x_2\}}$$

Where $\boldsymbol{x_1, x_2 \geq 0}$?

Ans. (a) $U(x_1, x_2)$ means utility derived from the consumption of x_1 and x_2, $\min(x_1, x_2)$ means the minimum value among x_1 and x_2, $\max(x_1, x_2)$ means the maximum value among x_1 and x_2. So, if $x_1 > x_2$, then $\min(x_1, x_2) = x_2$ and $\max(x_1, x_2) = x_1$ and if $x_1 < x_2, then$ $\min(x_1, x_2) = x_1$ and $\max(x_1, x_2) = x_2$.

In both the instances,

$$U(x_1, x_2) = \min(x_1, x_2) + \max(x_1, x_2) = x_1 + x_2$$

4. **In a two–good world, a consumer's preference over commodities 1 and 2 can be represented by the utility function $U(x_1, x_2) = u(x_1) + x_2$, where $x_1, x_2 \geq 0$. The consumer's income is known to be very high. Then, the demand for good 1 displays which of the following? (2012)**

(a) The substitution effect is negative and the income effect is positive.
(b) The substitution effect is positive and the income effect is negative.
(c) The substitution effect is zero and the income effect is positive.
(d) The substitution effect is negative and hence there are no income effects.

Ans. (d) Since, the consumer's income is known to be very high, therefore, there are no income effects. On the other hand, substitution effect is always negative.

5. **In a two–good world, suppose that the price of one good decreases. Which of the following holds true? (2012)**

(a) The Slutsky equation says that the total change in demand is exactly equal to the sum of the substitution effect and the income effect.
(b) The Slutsky equation says that the total change in demand is less than the sum of the substitution effect and the income effect.
(c) The Slutsky equation says that the total change in demand is more than the sum of the substitution effect and the income effect.
(d) The Slutsky equation does not deal with income effects at all.

Ans. (a) The Slutsky equation demonstrates that the change in the demand for a good, caused by a price change, is the result of two effects, which are as follows

Substitution effect, which is the result of change in relative prices of two goods.

Income effect which is the effect of change in price resulting in change in the consumer's purchasing power.

6. **Suppose a person's utility function is given by U(x, y). If good x and good y are perfect substitutes, then the indifference curves are (2011, 10)**

(a) Straight lines
(b) L –shaped
(c) U –shaped
(d) None of the above

Ans. (a) If goods x and y are perfect substitutes then the indifference curves will be downward sloping straight lines. Indifference curves are generally convex to origin because it is assumed that goods are not perfect substitutes of each other.

7. **Bread and apple are substitute goods. A sudden rise in the supply of flour making bread will result in (2011)**

(a) Fall in the price of bread; and rise in the price of apple.
(b) Fall in the price of bread; and fall in the price of apple.
(c) Fall in the price of bread; and no change in the price of apple.
(d) None of the above.

Ans. (c) Rise in supply of flour, assuming other factors to be constant, will cause price of flour to fall. Because of this, prices of bread will also fall. However, there will be no change in the price of apple, but it's demand will be affected.

8. **The utility function of a consumer is $u = 3(x_1 + x_2)$, where u, x_1 and x_2 denote utility, amount of good 1 and amount of good 2 respectively. Unit prices of good 1 and good 2 are Rs. 1 and Rs. 3 respectively. Consumer's income is Rs. 300. The consumer attains equilibrium at**

(a) $x_1 = 150$; $x_2 = 50$
(b) $x_1 = 50$; $x_2 = 150$
(c) $x_1 = 0$; $x_2 = 100$
(d) $x_1 = 300$; $x_2 = 0$ (2011)

Ans. (d) The consumer attains equilibrium at a point where his utility is maximum, subject to given constraints. Here, the defined constraint is income of the consumer. All the options given, are attainable, with the given level of income. So, next we will calculate the consumer's utility. For options (a) and (b), the consumer's utility is 600 utils [{3 (150+50)} =600]. For option (c), the utility is of 300 utils and for option (d), the utility will be 900 utils. Therefore, 'd' will be the correct option.

9. **If the absolute value of price elasticity of demand for good X is greater than one, then we must have (2011)**

(a) If price increases by 1%, then the quantity demanded will decrease by less than 1%.
(b) If price decreases by 1%, then the quantity demanded will increase by less than 1%.
(c) If price of X increases, then the expenditure on the good will increase.
(d) None of the above

Ans. (d) If the absolute value of price elasticity of demand for good X is greater than one, then it implies that

(i) If price increases by 1%, then the quantity demanded will decrease by more than 1%.
(ii) If price decreases by 1%, then the quantity demanded will increase by more than 1%.
(iii) If price of good X falls, then total expenditure increases.
(iv) If price of good X rises, then total expenditure falls.

Since, none of the conditions specified are given, hence, the correct choice will be option 'd'.

10. **Suppose the price elasticity of demand for good X is 0.2. if the price of X rises by 2.8%, what effect will it have on the total expenditure on good X? (2011)**

(a) **Expenditure on X will fall by 5.6%.**
(b) **Expenditure on X will rise by 5.6%.**
(c) **Expenditure on X will rise by 2.2%.**
(d) **Expenditure on X will fall by 2.2%.**

Ans. (c) If the price of X rises by 2.8%, given that $E_D = 0.2$, then it follows that quantity demanded will fall by 0.56% (0.2×2.8). So, if original price is assumed to be Rs. 1 and original quantity to be 100, leading to a total expenditure of Rs. 100, then according to the given condition,

New price $= 1 + 2.8\%\ of\ 1 =$ Rs. 1.028

New quantity $= 100 - 0.56\%\ of\ 100 = 99.44$ units

Hence, new expenditure $= 1.028 \times 99.44 = Rs.102.22$

So, expenditure rises by 2.2%.

11. **Suppose there are 3 alternatives x, y and z and four individuals 1, 2, 3 and 4. The individuals' ranking (orderings) of the three alternatives, $R_i, i = 1, 2, \ldots, 4$ are given by**

$$R_1 : (xy)z \qquad R_2 : yzx \qquad R_3 : z(xy) \qquad R_4 : (xy)z$$

(Notation : Alternatives inside the parentheses are indifferent to each other. If an alternative is written to the left of another alternative, then the former is preferred to the latter). Then the set of Pareto optimal alternatives is (2011)

(a) **{x. y}**
(b) **{x. z}**
(c) **{y. z}**
(d) **None of these**

Ans. (c) Pareto optimal is a state of allocation of resources in which it is impossible to make any one individual better off without making at least one individual worse –off. It is a condition in which no further improvements are possible. [y, z] is the Pareto optimal alternative because it satisfies the given conditions and it cannot be improved.

12. **In situation I : Price of good X is twice the price of good /y; and the consumer spends his entire income on buying 6 units of good X and 20 units of good Y. In situation II: Consumer's income is double of his income in situation I, price of good Y is twice the price of good Y in situation I, and the price of good X is the same as in situation I. The consumer wants to continue consuming 20 units of good Y in situation II. The maximum number of units of good X that he can purchase is situation II is (2011)**

(a) **12**
(b) **14**
(c) **16**

(d) 6

Ans. (a) Situation I

Let price of $Y =$ Rs. a

Then, price of X $=$ Rs. 2a

According to the given condition, $6 \times 2a + 2 \times a =$ Income of the consumer $= 32a$

Situation II

Income of the consumer $= 2 \times 32a =$Rs 64a

Price of Y $=$ Rs. 2a

Price of X $=$ Rs. 2a

According to the given condition,

$$x \times 2a + 20 \times 2a = 64a$$

$$\Rightarrow x = \frac{24a}{2a} = 12units$$

13. In a two –good world, a consumer's utility function is given by the following

$U(x, y) = max\{x, y\}$, where x and y are the amounts consumed of the first and second good respectively. The price of both goods are Rs. 2 per unit. The consumer's income is Rs. 100. His optimal consumption bundle is (2010)

(a) Either (i) zero unit of x and 50 units of y or (ii) 50 units of x and zero units of y.
(b) 50 units of x and 50 units of y.
(c) 25 units of x and 25 units of y.
(d) None of the above.

Ans. (a) A consumer's optimal consumption bundle is one which is within his budget and also gives him maximum utility. Option 'a' fulfills both the above conditions. If he consumes either 50 units of x or 50 units y, then his consumption is within his income and also his utility will be 50 utils which is more than the utility offered from option 'c'. Option 'b' is not to be considered because the expenditure exceeds his income.

14. Which of the following is a necessary and sufficient condition for consumer's equilibrium? (2009)
(a) Marginal rate of substitution is equal to the price ratio.
(b) Marginal rate of substitution is equal to the price ratio, if all goods are being purchased at equilibrium.

(c) Marginal rate of substitution is equal to the price ratio, provided marginal rate of substitution is diminishing.
(d) Marginal utilities are equal to prices.
(e) None of the above.

Ans. (c) Consumer's equilibrium is at a point where

(i) Marginal Rate of Substitution (MRS) equals the price ratio and
(ii) Beyond this point, MRS is diminishing.

Where, Marginal Rate of Substitution

$$= \frac{Loss\ in\ good\ on\ Y - axis}{gain\ in\ good\ on\ X - axis}$$

15. Suppose a technological advancement in tooth paste manufacturing reduces the cost of producing each tube by Rs 1. What will be the effect on supply? (2008)
(a) Quantity supplied will increase.
(b) The supply curve will shift inward.
(c) There will be no change in supply.
(d) Demand will go down since there will be less toothpaste supplied.
(e) The supply curve will shift outward.

Ans. (e) Technological advancement leading to a fall in cost of production will tend to increase the supplier's profit. Assuming ceteris paribus, this will increase his supply. Hence, the supply curve will shift outwards.

Hint: Option 'a' is not to be considered because quantity supplied increases with increase in price and not due to change in other factors.

16. Hari's total spending on grapes rises when the price falls from Rs. 2 per kg to Rs. 1 per kg. What can we say about the prices elasticity of his demand for grapes? (2008)
(a) It is greater than 1
(b) It is less than 1.
(c) It is equal to one.
(d) All of these.

Ans. (a) According to the expenditure method of computing price elasticity, elasticity is more than one, when fall in price of a commodity cause total expenditure to rise.

17. Last year, Priya bought 6 pairs of shoes when her income was Rs. 40000. This year, her income is Rs. 50000 and she purchased 10 pairs of shoes. Priya (2008)
(a) Treats shoes as an inferior good.
(b) Treats shoes as a luxury good.
(c) Prefers shoes to boots.

(d) Has a price−inelastic demand for shoes.

(e) Has a price−elastic demand for shoes.

Ans. (b) Luxury goods have high income−elasticity of demand and as income of the consumer increases, the demand for these goods increases more than proportionately.

So, if Priya was buying 6 pairs of shoes when her income was Rs. 40000 then at the income level of Rs. 50000 her purchases of shoes should have been

$$= \frac{6 \times 50000}{40000} = 7.5\ units$$

But she purchased 10 units, which is more than the proportionate level of consumption. Therefore, shoes are luxury goods for Priya.

18. Suppose the utility function of a person is $U(x, y) = 16x + 13y$, where x and y are the quantities consumed of two commodities X and Y. If the unit price of X is Rs. 13 and the unit price of Y is Rs. 11, in equilibrium the household will choose a commodity bundle (2008)

(a) Containing only X.

(b) Containing only Y.

(c) Containing both X and Y.

(d) Containing at least some Y.

(e) None of the above.

Ans. (c) The utility function $U(x, y) = 16x + 13y$, implies that a consumer gets 16 utils of utility from one unit of 'X' and 13 utils of utility from one unit of 'Y'. The Marginal Rate of Substitution (MU_X/MU_X) works out to be 1.23 which exhibits that goods 'X' and 'Y' are normal substitutes.

Therefore, a consumer will choose such a bundle which contains both the goods.

19. Indifference curves are downward sloping because (2006)

(a) More of a good is better.

(b) There is constant marginal rate of substitution.

(c) There is increasing marginal rate of substitution.

(d) There is decreasing marginal rate of substitution.

(e) None of the above.

Ans. (e) Indifference curves are downward sloping because more of a good can only be purchased by sacrificing the other good. It is convex to origin due to decreasing marginal rate of substitution. Hence, none of the above options is correct.

20. The value of the price elasticity of demand (2006)

(a) Depends on the units used to measure quantities.

(b) Depends on the units used to measure price.

(c) Is the same as the slope of the demand curve.

(d) Does not depend on units of measurement of either price or quantity.

Ans. (e) Price elasticity of demand measures the change in quantity demanded due to change in price. It is a unit free measure. Therefore, it does not depends on units of measurement of either price or quantity.

21. A 5% increase in income leads to a 12% increase in the demand for mobile phones. It follows that (2006)

(a) Income elasticity of demand is 2.4 and mobile phones are inferior goods.

(b) Income elasticity of demand is 0.24 and mobile phones are normal goods.

(c) Income elasticity of demand is 0.24 and mobile phones are inferior goods.

Ans. (a) Income elasticity of demand measures the degree of responsiveness in demand when income of the consumer changes and is computed with the help of the following formula

$$E_{yd} = \frac{\%\ Change\ in\ demand}{\%\ Change\ in\ income} = \frac{12}{5} = 2.4$$

With increase in income the demand for mobile phones is also increasing. Therefore, mobile phones are normal goods.

SECTION B [2 Marks each]

22. In a two–good economy, the utility function is given by $U(x, y) = min\ (x, y)$. The prices of both x and y are Rs. 1 per unit. The consumer has a budget of Rs. 100. What is his optimum consumption bundle? (2009)

(a) 30 units of X and 70 units of Y.

(b) 50 units of X and 50 units of Y.

(c) 70 units of Y and 30 units of X.

(d) 0 units of X and 100 units of Y.

Ans. (b) The consumer's optimum consumption bundle will be 50 units each of X and Y because at this level of consumption, his satisfaction will be of 50 utils which is maximum.

23. In an economy with only two goods X and Y, the price of X increased from 1 in period 1 to 1.5 in period 2, while that of Y remained constant at 1. Consumer A consumed 2 units of X and 3 units of Y in period 1 and 3 units of X and 2 units of Y in period 2. Consumer B consumed 3 units of X and 2 units of Y in period 1 and 1 unit of X and 3 units in period 2. Assuming that tastes of these two individuals have not changed, which individual is clearly better off in period 2 compared to period 1?

(a) Consumer A

(b) Consumer B

(c) Both are better off

(d) None of them are better off

Ans. (a) In period 1, the total expenditure of consumer A is Rs. 5 $(1 \times 2 + 1 \times 3)$ and that of consumer B is also Rs. 5 $(1 \times 3 + 1 \times 2)$. In period 2, the total expenditure of consumer A has risen to Rs. 6.5 $(1.5 \times 3 + 1 \times 2)$ and that of consumer B has fallen to Rs. 4.5 $(1 \times 1.5 + 1 \times 3)$. In period 2, A's consumption level has increased inspite of rise in price of good X. This implies that his income has risen. Therefore, consumer A is definitely better off in period 2.

24. In a competitive market, the demand and supply curves of a product are given by

$$\boldsymbol{q^d = 200 - p \; and \; q^s = \left(\frac{1}{2}\right)p - 25}$$

There is an imposition of commodity tax of 30 per unit on the output. Calculate the pre –tax equilibrium price and output. (2007)

(a) $\boldsymbol{p = 150, q = 50}$
(b) $\boldsymbol{p = 100, q = 100}$
(c) $\boldsymbol{p = 50, q = 150}$
(d) None of these

Ans. (a) At the equilibrium level, demand is equal to supply.

$$\therefore 200 - p = \frac{1}{2}p - 25$$

$$\Rightarrow 200 + 25 = \frac{1}{2}p + p$$

$$\Rightarrow 1.5p = 225$$

$$\Rightarrow p = \frac{225}{1.5} = 150$$

So, the price is Rs. 150.

On substituting this value, we get

$$q = 200 - 150 = 50$$

25. An individual always consumes goods x and y in the fixed proportion of 2 : 1. If the price of x is Rs. 10 per unit and the price of y is Rs. 5 per unit, the elasticity f demand for good x can be computed with the help of the following formula. (2006)

(a) $\boldsymbol{E_D = \frac{\%\, Change\ in\ quantity\ demanded}{\%\, Change\ in\ price}}$
(b) $\boldsymbol{E_D = \frac{\%\, Change\ in\ price}{\%\, Change\ in\ quantity\ demanded}}$
(c) $\boldsymbol{E_D = \frac{\%\, Change\ in\ quantity\ demanded\ of\ X}{\%\, Change\ in\ the\ price\ of\ Y}}$
(d) None of the above

Ans. (c) Since, the consumer consumes both the goods in a specific proportion, therefore this implies that the goods are complementary goods. Therefore, the formula for computing cross –elasticity of demand will be used.

SECTION C [1 Mark each]

DIRECTIONS (Q Nos. 26–28) **Study the following information very carefully and answer the questions that follow.**

The table below shows the domestic demand and supply conditions for computers in a small country, Norway, in the world computer market. **(2012)**

Price (in $)	**Demand**	**Supply**
1000	3200	800
1500	2800	1200
2000	2400	1600
2500	2000	2000
3000	1600	2400
3500	1200	2800

26. In the absence of trade, Norway's equilibrium price and quantity equals

(a) $1500 and 2800 computers

(b) $2000 and 1600 computers

(c) $2500 and 2000 computers

(d) $3500 and 2000 computers

Ans. (c) At the price of $2500, the demand and supply of computers is 2000 units. Therefore, $2500 is the equilibrium price and 2000 units is the equilibrium quantity.

27. With free trade, suppose the rest of the world can supply computers at a price of $1500. Norway's imports will now equal… Compared to what occurred in the absence of trade, Norway's consumer surplus will … and producer surplus will ……..

(a) 1600 computers, decrease, increase

(b) 1600 computers, increase, decrease

(c) 1200 computers, decrease, increase

(d) 1200 computers, increase, decrease

Ans. (b) When the price is $1500 dollars, the demand is at 2800 units and the supply at 1200 units. The excess demand of 1600 units will be met by imports. The equilibrium price falls from $2500 to 1500. This will lead to an increase in consumer's surplus and a fall in producer's surplus.

28. To reduce imports, suppose the Government of Norway imposes a quota equal to 800 computers. Compared to what occurred in the absence of trade, Norway's consumer surplus will ….. and producer surplus will….

(a) Increase, increase
(b) Increase, decrease
(c) Decrease, increase
(d) Decrease, decrease

Ans. (b) An imposition of quota implies that imports would be restricted to 800 computers. Compared to situation 1, this will lead to increase in supply and fall in prices. Accordingly, consumer's surplus will rise and producer's surplus will fall.

DIRECTIONS (Q Nos. 29–31) **Study the following information very carefully and answer the questions that follow**

In a two –good world, there is an individual with income $m = 3$ and utility function is given by $u(x, y) = x^{0.5}y^{0.5}$. The price of good x is 1 per unit and the price of good y is also 1 per unit. **(2012)**

29. If the individual can consume any non–negative amount of goods x and y, then the optimum consumption bundle is
(a) $\boldsymbol{x = 1, y = 1}$
(b) $\boldsymbol{x = 1.5, y = 1.5}$
(c) $\boldsymbol{x = 2.5,\ y = 0.5}$
(d) $\boldsymbol{x = 0, y = 3}$

Ans. (b) The consumer's income is Rs. 3. Consumption bundles (1.5, 1.5), (2.5, 1.5) and (0, 3) are within his reach. On substituting these values in the utility equation $u(x, y) = x^{0.5}y^{0.5}$, the consumption bundle of (1.5, 1.5) yields the maximum utility of 1.5 units. Therefore, his optimum consumption bundle is (1.5, 1.5).

30. If the individual can consume either zero unit of good x or at most one unit of x and any non–negative amount of good y, then the optimum consumption bundle is
(a) $\boldsymbol{x = 1, y = 2}$
(b) $\boldsymbol{x = 1, y = 3}$
(c) $\boldsymbol{x = 0, y = 3}$
(d) $\boldsymbol{x = 3, y = 0}$

Ans. (a) Consumer's income is Rs. 3. If he consumes 1 unit of x @ Rs 1 per unit, then will be left with Rs. 2. With this amount he can purchase 2 units of good y (priced @ Rs. 1 per unit).

Hint: Consumption of 0 units of 'x' will not be considered as this will render his utility function to fall to zero.

31. If both goods x and y can be consumed only in integer amounts (i.e., zero unit, one unit, two units etc), then the optimum consumption bundle is
(a) $\boldsymbol{x = 3, y = 1}$
(b) $\boldsymbol{x = 1, y = 3}$
(c) $\boldsymbol{x = 3, y = 0}$

(d) Either $x = 2, y = 1$ *or* $x = 1, y = 2$

Ans. (d) Options (a) and (b) are not within his reach as they exceed his given income. Option 'c' though within his reach, will render his utility function to fall to zero. Option 'd' is within his reach and also gives him a total utility of 1.41 utils, therefore his consumption bundle can be either (2, 1) or (1, 2).

DIRECTIONS (Q Nos. 32–37) **Study the following information very carefully and answer the questions that follow.**

Suppose a consumer's preferences over commodities 1 and 2 can be represented by the utility function $U(x_1, x_2) = \min\{x_1, x_2\}$, where $x_1, x_2 \geq 0$. The prices of the two commodities are 1 and 2 respectively and the consumer's income is 150. **(2012)**

32. The utility function of the consumer is

(a) Continuous at al points in the domain but not differentiable at all points in the domain.

(b) Not continuous at all points in the domain.

(c) Differentiable at all points in the domain.

(d) None of the above.

Ans. (c) The utility function of the consumer will be continuous at all points in the domain and also differentiable because of the presence of a linear relation.

33. Which of the following is true?

(a) At the optimum, the consumer should consume 150 units of commodity 1 and none of commodity 2.

(b) At the optimum, the consumer should consume 75 units of commodity 2 and none of commodity 1.

(c) At the optimum, the consumer should consume 50 units of commodity 1 and 50 units of commodity 2.

(d) At the optimum, the consumer should spend equal amounts on the two commodities.

Ans. (c) At the optimum level of consumption, the consumer should consume 50 units of commodity 1 and 50 units of commodity 2, as this consumption bundle gives the consumer the maximum benefit of 50 units.

34. If the income of the consumer increases by 1 unit, then

(a) The Optimum consumption of commodity 1 increases by 1/3 and the optimum consumption of commodity 2 increases by 1/3.

(b) The optimum consumption of commodity 1 increases by 1/3 and the optimum consumption of commodity 2 increases by 2/3.

(c) The optimum consumption of commodity 1 increases by ½ and the optimum consumption of commodity 2 increases by ½.

(d) None of the above.

Ans. (a) The additional increases of Rs. 1 in consumer's income will cause the consumption of commodity 1 to increases by 1/3 and also of commodity 2 to increase by 1/3 as

$$1 \times \frac{1}{3} + 2 \times \frac{1}{3} = 1$$

35. Suppose the price of commodity 2 reduces to 1 while the price of the other commodity and the consumer's income remain unchanged. The substitution effect according to Slitsky of this price change on the optimal amount of commodity 1 is

(a) – 1
(b) 25
(c) –25
(d) 0

Ans. (d) In Slutsky's approach, income is increased by the amount which leaves the consumer to be just able to purchase the same combination of goods, which he was purchasing at old prices. So, the consumer will continue to purchase 50 units each of 1 and 2 and therefore, there will be no change in the demand for commodity.

36. Suppose the price of commodity 2 reduces to 1 while the price of the other commodity and the consumer's income remain unchanged. The income effect according to Slutsky of this price change on the optimal amount of commodity 1 is

(a) 0
(b) 25
(c) –25
(d) –1

Ans. (b) Due to fall in the price of commodity '2', the consumer's real income increases by Rs. 50. The income effect of this price change on the optimal amount of commodity 1 will be

$$50 \times \frac{1}{2} = Rs.25$$

37. The equation of the income expansion path for the consumer is

(a) $\boldsymbol{x_1 + 2x_2 = 150}$
(b) $\boldsymbol{x_1 = 2x_2}$
(c) $\boldsymbol{x_1 = x_2}$
(d) None of these

Ans. (c) The equation of the income expansion path for the consumer will be $x_1 = x_2$, because price of commodity 1 equals price of commodity 2.

DIRECTIONS (Q Nos. 38–39) **Study the following information very carefully and answer the questions that follow.**

The market for a good consists of 100 buyers and 50 sellers. Each seller has the same supply function, which is given by

Supply $= 0$, if price ≤ 10 and p −10, if price > 10. Such buyer has the same demand function, which is given by

Demand $= 0$, if price ≥ 20 and 20 –p, if price < 20. **(2011)**

38. Market demand function is given by

(a) Market demand $= \mathbf{2000 - 100}\boldsymbol{p}$

(b) Market demand $= \mathbf{2000 - 100}\boldsymbol{p}$, if p < 20; and Market demand $= \mathbf{0}$, if $\boldsymbol{p \geq 20}$.

(c) Market demand $= \mathbf{2000 - 100}\boldsymbol{p}$ if p < 2000, and Market demand $= \mathbf{0}, \boldsymbol{if\ p \geq 2000}$.

(d) None of the above

Ans. (b) Demand of an individual buyer $= 0, if\ price \geq 20\ and\ 20 - p$, if price < 20. For 100 buyers, the market demand function will be $0 \times 100\ if\ price\ \geq 20$ and $(20 - p) \times 100 = 2000 - 100p$, if price < 20.

39. Let the market equilibrium price be denoted by p*. Then

(a) 10 < p* < 11

(b) 14 < p* < 15

(c) 16 < p* < 17

(d) None of these

Ans. (c) Market equilibrium price is the price at which market demand equals market supply. Market demand $= 2000 - 100p$ when price < 20. Market supply $= 50p - 500$ when price > 10. So, from the above two equations, it is clear that equilibrium price should be more than 10 but less than 20.

$$2000 - 100p = 50p - 500$$

$$\Rightarrow 150p = 2500\ or\ p = \frac{2500}{150} = 16.67$$

DIRECTIONS (Q Nos. 40–41) **Study the following information very carefully and answer the questions that follow.**

Suppose a consumer wants to consume two commodities both of which are available only in discrete units. Let the prices of the goods be Rs. 4 and Rs. 3 respectively. The consumer's income is Rs. 10. **(2011)**

40. The consumer's budget set is

(a) $\{(\boldsymbol{x_1, x_2}) | \mathbf{4}\boldsymbol{x_1} + \mathbf{3}\boldsymbol{x_2} \leq \mathbf{10}\ \boldsymbol{and}\ \boldsymbol{x_1, x_2} \geq \mathbf{0}\}$

(b) $\{(0,0),(0,1),(0,2),(0,3),(1,0),(1,1),(1,2),(2,0)\}$
(c) $\{(0,1),(0,2),(0,3),(1,0),(1,1),(1,2),(2,0)\}$
(d) $\{(1,2)\}$

Ans. (b) Budget set is the set of all possible combinations of two gods which is a consumer can afford to buy with his given income and prevailing prices in the market. It is expressed at:

$$P_x Q_x + P_x Q_y \leq M.$$

Budget set also contains combinations of goods which cost less than his income. Option 'b' contains all possible bundles which cost less than or equal to Rs. 10. Therefore, it is the correct option.

41. Suppose the price of both commodities fall by 10 paise and money income increases by 10 paise. If the preference of the consumer over the two goods have not changed, then
(a) At the optimum, the consumer would consume more of both commodities.
(b) At the optimum, the consumer would consume more of commodity 1 and less of commodity 2.
(c) At the optimum, the consumer would consume less of commodity 1 and more of commodity 2.
(d) The consumer's optimal bundle does not change.

Ans. (d) The consumer's optimal bundle will not change as the change in price of commodities and consumer's income is negligible to affect his consumption pattern.

Chapter 3

Theories of Production, Interest, Rent and Profit

SECTION A [1 Mark each]

1. When an economist refers to the long–run, he is referring to (2013, 08)
(a) A length of time no shorter than 2 years.
(b) A length of time no shorter than 1 month.
(c) Approximately the length of time such that all inputs remain fixed.
(d) Approximately the length of time such that all inputs are variable.

Ans. (d) In economics, the concept of long–run refers to a time period in which all factors of production are variable i.e., they can be increased or decreased, as per the requirement.

2. The real rate of interest is normally calculated by (2013)
(a) Dividing the nominal interest rate by the price level.
(b) Subtracting the rate of inflation from the nominal interest rate.

(c) Dividing the rate of interest by the rate of inflation.
(d) None of the above as it is set by the Central Bank.

Ans. (b) Real rate of interest = Nominal Rate of interest –Rate of inflation

It gives us a measure of interest, free from the effect of inflation.

3. The rate of interest is (2013, 10)
(a) A flow variable
(b) A stock variable
(c) The ratio of a flow variable to a stock variable
(d) The ratio of a stock variable to a flow variable

Ans. (a) Rate of interest is a flow variable as it relates to a period of time, e.g. 6% per annum or 2% per month.

4. Assume that country A is relatively abundant in labour and country B is relatively abundant in land. Note that wages are the returns to labour and rents are the returns to land. According to the factor price equalization theorem, once country A begins specializing according to comparative advantage and trading with country B.
(2012)
(a) Wages and rents should fall in country A.
(b) Wages and rents should rise in country A.
(c) Wages should rise and rents should fall in country A.
(d) Wages should fall and rents should rise in country A.

Ans. (c) As country A begins to specialize according to comparative advantage theory and starts to trade with country B, then this will lead to supply of labour from country A to B and supply of land from country B to A. This will cause wages to rise and rent to fall in country A.

5. The production function of firm is given by $Q = X^{1/3}Y$, where Q, X and Y denote quantities of output, input 1 and input 2 respectively. The production function exhibits (2011)
(a) Constant returns to scale
(b) Increasing returns to scale
(c) Decreasing returns to scale
(d) None of the above

Ans. (b) The production function is exhibiting increasing returns to scale as increase in output is more than the proportionate increase in input.

6. Utensils worth Rs. 1500 are produced with steel costing Rs. 750 and other materials costing Rs. 150. Labour cost of producing these utensils is Rs. 150 and depreciation of machinery is 0. The value added in producing these utensils is (2011)
(a) Rs. 450
(b) Rs. 600

(c) Rs. 750

(d) None of the above

Ans. (b) Value added = Cost of output –Cost of input = 1500 –(750+150) = Rs. 600

7. If the marginal cost of producing 4th unit is greater than the marginal cost of producing 3rd unit, then it follows that (2011)

(a) The average cost of producing 4 units must be greater than the average cost of producing 3 units.

(b) The average cost of producing 4 units must be less than the average cost of producing 3 units.

(c) The average cost of producing 4 units must be equal to the average cost of producing 3 units.

(d) None of the above.

Ans. (d) No exact relationship can be observed. The average cost of producing 4th unit can be greater than, equal to or less than the average cost of producing 3rd unit, as illustrated below.

Greater than			
Units	**TC**	**MC**	**AC**
2	34	_	_
3	44	10	14.67
4	60	16	15
Less than			
Units	**TC**	**MC**	**AC**
2	34	_	_
3	44	10	14.67
4	56	12	14
Equal to			
Units	**TC**	**MC**	**AC**
2	34	_	_
3	44	10	14.67
4	58.58	14.68	14.67

8. A firm has a production function $q = 4x^{1/2}$, where q and x denote the quantities of output and input respectively. If the price of the output is Rs. 90 per unit and the price of the input is Rs. 20 per units, the firms can earn a maximum profit of (2011)

(a) Rs. 1620

(b) Rs. 3600

(c) Rs. 808

(d) None of the above

Ans. (a) The maximum profit that a firm can earn, following the production function of $q = 4x^{1/2}$ is Rs. 1620, as explained in the table below.

Units of variable factor (x)	**Output (y)**	**TC $(x \times 20)$**	**TR $(y \times 90)$**	**Profit**

1	4	20	360	340
4	8	80	720	640
9	12	180	1080	900
16	16	320	1440	1120
25	20	500	1800	1300
36	24	720	2160	1440
49	28	980	2520	1540
64	32	1280	2880	1600
81	36	1620	3240	1620
100	40	2000	3600	1600

When the output is 36 units, the firm is earning maximum profit of Rs. 1620. At production levels, below and above this output, profit tends to fall.

Hint: The value of x is taken as numbers which are perfect squares.

Alternatively, it could be solved as

$$\text{Profit (y)} = \text{Total revenue} - \text{Total cost}$$

$$= 90 \times q - 20 \times x$$

$$= 90 \times 4x^{1/2} - 20x$$

$$y = 360\sqrt{x} - 20x$$

$$\therefore \frac{dy}{dx} = 360.\frac{1}{2\sqrt{x}} - 20 = \frac{180}{\sqrt{x}} - 20$$

For maxima or minima, put $dy/dx = 0$

$$\frac{180}{\sqrt{x}} - 20 = 0 \; or \frac{180}{\sqrt{x}} = 20$$

$$Or, \sqrt{x} = 9 \; or \; x = 91$$

$$Now, \frac{d^2y}{dx^2} = \frac{d}{dx}\left(\frac{180}{\sqrt{x}} - 20\right)$$

$$= 180 \left(-\frac{1}{2}\right)^{x^{-3/2}} - 0 = -90x^{-3/2}$$

Which is less than zero, therefore the profit is maximum when $x = 81$

$$\therefore Profit = 360\sqrt{81} - 20 \times 81$$

$$= 3240 - 1620 = Rs.1620$$

9. Suppose a plant can be used to produce in a day x units of product 1 and y units of product 2, where

$$\boldsymbol{y = \frac{32 - 5x}{(10 - x)}}$$

Where $32/5 \geq x \geq 0$. If the unit price of product 1 is twice the unit price of product 2, then to maximize total revenue the number of units of x the plant should be used to produce in a day is (2010)

(a) 4
(b) 5
(c) 6
(d) 6.4

Ans. (d) To maximize the total revenue, the plant should be used to produce 6.4 units of x. At this level, the production of y will be nil, as

$$y = \frac{32 - 5 \times 6.4}{10 - 6.4} = \frac{0}{3.6} = 0$$

Total revenue will be $6.4 \times 2a = 12.8a$, which is more than the revenue computed at other output levels specified.

10. If utensils worth Rs. 100 are produced with steel worth Rs. 50, wages paid are Rs. 10, depreciation of machinery is 0 and other material purchased is Rs. 10, then the value added in the process is (2010)

(a) Rs. 40
(b) Rs. 50
(c) Rs. 100
(d) Rs. 10

Ans. (a) Value added = Value of output –Value of input

=100− (50+60) = 100−60= Rs. 40

11. A firm has a production function $q = A.K^{0.5}L^{1.8}$, where A is a positive constant. Such a production function exhibits (2010)

(a) Decreasing returns to scale and diminishing marginal product for factors K.
(b) Increasing returns to scale and diminishing product for factor K.
(c) Decreasing returns to scale and increasing marginal product for factor K.
(d) Constant returns to scale with increasing marginal product for factor L.

Ans. (b) This production function exhibits increasing returns to scale, as increase in output is proportionately more than the increase in input. Factor K will exhibit diminishing product because of its power of 0.5.

12. The production function $Q = x_1^{1/2} x_2^{1/3}$, where Q is output and x_1, x_2 are quantities of inputs reflects (2009)

(a) Constant returns to scale.
(b) Increasing returns to scale.
(c) Decreasing returns to scale.
(d) No returns to scale.
(e) None of the above.

Ans. (c) The function reflects decreasing returns to scale as the increase in output is proportionately less than the increase in input.

13. A competitive firm has constant marginal cost of Rs. 12 per unit of output. To maximize profit, it sells (2009)

(a) 12 units of output
(b) Any amount of output
(c) Any amount of output provided per unit revenue is Rs. 12 or more
(d) Any amount of output provided the average cost is increasing
(e) None of the above

Ans. (c) A producer can continue to expand his production, till his marginal revenue exceeds his marginal cost.

Hint: For a competitive firm, average (per unit) revenue and marginal revenue are the same.

14. Suppose only a single firm has the technology to produce a commodity for which the demand curve is perfectly elastic. Total variable cost of the firm increases more than proportionately with firm's output. Which of the following conditions must necessarily be true for the firm at equilibrium? (2009)

(a) Average revenue = Marginal cost
(b) Average revenue > Marginal cost
(c) Average revenue > Average cost
(d) Average revenue > Marginal revenue
(e) None of the above

Ans. (e) The necessary conditions for a firm to be at equilibrium are

(i) Marginal revenue = Marginal cost, and
(ii) Marginal cost should be rising from the point of equilibrium.

15. An investment is worth –making, if over the lifetime of the project (2009)

(a) Cash inflows are positive
(b) Net cash inflows (inflows minus outflows) are positive
(c) Cash inflows discounted by an appropriate rate of interest are positive

(d) Net cash inflows (inflows minus outflows) discounted by an appropriate rate of interest are positive

(e) None of the above

Ans. (d) As per the Net Present Value (NPV) method of capital budgeting, an investment should be made only if discounted cash inflows exceed cash outflows.

16. In W Arthur Lewis, model of growth in a dual economy the rate of growth of the money wage rate in the modern sector is
(2008)

(a) Zero

(b) Constant

(c) Equal to the rate of inflation

(d) Determined by the rate of growth of the labour force

(e) None of the above

Ans. (b) W Arthur Lewis' model explains the growth of a developing economy in terms of a labour transition between two sectors, the capitalist sector and the subsistence sector. He assumes that the growth of the money wage rate in modern sector is constant.

17. Aparna makes chocolates. If the total cost of 10 chocolates is Rs. 10, and the total cost of 30 chocolates is Rs. 20, what does this tell us about the marginal cost of producing the 31st chocolate? (2008)

(a) It will be greater than Rs. 0.50

(b) It will be less than Rs. 0.50

(c) It will be exactly Rs. 0.50

(d) It will revert to Rs. 1

(e) Any of the above is possible.

Ans. (e) Any of the specified conditions are possible.

Marginal cost can be constant, it can fall or it can also rise, (depending upon the stage of operation, as per law of variable proportion).

18. If a worker's marginal product of labour is 6 units of the good per hour and the price of the good is Rs. 5, what is the highest hourly wage that a firm can pay her? (2006)

(a) Rs. 11

(b) Rs. 1

(c) Rs. 30

(d) Rs. 6

(e) Rs. 5

Ans. (c) The firm can afford to pay a labourer the amount corresponding to total revenue generated by him, which amounts to 6×5 i.e., Rs. 30.

19. **Suppose that the nominal interest rate of an economy is 10%, the inflation rate is 5%, and the tax rate from interest income is 40%. The after tax real rate of interest will be (2007)**
    (a) 1%
    (b) 2%
    (c) 3%
    (d) None of the above

Ans. (a) The after−Tax real rate of interest will be 1%. After tax, Real rate of interest = Nominal rate – Rate of inflation –Tax rate as percentage of nominal rate $= 10 - 5 - (10 \times 40\%) = 1\%$

20. **In an economy where all commodities are produced with labour alone, 0.5 units of labour is required to produce a unit of commodity A and 1.0 unit of labour is required to produce a unit of commodity B. If the international price of B is 2.5 units of A (and unaffected by how much the economy trades), and if the total amount of labour in the economy is 100 units, how much of the commodities will the economy produce? (2007)**
    (a) 200 units of A, 0 units of B
    (b) 57.14 units of A, 71.04 units of B
    (c) 57.14 units of B, 71.04 units of A
    (d) 0 units of A, 100 units of B

Ans. (d) Since, the price of B is 2.5 times the price of A, therefore, it follows that production of B is more profitable. By producing 100 units of B, the total revenue generated will be 250a which exceeds revenue generated from all other production possibilities.

SECTION B [2 Marks each]

21. **If the short−run average cost for a firm is given by $(Q - 15)2 + 4$, where Q stands for units of output, then the level of output at which short−run marginal cost is equal to average cost will be (2009)**
    (a) 0 unit
    (b) 1 unit
    (c) 2 units
    (d) 3 units

Ans. (a) Short−run marginal cost equals average cost when the output is zero units.

It is given that

Average cost $= (Q - 15)2 + 4 \; or \; 2Q - 26$

As we know that, TC $= AC \times Q$

$$\therefore Total\ cost = [(Q - 15)2 + 4] \times Q = 2Q^2 - 26Q$$

Marginal cost $= \frac{d}{dq}$ of total cost

$$= \frac{d}{dq} 2Q^2 - 26Q$$

$$= 4Q - 26$$

Now, level of output where $AC = MC$ will be

$$4Q - 26 = 2Q - 26$$

$$Or, \qquad 4Q - 2Q = 26 - 26 = 0 \; or \; Q = 0$$

SECTION C [1 Mark each]

DIRECTIONS (Q Nos. 22–24) **Read the following passage very carefully and answer the questions that follow.**

"While capital is the most important condition or prerequisite of high efficiency production, one cannot explain differences in the wealth of nations in terms of differences in 'capital endowment' of different countries, in the same manner as one can explain differences in population density by reference to differing endowments of natural resources, such as climate, rainfall, geology etc. For in contrast to natural resources which exist independently of human activities, 'capital endowment' is necessarily the result of such activities. It is impossible therefore to separate cause and effect; it is just as sensible – indeed more enlightening to say that capital accumulation has resulted from industrial development than that it was the cause of such development. For taking manufacturing activities as a whole, the growth of output and the accumulation of capital are merely different aspects of a single process.

(Nicholas Kaldor, Capitalism and Industrial Development, 1972) **(2013)**

22. According to Kaldor, differing endowments of natural resources
- **(a) Explain differences in capital accumulation**
- **(b) Result from industrial development**
- **(c) Can help to explain differences in population density.**
- **(d) Can be the result of human activities.**

Ans. (c) Accoding to Kaldor, differences in population density can be attributed to differing endowments of natural resources such as climate, rainfall etc.

23. 'Capital endowment' cannot explain the differences in the wealth of nations, because
- **(a) These are more determined by natural resources endowment**
- **(b) Capital is the most important condition or prerequisite of high efficiency production**
- **(c) Capital cannot be the cause of industrial development**
- **(d) Industrial development may change 'capital endowment'**

Ans. (a) According to Kaldor, capital endowment is necessarily the result of a variety of factors such as natural resources, level of industrial development etc.

24. Kaldor argues that climate, rainfall, geology etc.

(a) Have a strong relationship with patterns of industrial development

(b) Are determinants of economic growth

(c) Exist independently of human activities

(d) Can explain the differences in the wealth of nations

Ans. (a) According to Kaldor, natural factors such as climate, rainfall, geology etc affect a country's industrial development.

DIRECTIONS (Q Nos. 25–27) **Read the following passage very carefully and answer the questions that follow.**

A firm produces a certain good and has two plants. To produce y_1, units of the good in plant 1, the total cost for the firm is $c_1(y_1) = y_1 \times y_1$. To produce y_2 units of the good in plant 2, the total cost for the firm is $c_2(y_2) = y_2 \times y_2$. **(2012)**

25. Suppose the firm produces output y at minimum cost. Which of the following is true?

(a) All of the output is produced in one of the two plants.

(b) Output y/2 is produced in plant 1 and output y/2 is produced in plant 2.

(c) All divisions of output y between the two plants result in the same cost for the firm.

(d) None of the above

Ans. (b) Half of the output should be produced in plant 1 and half of the output in plant 2, as this would give the lowest cost of production. E.g. if a total of 100 goods have to be produced the if the total output is produced at either of the one units, then cost will be $100 \times 100 = Rs.10000$.

However, if 50 units are produced in plant 1 and 50 units in plant 2, then total cost will be

$$(50 \times 50) + (50 \times 50) = Rs.5000$$

Which is the minimum cost among all possibilities.

26. Each unit or good produced by the firm is sold at price equal to 3. The profit maximizing output of the firm is

(a) 3

(b) 0

(c) 6

(d) The profit maximization problem does not have a solution

Ans. (a) The profit maximizing output will be of 3 units. When the firm is producing 3 units, it will be able to earn a maximum profit of Rs. 4.5.

Total cost $= (1.5 \times 1.5) + (1.5 \times 1.5) = Rs.4.5$

Total revenue $= 3 \times 3 = Rs. 9$

$$\therefore Profit = Total\ revenue - Total\ cost$$

$$= 9 - 4.5 = Rs. 4.5$$

27. Each unit of good produced by the firm is sold at price equal to 3. The profit level of the profit maximization firm is

(a) 9

(b) 0

(c) The profit maximization problem does not have a solution.

(d) None of the above

Ans. (d) The profit level, as computed above will be Rs. 4.5.

DIRECTIONS (Q Nos. 28–30) **Study the following information very carefully and answer the questions that follow.**

A firm uses labour to produce a certain good. If x units of labour are used by the firm, the output of the good equals $f(x) = 20x - x^2$.

Each unit of the good sells at a price of 1. Let w denote the price of each unit of labour. We must have $x \geq 0$. Assume that the firm hires labour to maximize profits. **(2012)**

28. What is the minimum w for which it is optimal for the firm to hire zero unit of labour?

(a) 0

(b) 10

(c) 15

(d) None of these

Ans. (d) The profit function of the above firm will be

$$y = 20x - x^2 - xw$$

On differentiating it with respect to x, we will get,

$$\frac{dy}{dx} = \frac{d}{dx} 20x - x^2 - xw$$

$$= 20 - 2x - w$$

Assuming the function to be a maximizing one, we get

$$20 - 2x - w = 0$$

$$Or, w = 2(10 - x)$$

Which implies that either $w = 2\ or\ w = 10 - x$

For zero unit of labour w$= 2\ or\ w = 10 - 0 = 10$

Minimum value is 2. Therefore, the minimum w for which it is optimal for the firm to hire zero unit of labour is 2.

29. For what value of w is it optimal for the firm to hire 10 units of labour?

(a) 0
(b) 20
(c) 10
(d) None of the above

Ans. (a) From the above solution, it is inferred that,

$$w = 2\ or\ w = 10 - x$$

So, if $x = 10$, then the minimum value of w will be 0.

30. Assume that $w = 16$. Then the profits of the firm equal

(a) 2
(b) 36
(c) 4
(d) None of these

Ans. (c) The profit function of the firm is given by

$$y = 20 - x^2 - xw$$

It is given that $w = 16$, therefore, the profit function is reduced to,

$$y = 4x - x^2$$

On differentiating the given function w.r.t. x, we get

$$\frac{dy}{dx} = \frac{d}{dx}(4x - x^2)$$

$$= 4 - 2x$$

Assuming it to be a maximizing function, we get

$$4 - 2x = 0 \ \Rightarrow x = 2$$

On substituting the value of $x = 2$ in the profit function, we get

$$y = 4x - x^2$$

$$= 4 \times 2 - 2^2 = 4$$

DIRECTIONS (Q Nos. 31–34) **Study the following information very carefully and answer the questions that follow.**

The following table shows the marginal cost of producing nth $(n = 1, 2, \ldots, 10)$unit of output by a competitive firm

Output	Marginal cost
1	1.0
2	1.3
3	1.7
4	2.3
5	3.0
6	3.9
7	5.0
8	6.5
9	8.2
10	10.0

It is also given that the total cost of producing 3 units of output is 7. **(2011)**

31. The total cost of producing 5 units of output (correct up to two decimal places) is

(a) 15.00

(b) 9.30

(c) 12.30

(d) None of these

Ans. (c) The cost–table of the above competitive firm is given as

Units	MC	VC	FC	TC	AVC	AC
1	1	1	3	4	1	4
2	1.3	2.3	3	5.3	1.15	2.65
3	1.7	4.0	3	7	1.33	2.33
4	2.3	6.3	3	9.3	1.575	2.325
5	3.0	9.3	3	12.3	1.86	2.46
6	3.9	13.2	3	15.2	2.2	2.53
7	5.0	18.2	3	21.2	2.6	3.03
8	6.5	24.7	3	27.7	3.0875	3.4625
9	8.2	32.9	3	35.9	3.655	3.988

10	10.0	42.9	3	45.9	4.29	4.59

From the above table, it is clear that the total cost of producing 5 units is Rs. 12.30.

32. The average variable cost of producing 7 units of output (correct upto two decimal places) to

(a) 2.60

(b) 0.71

(c) 3.03

(d) None of these

Ans. (a) From the table, it can be observed that the average variable cost of producing 7 units of output is Rs. 2.60.

33. The average cost of producing 9 units of output (correct upto two decimal places) is

(a) 3.66

(b) 3.99

(c) 0.91

(d) None of these

Ans. (b) From the table, it can be observed that average cost of producing 9 units of output is Rs. 3.99.

34. The profit maximizing number of units of output for the firm, if the market price of the good is 6 is,

(a) 4

(b) 7

(c) 10

(d) None of these

Ans. (b) From the table given below, it is clear that the firm earns a maximum profit of Rs. 20.8 when it is producing 7 units.

Units	**TR**	**TC**	**Profit (TR –TC)**
1	6	4	2
2	12	5.3	6.7
3	18	7	11
4	24	9.3	14.7
5	30	12.3	17.7
6	36	15.2	20.8
7	42	21.2	20.8
8	48	27.7	20.3
9	54	35.9	18.1
10	60	45.9	14.1

DIRECTIONS (Q Nos. 35–40) **Study the following information very carefully and answer the questions that follow.**

Output	Variable cost of production
0	0
1	25
2	42
3	54
4	64
5	75
6	93
7	112
8	140
9	180
10	230

The sunk cost of production in the short –run is 15. **(2010)**

35. If the price of the commodity is 20, then the profit maximizing level of output is

(a) 6

(b) 7

(c) 8

(d) 9

Ans. (b) From the given table, it can be inferred that the profit maximizing level of output is 7 units.

Units	VC	TC (VC+15)	TR	Profit/Loss
0	0	15	0	(15)
1	25	40	20	(20)
2	42	57	40	(17)
3	54	69	60	(9)
4	64	79	80	1
5	75	90	100	10
6	93	108	120	12
7	112	127	140	13
8	140	155	160	5
9	180	195	180	(15)
10	230	245	200	(45)

36. If the price of the commodity is 19, then the profit maximizing level of output is

(a) 6

(b) 7

(c) 8

(d) 9

Ans. (b) From the given table, it can be inferred that the profit maximizing level of output is 7 units.

Units	TC	TR	Profit/Loss
0	15	0	(15)
1	40	19	(21)
2	57	38	(19)
3	69	57	(12)
4	79	76	(3)
5	90	95	5
6	108	114	6
7	127	133	6
8	155	152	(3)
9	195	171	(24)
10	245	190	(55)

37. Let $\pi(20)$ denote the profit of the firm when the price of the output is 20 and let $\pi(19)$ denote the profit of the firm when the price of the output is 19. Which of the following is correct?

(a) $\pi(20) = \pi(19) = 6$

(b) $\pi(20) < \pi(19)$

(c) $\pi(20) > \pi(19)$

(d) $\pi(20) = \pi(19) = 23$

Ans. (c) The profit of the firm when the price is Rs. 20 will exceed the profit of the firm when the price is Rs. 19.

38. If the price of the commodity is 144, then the profit maximizing level of output is

(a) 4

(b) 5

(c) 0

(d) None of these

Ans. (c) From the table given below, it can be inferred that the profit maximizing output of the firm is 0 units.

Units	**TC**	**TR**	**Profit/ Loss**
0	15	0	(15)
1	40	14	(26)
2	57	28	(29)
3	69	42	(27)
4	79	56	(23)
5	90	70	(20)
6	108	84	(24)
7	127	98	(29)
8	155	112	(43)
9	195	126	(69)
10	245	140	(105)

39. If the price of the commodity is 17, then the profit maximizing level of output is

(a) 1
(b) 2
(c) 3
(d) 5

Ans. (d) From the table, it can be inferred that the profit maximizing output is 5 units. At this level the loss sustained is the minimum.

Units	TC	TR	Profit/ Loss
0	15	0	(15)
1	40	17	(23)
2	57	34	(23)
3	69	51	(18)
4	79	68	(11)
5	90	85	(5)
6	108	102	(6)
7	127	119	(8)
8	155	136	(19)
9	195	153	(42)
10	245	170	(75)

40. If the price of the commodity is 17, then at the profit maximizing level of output, the firm

(a) Incurs a loss of 5
(b) Incurs a loss of 15
(c) Makes a profit of 7
(d) None of these

Ans. (a) At the profit maximizing level, the firm is sustaining a loss of Rs. 5.

DIRECTIONS (Q Nos. 41–43) **Read the following passage very carefully and answer the questions that follow.**

"The main point is that technical change and capital accumulation go hand in hand and it is not really possible to isolate the effects of increased knowledge or ability or know–how from the effect of accumulation of capital. Nor it is possible to distinguish, in general, the technical change which is the result of some brand new discovery from that which merely represents an increase in know–how in the ability to use and exploit knowledge which has already existed, in some shape or another, in the minds of some people. Further, just as technical progress causes accumulation, the process of accumulation stimulates the growth of knowledge and of know–how.

Hence, it is useless to analyze the effects of capital accumulation in terms of production function which assumes a given state of knowledge, and then assumes that this function continually shifts upwards with the progress of knowledge." **(2008)**

41. What are the types of technical changes that the author mentions in the text?

(a) Technical changes arising from a new discovery.

(b) Technical changes which assist in exploiting existing knowledge.

(c) Both (a) and (b)

(d) None of the above

Ans. (c) According to Kaldor, technical changes can take the two forms mentioned.

42. According to Kaldor, what is the relationship between technical change and capital accumulation?

(a) A direct relationship is observed.

(b) An indirect relationship is observed.

(c) There is no relationship.

(d) None of the above.

Ans. (a) According to Kaldor, there exists a direct relationship between technical changes and capital accumulation. Technical changes stimulates the process of capital accumulation.

43. According to Kaldor, can the effects of technical change be clearly distinguished from the effect of capital accumulation?

(a) Yes, the effects can be distinguished.

(b) No, the effects cannot be distinguished.

(c) Either (a) or (b)

(d) None of the above

Ans. (b) According to Kaldor, the technical changes and capital accumulation go hand–in–hand and it is not possible to isolate the effect of increased knowledge from the effect of accumulation of capital.

Chapter 4

Market Forms

SECTION A [1 Mark Each]

1. Which of the following does monopolistic competition have in common with perfect competition? (2013)

(a) A large number of firms and freedom of entry and exit.

(b) A standardized product.

(c) Product differentiation.

(d) The ability to earn an economic profit in the long–run.

Ans. (a) The common characteristics of perfect competition and monopolistic competition are the presence of a large number of firms and freedom of entry and exit. Standardized product is a feature of

perfect competition, while product differentiation prevails in monopolistic competition. In both the market forms, firms are unable to earn an economic profit in the long−run.

2. **A monopoly producing a chip at a marginal cost of Rs. 6 per unit faces a demand elasticity of −2.5. Which price should it charge to optimize its profits? (2013)**

(a) Rs. 6 per unit
(b) Rs. 8 per unit
(c) Rs. 10 per unit
(d) Rs. 12 per unit

Ans. (c) At the optimum level of profit, $MR = MC$.

$$\therefore MR = p\left(1 + \frac{1}{e}\right)$$

Where p is the price and e is the elasticity of demand.

$$\Rightarrow 6 = p\left(1 + \frac{1}{-2.5}\right)$$

$$\Rightarrow 6 = p\left[\frac{-2.5 + 1}{-2.5}\right]$$

$$\Rightarrow 6 = p\left[\frac{+1.5}{+2.5}\right]$$

$$\therefore p = \frac{6 \times 2.5}{1.5} = 10$$

Hence, to optimize the profit, it should charge a price of Rs. 10 per unit.

3. **Which of the following does monopolistic competition have in common with monopoly? (2013)**

(a) A large number of firms
(b) A downward sloping demand curve
(c) The ability to collude with respect to price
(d) None of the above

Ans. (b) Monopolistic competition and monopoly, both have a downward sloping demand curve. Monopolistic competition is characterized by the presence of large number of firms and the ability to collude with respect to price is a feature of oligopoly.

4. **Compared to a single price monopoly, a perfectly competitive industry produces. (2012)**

(a) Less output and has a lower price
(b) Less output and has a higher price
(c) More output and has a lower price
(d) None of the above

Ans. (c) Compared to a single price monopoly, a perfectly competitive industry produces more output and has a lower price. More output is produced due to the presence of large number of firms. Prices are lower because of intense competition among firms producing homogeneous product.

5. The short−supply curve of a competitive firm is given by (2010)

(a) The marginal cost curve of the firm

(b) The marginal cost curve above the average cost curve.

(c) The marginal cost curve above the average variable cost curve

(d) The upward sloping part of the marginal cost curve

Ans. (c) The short−run supply curve of a competitive firm is given by the marginal cost curve above the average variable cost curve. In the graph below, the highlighted region of the MC curve depicts the supply curve of the firm.

6. A monopolist has a demand curve with constant price elasticity with absolute value 4. The monopolist charges a price of Rs. 60 per units of output. What is his marginal cost at this level of output? (2010)

(a) 23.5

(b) 136

(c) 45

(d) 54

Ans. (c) A monopolist's marginal cost can be computed with the following formula

$$MR = MC = p\left[1 - \frac{1}{e}\right]$$

Where, p is the price and e is the elasticity of demand.

$$so, MC = 60\left[1 - \frac{1}{4}\right] = 60 \times \frac{3}{4} = 45$$

Hence, the marginal cost is Rs. 45 at this level of output.

7. Suppose a market demand curve for an individual is given by $q = 100 - p$. The market price prevailing is Rs. 50. The supplier of the unit is a monopolist and wants to perform first –degree price discrimination. He will then (2009)

(a) Charge a price of Rs. 50 for all units.

(b) Charge a price of Rs. 60 for the first 25 units and a price of Rs. 50 for the rest.

(c) Charge a price of Rs. 1250 per unit

(d) Set up a two part tariff in pricing and charge the consumer a flat fee of Rs. 1250 and a price of Rs. 50 per unit.

(e) Set up a two part tariff in pricing and charge the consumer a flat fee of Rs. 1250 and a price of Rs. 60 per unit

Ans. (a) A monopolist performing price discrimination of first degree, discriminates his price and not only between different consumers but also between the different units purchased by the same consumer.

It is also known as personalized pricing because the seller is able to access the maximum price that the consumer is willing to pay. In the given instance, the market price prevailing is Rs. 50. The consumer's demand is affected by the price.

When the price is Rs. 50, the consumer will be willing to purchase $q = (100 - 50) = 50$ units. This will help the monopolist to generate a revenue of Rs. 2500, which is more than what he generates in option 'b'.

Option (c), (d), and (e) will not be considered correct as a fixed amount is not chargeable in this form of discrimination.

8. **The long–run cost function for a commodity sold in a perfectly competitive market is given by $C(q) = q^3 - 2q^2 + 2q$. The equilibrium price of the commodity in the long–run is (2007)**

(a) 4
(b) 2
(c) 1
(d) ½

Ans. (c) The equilibrium price in a perfectly competitive market in the long–run is at the minimum point of the average cost curve.

$$TC = q^3 - 2q^2 + 2q$$

$$AC = TC/q$$

$$= \frac{q^3 - 2q^2 + 2q}{q}$$

$$= q^2 - 2q + 2$$

To find the minimum point, the above equation will be differentiated w.r.t. q, we get

$$= \frac{d}{dq}(q^2 - 2q + 2) = 2q - 2$$

Assuming it to be a maximizing function,

$$2q - 2 = 0$$

$$Or, q = \frac{2}{2} = 1$$

Hence, the equilibrium price of the commodity in the long–run is 1.

9. **Suppose a monopolist firm faces a demand curve given by $D(p) = 1 - p$, where p is the unit price of the firm's product in rupees. If the firm's output in short–run equilibrium is 0.1 units, what is the marginal cost of the firm at the equilibrium level of output? (2007)**

(a) 0.8
(b) 0.9
(c) 1.0
(d) 1.1

Ans. (a) The demand curve is given by $D(p) = 1 - p$. The demand function (inverse) in terms of quantity

$$(q) = p = 1 - q$$

Now, Total Revenue (TR) $= p \times q$

$$= (1 - q) \times q = q - q^2$$

Marginal Revenue (MR)

$$= \frac{d}{dq}(TR)$$

$$= \frac{d}{dq}(q - q^2)$$

$$= 1 - 2q$$

$$Or, q = 0.1$$

$$\therefore MR = 1 - 2 \times 0.1 = 0.8$$

SECTION B [2 Marks Each]

10. **A monopolist faces a demand curve $q(p) = 1/p$. He incurs a cost of Rs. 3 per unit of output produced. There is no fixed cost. His optimal output choice is (2008)**

(a) 2
(b) 3
(c) 0
(d) No such optimal output exists.

Ans. (d) The inverse demand function will be $p = 1/q$.

$$\therefore TR = p \times q = 1/q \times q = 1$$

His costs exceed the maximum possible revenue that can be earned. Therefore, no optimal output exists.

Chapter 5

National Income and Government Budget

SECTION A [1 Mark Each]

1. The following data is given for an economy

Gross domestic product at market price	**20000**
Gross domestic capital formation	**5000**
Depreciation	**4000**
Net exports	**(–)2000**
Net factor income from abroad	**5000**

The economy's net domestic capital formation is (2013)

(a) 1000
(b) 5000
(c) 3000
(d) (–)1000

Ans. (a) Net domestic capital formation =Gross domestic capital formation –Depreciation $= 5000 - 4000 = 1000$

2. The incidence of sales tax falls (2013)
(a) On only consumers, if demand is completely elastic.
(b) On only retailers, if demand is completely elastic.
(c) On only retailers, if demand is completely inelastic.
(d) Always on both consumers and retailers.

Ans. (a) Sales tax is an indirect tax. Therefore, its incidence falls on only consumers, if demand is completely elastic.

3. Between 1990–91 and 2000–01, the Tax/GDP ratio of the Central Government of India (2013)
(a) Increased from around 8% to around 15%.
(b) Increased from around 9% to around 11%.
(c) Decreased from around 11% to around 9%.
(d) Decreased from around 15% to around 8%.

Ans. (d) As revealed by the statistics, between 1990−91 and 2000−01, the Tax/GDP ratio of the Central Government of India decreased from around 15% to around 8%.

4. **Take India's GDP in 2009−10 at Rs. 5000000 crore. Indians working abroad remit to the country Rs. 150 crore and foreigners working in India remit Rs. 100 crore out of the country. Foreign investors repatriate Rs. 50 crore and Indian business abroad brings in Rs. 10 crore. Then India's GNP in 2009−10 would have been (2013)**

(a) Rs. 5000050 crore
(b) Rs. 4999950 crore
(c) Rs. 5000090 crore
(d) Rs. 4999910 crore

Ans. (*) None of the above options are correct.

Gross National Product = Gross domestic product + Net factor income from abroad

In the given instance, GDP= Rs. 5000000 crore

Net factor income from abroad = Remittances from Indians working abroad –Remittances from foreigners working in India to abroad –Remittances by foreign investors + Earnings of Indian businesses from abroad = Rs. 150 crore –Rs. 100 crore−Rs. 50 crore + Rs. 10 crore = Rs. 10 crore

$$\therefore GNP = 5000000\ crore + 10 crore = Rs. 5000010\ crore$$

5. **National accounts of a country show the following**

Net factor income from abroad	**10**
Income from private domestic industries	**780**
Income from governmental industries	**100**
Personal consumption expenditures	**500**
Government purchases	**250**
Exports	**40**
Imports	**60**
Depreciation	**30**

Then the net domestic product is (2013)

(a) 890
(b) 880
(c) 910

(d) 660

Ans. (b) As per the income method,

Net domestic product = Income from private domestic industries + Income from governmental industries $= 780 + 100 = 880$

6. Currently, State Governments receive approximately which of the following shares of the Central Government's gross tax collection? (2013)

(a) $\mathbf{22}\%$
(b) $\mathbf{25}\%$
(c) $\mathbf{32}\%$
(d) $\mathbf{40}\%$

Ans. (c) As per the 13th Finance Committee, State Governments approximately receive 32% of the Central Government's gross tax collection.

7. The fiscal deficit is (2013, 10)

(a) A flow variable
(b) A stock variable
(c) The ratio of a flow variable to a stock variable.
(d) The ratio of a stock variable to a flow variable.

Ans. (a) Fiscal deficit is a flow variable as it is defined with reference to a period of time.

8. The GDP of a country is growing at 5%, its population growth is 2% and its income elasticity for food is 0.5. We can expect food demand to grow at (2013)

(a) $\mathbf{2.0}\%$
(b) $\mathbf{2.5}\%$
(c) $\mathbf{3.5}\%$
(d) $\mathbf{5.0}\%$

Ans. (c) Per capita growth in income= Growth in GDP –Population growth

$$= 5\% - 2\% = 3\%$$

Since income elasticity for food is 0.5, therefore, as a result of 3% growth in per capita income, demand for food grows by $3 \times\times 0.5 = 1.5\%$.

Also, since the population grows by 2%, therefore demand for food will also increase by this percentage.

Therefore, total increase in the demand for food= Increase due to income + Increase due to population growth $= 2 + 1.5 = 3.5\%$

9. In which of the following cases would the purchase of rice be included in our calculation when we calculate the GDP of India from the expenditure side? (2012)

(a) A resident Indian purchases rice to make a dosa which he sells to his neighbor. He then pockets the money received.
(b) A resident Indian purchases rice to make dosa which he sells to his neighbor. He donates the money received to a charity.
(c) A foreign citizen visiting India purchases rice to make a dosa which he sells to another foreign citizen visiting India.
(d) A non−resident India visiting India purchases rice, goes back to his country of residence, makes a dosa and then sells it to his neighbor.

Ans. (d) The expenditure of a non−resident Indian on purchase of rice would be included in the calculation of GDP as a component of net exports.

10. With a positive externality, (2011)
(a) There is under consumption in the free market.
(b) There is over consumption in the free market.
(c) The government may tax to decrease production.
(d) Society could be made better−off if less was produced.

Ans. (b) Positive externality refers to the benefits enjoyed by a firm from external factors. Due to positive externality, there is over consumption in free market as it might lower the market price.

11. A streetlight is considered as a good example of a public good (2010)
(a) Because it is provided in public spaces.
(b) Because its consumption is non−rival and non−excludable.
(c) Because its consumption is non−rival but excludable.

Ans. (b) Streetlight is considered as a good example of a public good because it possesses the characteristics of non−rivalrous and non−excludability.

12. If in a given year, a country's GDP at constant prices is 1000 currency units and the value of its implicit GDP deflator for that year is 110, the value of the country's GDP at current prices (in its currency units) is
(a) 890
(b) 909.09
(c) 990.09
(d) 1100

Ans. (d) GDP deflator is the ratio between nominal GDP and real GDP. Symbolically,

$$GDP\ Deflator = \frac{Nominal\ GDP}{Real\ GDP} \times 100$$

$$\Rightarrow 110 = \frac{Nominal\ GDP}{1000} \times 100$$

$$\therefore Nominal\ GDP = 1100$$

13. If an economy produces GDP of Rs. 30 billion per year with a capital stock of Rs. 135 billion, then capital output ratio is a (2010)

(a) Stock variable with a value of Rs. 4.5 billion.

(b) Stock variable with a value of 4.5 years.

(c) Flow variable with a value of Rs. 4.5 billion.

(d) Flow variable with a value of 4.5 as pure number.

Ans. (d) Capital output ratio establishes a relationship between capital employed and units produced. It is a flow variable as it relates to a period of time and it is a unit free measure, therefore it is represented as a pure number.

It is calculated as (Capital Stock)/ GDP

14. GDP does not include (2009)

(a) Government spending to clean up pollution caused by factories.

(b) Payments to technical consultants abroad

(c) Additions to inventory stocks of intermediate goods

(d) None of the above

Ans. (b) GDP does not include payments made to technical consultants abroad, as it is a component of 'Net factor income from abroad', which is considered at the time of computing national product.

15. GDP equals GNP, when (2009)

(a) The value of exports of goods equals the value of imports of goods.

(b) The value of exports less imports equals the net flow of invisibles into the country.

(c) The value of exports of goods and services equals the value of imports of goods and services.

(d) There are no net factor incomes from abroad.

(e) None of the above.

Ans. (d) GNP= GDP + Net factor income from abroad. So, if there are no net factor incomes from abroad, then value of GDP will be equal to the value of GNP.

16. CENVAT is related to (2009)

(a) Sales tax

(b) Excise duty

(c) Customs duty

(d) Service tax

(e) None of these

Ans. (b) CENVAT is related to excise duty, in which duty paid at the time of purchase of raw materials is admissible as a deduction from duty paid to be paid on final goods 100%. CENVAT credit is allowed for intermediate goods.

17. Which of the following is not a leak from the circular flow of income/expenditure? (2009)

(a) Taxes

(b) Transfers
(c) Net imports
(d) Savings
(e) None of these

Ans. (b) Transfers are not a leak from the circular flow of income/expenditure, as they merely represent movement from one head to another.

18. Which of the following is true for the government budget? (2007)
(a) The revenue deficit is always less than the budget deficit.
(b) The revenue deficit is always less than or equal to the budget deficit.
(c) The revenue deficit is always greater than or equal to the budget deficit.
(d) None of the above

Ans. (d) Revenue deficit is the excess of revenue expenditure over revenue income. It may be less than, equal to or even more than the budget deficit. So, none of the specified conditions hold true.

19. The value added tax is (2007)
(a) A direct tax
(b) An indirect tax.
(c) A partly direct and partly indirect tax.
(d) A new type of tax, neither direct nor indirect.

Ans. (b) Value Added Tax (VAT) is an indirect tax, levied in the course of intra−state trade.

20. If the excess of private sector savings over investment in a year in an economy increase by Rs. 700 crore, the net savings of the government sector in a year decreases by Rs. 850 crore and the annual value of imports of goods and services increases by Rs. 600 crore, what is the change in the annual value of exports of goods and services in the economy? (2007)
(a) Increases by Rs. 450 crore
(b) Increases by Rs. 750 crore
(c) Decreases by Rs. 450 crore
(d) Decreases by Rs. 750 crore

Ans. (b) Increase in exports of goods and services = Decrease in the net savings of government sector + Increase in the annual value of exports of goods and services –Excess of private sector savings over investment $= 850 + 600 - 700 = Rs. 750\ crore$

Hence, the exports of goods and services in the economy increases by Rs. 750 crore.

SECTION C [1 Mark Each]

DIRECTIONS (Q Nos. 21–26) **Study the following information very carefully and answer the questions that follow.**

There are two experts, X_1 and X_2, employed by the Planning Commission of Hubble Bubble to calculate the annual rate of growth of output in the country. Given that Y(t) denotes output in year t and $Y(t-1)$ denotes output in the previous year (t–1), X_1 calculates the rate of growth in year t using the formula $[Y(t)-Y(t-1)]/Y(t)$ and X_2 calculates it using the formula **(2013)**

$$[Y(t)-Y(t-1)]/Y(t-1)$$

21. Suppose Hubble Bubble's output in 2012 was greater than its output in 2011. Which experts calculated a higher rate of growth for 2012?

(a) $\boldsymbol{X_1}$

(b) $\boldsymbol{X_2}$

(c) Both $\boldsymbol{X_1}$ $\boldsymbol{and}$ $\boldsymbol{X_2}$ **calculated the same value for the rate of growth**

(d) Cannot be answered on the basis of the information provided

Ans . (b) Let us assume that output in 2012 is 1000 and in 2011 is 800.

Growth rate according to $X_1 = \frac{1000-800}{1000} = 0.20$

Growth rate according to $X_2 = \frac{1000-800}{800} = 0.25$

So, if output of 2012 exceeds the output in 2011, then the growth rate computed by X_2 would be higher.

22. Suppose Hubble Bubble's output in 2010 was less than its output in 2011. Which expert calculated a higher rate of growth in 2012?

(a) $\boldsymbol{X_1}$

(b) $\boldsymbol{X_2}$

(c) Both $\boldsymbol{X_1}$ $\boldsymbol{and}$ $\boldsymbol{X_2}$ **calculated the same value of the rate of growth**

(d) Cannot be answered on the basis of the information provided

Ans. (b) Let us assume that output in 2012 is 800 and that in 2011 was 1000.

Growth rate according to X_1

$$= \frac{800-1000}{800} = -0.25$$

Growth rate according to X_2

$$= \frac{800-1000}{1000} = -0.20$$

Since, –0.20> –0.25, therefore growth rate calculated by X_2 will be higher.

23. Suppose $X_2{}'$ s calculations show that the rate of growth in 2012 was 5%. Which of the following numbers is the closest to X_1's calculated value for the rate growth in 2010?

(a) 4.76

(b) 4.79

(c) 5.21

(d) 5.26

Ans. (a) Let output in 2012 be 'a', and the output in 2011 be 'b'.

Growth rate according to X_2

$$= \frac{a-b}{b} \times 100 = 5$$

$$\Rightarrow 100a - 100b = 5b$$

$$\Rightarrow 100a = 105b$$

$$\Rightarrow a = \frac{105b}{100} \ldots\ldots (i)$$

Growth rate according to X_1

$$= \frac{a-b}{a} \times 100$$

$$= \frac{100a - 100b}{a}$$

$$= 100 \times \frac{105b}{100} - 100b \div \frac{105b}{100} \quad [from\ Eq.(i)]$$

$$= 105b - 100b \times \frac{100}{105b}$$

$$= 5b \times \frac{100}{105b} = 4.76\%$$

24. Suppose X_1's calculations show that the rate of growth in 2012 was 5%. Which of the following numbers is the closest to X_2's calculated value for the rate of growth in 2012?

(a) 4.76

(b) 4.79

(c) 5.21

(d) 5.26

Ans. (d) Let output in 2012 be 'a' and the output in 2011 be 'b'.

Growth rate according to X_1

$$= \frac{a-b}{a} \times 100 = 5$$

$$\Rightarrow 100a - 100b = 5a$$

$$\Rightarrow 95a = 100b$$

$$\Rightarrow a = \frac{5.26b}{b} = 5.26 \ldots \ldots (i)$$

Growth rate according to X_2,

$$= \frac{a-b}{b} \times 100$$

$$= \frac{100a - 100b}{b}$$

$$= \frac{100 \times \frac{100b}{95} - 100b}{b} \quad [from\ Eq.(i)]$$

$$= \frac{105.26b - 100b}{b} = \frac{5.26b}{b} = 5.26$$

25. Suppose X_2's calculations show that the rate of growth in 2010 was -5%. Which of the following numbers is the closest to X_1's calculated value for the rate of growth in 2012?

(a) –4.76

(b) –4.79

(c) –5.21

(d) –5.26

Ans. (d) Let output in 2012 be a and the output in 2011 be b.

Growth rate according to X_2

$$= \frac{a-b}{b} \times 100 = -5$$

$$\Rightarrow 100a - 100b = -5b$$

$$\Rightarrow 100a = 95b$$

$$\Rightarrow a = \frac{95b}{100}$$

Growth rate according to X_1

$$= \frac{a-b}{a} \times 100$$

$$= \frac{100a - 100b}{a}$$

$$= 100 \times \frac{95b}{100} - 100b \div \frac{95b}{100} \ \ [from\ Eq.(i)]$$

$$= 95b - 100b \times \frac{100}{95b}$$

$$= -5b \times \frac{100}{95b} = -5.26$$

26. Suppose X_1's calculations show that the rate of growth in 2012 was -5%. Which of the following numbers is the closest to X_2's calculated value for the rate of growth in 2012?

(a) –4.76

(b) –4.79

(c) –5.21

(d) –5.26

Ans. (a) Let output in 2012 be 'a' and the output in 2011 be 'b'.

Growth rate according to X_1

$$= \frac{a - b}{b} \times 100 = -5$$

$$\Rightarrow 100a - 100b = -5a$$

$$\Rightarrow 105a = 100b$$

$$\Rightarrow a = \frac{100b}{105} \ldots\ldots (i)$$

Growth rate according to X_2

$$= \frac{a - b}{b} \times 100 = \frac{100a - 100b}{b}$$

$$= \frac{100 \times \frac{100b}{105} - 100b}{b} \ \ [from\ Eq.(i)]$$

$$= \frac{95.24b - 100b}{b}$$

$$= -\frac{4.76b}{b} = -4.76$$

DIRECTIONS (Q Nos. 27–30) **Study the following information very carefully and answer the questions that follow.**

Consider the following tabulated data for an economy:

Year	GDP at Current Prices	GDP at Constant Prices
1975	21	17
1980	26	21
1985	32	26
1990	39	32
1995	47	39

27. In which period did the economy have the highest rate of growth of real GDP?

(a) 1975–80

(b) 1980–85

(c) 1985–90

(d) 1990–95

Ans. (b) The growth rate of 23.81% is the highest in the period 1980–85. Using formula, Growth Rate (at constant price)

$$= \frac{GDP\ of\ current\ period - GDP\ of\ previous\ period}{GDP\ of\ previous\ period} \times 100$$

28. In which period did the economy have the lowest rate of growth of real GDP?

(a) 1975–80

(b) 1980–85

(c) 1985–90

(d) 1990–95

Ans. (d) The economy has the lowest growth rate of 21.875% in the period 1990–95.

Hint: Using the formula as given above in Ans. 27.

29. If the GDP deflator is taken as the price index for the economy, in how many of the periods 1975–80, 1980–85, 1985–90, 1990–95 did the economy experience deflation?

(a) 1

(b) 2

(c) 3

(d) 4

Ans. (c) GDP deflator is the ratio between nominal GDP and current GDP. The deflator of 80–85, 85–90 and 90–95 is falling. Therefore, during these three periods the economy experienced deflation.

30. If the GDP deflator is taken as the price index for the economy, in how many of the periods 1975–80, 1980–85, 1985–90, and 1990–95 did the economy experience inflation?

(a) 1

(b) 2

(c) 3
(d) 4

Ans. (a) The economy experiences inflation in the period between 75−80 to 80−85.

DIRECTIONS (Q Nos. 31−34) **Study the following information very carefully and answer the questions that follow.**

Consider an economy in which only three goods X, Y and Z are produced. X and Y are consumption goods and the output of Z in a year is used up in production of X and Y in that year. The following table gives the unit prices (P_x, P_y and P_z rupees respectively) and the numbers of units produced (q_x, q_y and q_z respectively) of each of the goods for three years I, II and III. **(2011)**

Year	P_x	q_x	P_y	q_y	P_z	q_z
I	1	2	2	5	1	2
II	1.5	3	2	6	1.5	4
III	1.5	6	3	6	2	5

31. What is the GDP (in rupees) at current prices in year II?
(a) 10.5
(b) 16.5
(c) 22.5
(d) 28.5

Ans. (b) GDP at current prices as per value added method = Value of output –Value of input= $(1.5 \times 3) + (2 \times 6) + (1.5 \times 4) - (1.5 \times 4)$

$= 16.5$

32. If year I is the base year, what is the GDP (in rupees) at constant prices in year III?
(a) 13
(b) 14
(c) 17
(d) 18

Ans. (d) Assuming year I to be the base year, GDP at constant prices for year III will be

$$(1 \times 6) + (2 \times 6) + (1 \times 5) - (1 \times 5) = 18$$

Hint: Quantity of year III and prices of year I will be considered.

33. In year I is the base year, what is the value of the GDP deflator in year III?
(a) 100
(b) 130.77 (approx)
(c) 141.67 (approx)

(d) 150

Ans. (d) GDP Deflator

$$= \frac{Nominal\ GDP\ of\ year\ III}{Real\ GDP\ of\ year\ III} \times 100$$

$$= \frac{27}{18} \times 100 = 150$$

34. What is the rate of growth of real GDP (base year I) in year III?

(a) $\mathbf{10}\%$

(b) $\mathbf{13.67}\%$

(c) $\mathbf{18.18}\%$

(d) $\mathbf{20}\%$

Ans. (d) Rate of growth of real GDP

$$= \frac{Real\ GDP\ of\ year\ III - Real\ GDP\ of\ year\ II}{Real\ GDP\ of\ year\ II} \times 100$$

$$= \frac{18 - 15}{15} \times 100 = 20\%$$

DIRECTIONS (Q Nos. 35–36) **Study the following information very carefully and answer the questions that follow.**

The information data is given for an economy for a particular year: **(2008)**

	Rs. in crore
GDP at factor cost	10000
Net factor income from abroad	500
Net indirect taxes	1500
Government (non–investment) expenditure at market prices	1500
Current account deficit on balance of payments	500
Gross saving of government	–300

35. GDP at market price will be

(a) Rs. 12000

(b) Rs. 10500
(c) Rs. 11500
(d) Rs. 12500

Ans. (c) GDP at= GDP at factor cost + Net indirect taxes = 10000+1500=11500

36. GNP at market price will be
(a) Rs. 12000
(b) Rs. 10500
(c) Rs. 11500
(d) Rs. 12500

Ans. (a) GNP at market price $= GDP_{FC} + NIT + NFIA = 10000 + 1500 + 500 = Rs.12000$

DIRECTIONS (Q Nos. 37−38) Study the following information very carefully and answer the questions that follow.

Share of Sector in GDP (%)				Share of Sector in Workforce (%)		
Year	Agriculture	Manufacturing	services	Agriculture	Manufacturing	Services
1990	35	33	32	70	15	15
2005	20	32	48	66	12	22

(2007)

37. Which sector registered the highest productivity (output per worker) in 1990?
(a) Agriculture sector
(b) Manufacturing sector
(c) Service sector
(d) Both (b) and (c)

Ans. (b) Manufacturing sector registered the highest productivity

Productivity $= \frac{Share\ of\ Sector\ in\ GDP}{Share\ of\ Sector\ in\ workforce} = \frac{33}{15} = 2.2$

38. Which sector registered the lowest productivity in 2005?
(a) Agriculture sector
(b) Manufacturing sector
(c) Service sector
(d) Either (b) or (c)

Ans. (b) Manufacturing sector registered the highest productivity.

$$Productivity = \frac{Share\ of\ sector\ in\ GDP}{Share\ of\ sector\ in\ workforce} = \frac{33}{15} = 2.2$$

39. Which sector registered the lowest productivity in 2005?
(a) Agriculture sector
(b) Manufacturing sector
(c) Service sector
(d) Either (b) or (c)

Ans. (a) Agriculture sector registered the lowest productivity of 0.303 in 2005.

DIRECTIONS (Q Nos. 40–41) **Read the following passage very carefully and answer the questions that follow.**

'The importance of public revenue to the underdeveloped countries can hardly be exaggerated if they are to achieve their hopes of accelerated economic progress. Whatever the prevailing ideology or political colour of a particular government, it must steadily expand a whole host of non–revenue yielding services –education, health, communication systems and so on—as a prerequisite for country's economic and cultural development. These services must be financed out of government revenue. Besides meeting these needs, taxes and other compulsory levies provide the most appropriate instruments for increasing savings for capital formation out of domestic sources. By providing a surplus over recurrent expenditure, they make it possible to devote a higher proportion of resources to building up capital assets.

The fact is that in relation to gross national product, the tax revenue of the underdeveloped countries is typically much smaller than in the advanced countries. Is this an inevitable consequence of their poverty? No, the shortfall in revenue is largely a reflection of failure to tax the wealthier sections of the community effectively. **(2006)**

40. Identity of non—revenue yielding services from those given below.
(a) Education
(b) Health
(c) Communication
(d) All of the above.

Ans. (d) All the services specified are non—revenue yielding services. These services are provided by the government to enhance social welfare and for the upliftment of the backward classes and not to earn revenue.

41. Tax –revenue of the underdeveloped countries is much less than that of the developed countries. What is the reason for this according to the passage given?
(a) In less developed countries, the incidence of tax is low.
(b) In less developed countries, people evade tax.

(c) In less developed countries, the wealthier sections of society are not taxed effectively.

(d) All of the above.

Ans. (c) As per the passage, the tax collection in less developed countries is small because of the inability of the tax−regime to tax the wealthier sections of society effectively.

Chapter 6

Money, Money Market and Banking

SECTION A [1 Mark Each]

1. Market capitalization in the Bombay Stock Exchange (BSE) rose by 100% in a single year. This means that (2013, 10, 06)

(a) The Sensex rose by 100% during the year.

(b) The value of shares traded at the BSE over the year increased by 100% when compared with the previous year.

(c) The value of all outstanding shares of companies listed at the BSE rose by 100%.

(d) The prices of every share listed at the BSE rose by 100%.

Ans. (c) Market capitalization refers to the rate at which new shares are issued in the market. An increase of 100% in the rate of market capitalization in BSE means that the value of shares (listed) rose by 100%.

2. If an individual deposits a sum of money in a bank, then the amount of traditional credit that the banking system can create is (2013, 08)

(a) A fraction of that sum defined by the cash reserve ratio

(b) A fraction of that sum defined by the statutory liquidity ratio

(c) A multiple of the sum defined by the cash reserve ratio

(d) None of the options given are correct

Ans. (d) The process of credit creation is a multiple of that sum defined by the sum of cash reserve ratio and statutory liquidity ratio.

3. The Bombay Stock Exchange Sensitive Index or Sensex is (2013)

(a) A simple average of the stock prices of the top 500 companies by market capitalization.

(b) A weighted average of the stock prices of the 500 most actively traded shares.

(c) A weighted average of the stock prices of the 50 most actively traded shares.

(d) A weighted average of the stock prices of a changing set of 30 actively traded stocks.

Ans. (d) Sensex is an abbreviation of the Bombay Stock Exchange Sensitive Index. It is composed of 30 of the largest and most actively traded stocks on the BSE. Initially compiled in 1986, the Sensex is the oldest stock index in India. The base year of Sensex is 1978−79 with a base value of 100.

4. **Suppose the penalty imposed for premature withdrawal of a time deposit from any bank in an economy increase from $1\%\ to\ 2.5\%$ of the amount of the deposit. Everything else remaining constant, what will happen to the transactions demand for money in the economy? (2012)**

(a) Remain unchanged
(b) Increase
(c) Decrease
(d) Cannot be determined

Ans. (c) According to Keynes, transaction demand of money relates to meeting day−to−day expenses. So, if penalty imposed increase from $1\%\ to\ 2.5\%$, then people will not liquidate their deposits to meet their day−to−day expenses. So, transactions demand of money will decrease.

5. **The cash Reserve Ratio (CRR) refers to (2011)**

(a) The liquid cash that banks have to maintain with the Reserve Bank of India as a certain percentage of their demand and time deposits.
(b) The cash that banks have to keep in their vaults in order to meet sudden demand from depositors in times of crisis.
(c) The cash that households have to keep in reserve to meet sudden increases in the price of essential goods and services
(d) The cash that the government keeps in reserve so as to be ready to meet unexpected contingencies

Ans. (a) Cash Reserve Ratio (CRR) refers to the liquid cash that banks have to maintain with Reserve Bank of India as a percentage of their demand and time deposits.

6. **The money multiplier in an economy increases with (2011)**

(a) Increase in cash reserve ratio
(b) Increase in statutory liquidity ratio
(c) Increase in banking habits of the population
(d) Increase in the population of the country

Ans. (c) Money multiplier un an economy increases with the increase in the banking habits of the population. It measures the amount of money that commercial banks would create out of their deposits after keeping certain fractions as reserve. So, as the banking habits of the people increase, the deposits will also increase leading to an increase in the value of money multiplier.

7. **Suppose the difference between the transactions velocity and the income velocity o circulation of money in an economy is 5 and the money value of total transactions is 6 times the money value of aggregate income. If the quantity of money is circulation is 1000 currency units, then the money value of aggregate income in currency units is (2010)**

(a) 1000
(b) 1200
(c) 1500
(d) 1800

Ans. (a) Let the money value of aggregate income velocity be x.

Then, the money value of transaction velocity $= 6x$

$$\Rightarrow 6x - x = 5 \times 1000$$

$$\Rightarrow 5x = 5 \times 1000$$

$$\Rightarrow x = 1000$$

Hence, the money value of aggregate income in currency unit is 1000.

8. Which of the following is not a tool of monetary policy? (2010)

(a) Tax rate

(b) Interest rate

(c) Cash reserve ratio

(d) Open –market operations of the Central Bank.

Ans. (a) Tax rate is not a tool of monetary policy as it does not affect the demand and supply of money.

9. The relationship between the stock of money and the stock of high powered money is (2009)

(a) Determined solely by the reserve deposit ratio

(b) Determined solely by the currency−deposit ratio

(c) Between zero and one

(d) The money multiplier

(e) The income velocity of money

Ans. (b) High powered money is referred to as the monetary base of the country and includes currency notes and coins held by the public and deposits held by commercial banks with RBI. The relationship between stock of money and stock of high powered money, as such, is determined by the currency deposit ratio.

SECTION C [1 Mark Each]

DIRECTIONS (Q Nos. 10−14) Read the following passage very carefully and answer the questions that follow.

"In the beginning, money was a commodity like any other, save that its physical characteristics allowed of its being divided into parts of varying but specific weight and it had high enough worth in small enough bulk so that it could be readily carried around. Thus, it served as an intermediate step in exchange, eliminating the inherent awkwardness of barter. And it was a convenient way of holding wealth –a storehouse of value.

But in major measure the separate identity of money, its personality was discovered with the establishment of banks; through banks the supply of money could be increased or, on occasion, sharply

diminished and this, more or less at will. The funds thus made available could be used for investment, necessary or frivolous consumption or the needs of the state.

Together, the deposits and the banks notes were in excess of the value of the mental on which they were based. This, however, was entirely safe and acceptable for so long as everyone –original depositors, borrowers, noteholders –did not come at the same time for the hard money. Unless, there were fear, panic or spreading rumour and unease about the competence and solidity of the bank−all by no means negligible possibilities –this would not happen.

Give the profits possible from this manufacture of money−the return in interest for an effortless act of lending –the temptation to over do a quite wonderful thing was obvious. Out of temptation were born the Central Bank and much of the structure of modern bank regulation. In return for various privileges, including in the later time the exclusive right to issue notes. Central bank came into existence. They proceeded to regulate the lending and money creation of the lesser banks, which they did in an inconveniently disciplinary way by returning to the smaller banks their notes for payments in mental and by enforcing minimum level of reserves against deposits."

(John Kenneth Galibraith, A History of Economics: The past as the present, Chapter 12) **(2010)**

10. Galibraith argues that

(a) Money was a commodity like any other until Central Bank was created.

(b) Money was at first a commodity that could be easily divided by weight and carried around easily.

(c) The physical feature of money being something that can be carried around easily gives it a special personality.

(d) Money can never be more than an intermediate feature in exchange.

Ans. (a) According to the passage, Galibraith argues that money was a commodity until Central Bank was created. The creation of Central Bank gave money a separate identity.

11. Minimum levels of reserves against deposits

(a) Is a rule that money creation necessarily imposes on all banks

(b) Are necessary because depositors, borrowers and noteholders all come to banks at the same tine for their money.

(c) Are part of the regulatory actions of Central Bank.

(d) Are returns for various privileges that are accorded to banks.

Ans. (c) Minimum levels of reserves are maintained against deposits under the directives issued by the Central Bank. Maintenance of minimum reserves allows easy withdrawal of money.

12. The supply of money in an economy can be increased or decreased at will

(a) Because of the inherent awkwardness of barter

(b) Through the activities of banks

(c) Because money is a storehouse of value

(d) Since deposits and bank notes cannot be in excess of the metal on which they are based.

Ans. (b) The supply of money in an economy can be increased or decreased at will through the activities of banks. As controller of money supply in the country, the Central Bank has qualitative tools, as well as, quantitative tools, through which it can control money supply in the economy.

13. The presence of banks mean that
(a) Money in circulation can be in excess of the supply of metal that is money.
(b) Deposits in banks must always be equal to the notes issued by banks.
(c) Money is always safe in banks and this is acceptable to all.
(d) Banks are the storehouses of value.

Ans. (a) Banks create money that exceeds the supply of metal, which is the basis of the money in circulation.

14. Central Bank exist because
(a) Banks earn profits in the form of a return in interest from an effortless act of tending.
(b) The funds loaned out can be used for investment, necessary or frivolous consumption or the needs of the state.
(c) All banks want the exclusive power to issue notes.
(d) It is necessary to regulate the lending and money creation of lesser banks, given the temptation to over do lending.

Ans. (d) Central Bank's role is that of a regulator and facilitator of the commercial banks. Commercial banks function according to the guidelines issued by the Central Bank.

Chapter 7

Theory of Income and Employment

SECTION A [1 Mark Each]

1. Consider two economies (1 and 2) where, in equilibrium, the level of aggregate income (Y) is the sum of aggregate investment expenditure (I) and aggregate consumption expenditure (C). (I) is determined autonomously of Y and its value in economy 1 is double that in economy 2. If the marginal propensity to save in economy 1 is half that in economy 2 for all values of Y, then the equilibrium value of Y –C in economy 1 is (2013)
(a) Double that in economy 2
(b) Half that in economy 2
(c) The same as that in economy 2
(d) None of the above

Ans. (d) Let the aggregate consumption expenditure in economy 2 be x. Then, the aggregate consumption expenditure in economy 1 will be 2x. Also, let the savings in economy 2 be y. Then, the savings in economy 2 be y. Then, the savings in economy 1 will be 1/2 y.

Now, value of Y−C in economy 1 will be

$$2x - \frac{1}{2}y = \frac{4x - y}{2}$$

And the value in economy 2 will be $x - y$. So, we see that none of the conditions specified hold true. Hence, option (d) is correct.

2. **The equilibrium rent for four−bedroom apartments is Rs. 1500 per month. If the city government imposes a price ceiling of Rs. 1600 per month on rents, which of the following will happen? (2012)**

(a) There will be excess demand for four−bedroom apartments
(b) There will be excess supply of four−bedroom apartments
(c) The government will earn Rs. 100 per month from each four−bedroom apartment that is rented.
(d) None of the above

Ans. (d) Since, the ceiling exceeds the equilibrium price, therefore none of the conditions specified will hold true. Price ceiling implies that equilibrium price should not exceed the given price. It can be less than it. In the given instance since equilibrium price is less than the ceiling price, therefore the state of equilibrium will not affected.

3. **Consider an economy where in equilibrium level of aggregate income (Y) is the sum of aggregate investment expenditure (I) and aggregate consumption expenditure (C). for values of $Y \leq 1500, C = 200 + 0.6Y$ and any amount of aggregation income in excess of 1500 currency units is entirely saved in the economy. If the full employment level of $Y = 1750$, the minimum value of (I) necessary to ensure full employment in the economy is (2011)**

(a) 500
(b) 550
(c) 600
(d) None of these

Ans. (d) It is given that if $Y \leq 1500$, then $C = 200 + 0.6Y$. Now, if we assume income to be 1500, then consumption will be 1100 $(200 + 0.6 \times 1500)$. So, out of an income of 1500, 400 is saved. Also, it is given in the question that any amount of aggregate income in excess of 1500 units is saved. So, at the income level of 1750 units, 250 units will be saved. So, total savings at the income level of 1750 units will be 650 units (400+250). At the level of full employment, total savings are equal to total investment. Therefore, the investments will also amount to 650 units.

4. **Suppose in a closed economy with no government expenditure and taxation, the investment function is given by $I = 2000 + 0.1Y - 8000r$ and the savings function is given by $S = 1000 + 0.2Y + 2000r$ (Y denotes aggregate income and r is the nominal rate of interest). The economy is subject to a liquidity trap at $r = 0.01$. What is the maximum equilibrium value of Y possible in this economy? (2011)**

(a) 7800
(b) 9000
(c) 11000
(d) None of these

Ans. (b) At the equilibrium level, $I = S$

$$\therefore 2000 + 0.1Y - 8000r = 1000 + 0.2Y + 2000r$$

$$1000 = 0.1Y + 10000r (r = 0.01)$$

$$\therefore 0.1Y = 1000 - 100 = 900$$

$$\therefore Y = 900/0.1 = 9000$$

5. **In a closed economy, the balanced budget multiplier is (2010)**

(a) Equal to 1
(b) Less than 1
(c) More than 1
(d) Dependent on the marginal propensity to consume in the economy

Ans. (a) In a closed economy, the balanced budget multiplier is equal to 1, based on the assumption that a rise in government spending on real goods and services combined with an equal rise in taxation increases the national product by the same amount.

6. **Linear accelerator has the following characteristic (2010)**

(a) Depends on expectations and has the dimension of time.
(b) Depends on expectations and has the dimension of inverse time.
(c) Does not depend on expectations and has the dimension of time.
(d) Does not depend on expectations and has no time dimension.

Ans. (a) Linear accelerator possesses the dual characteristics of dependence on expectations and having a time dimension.

7. **If the savings propensity is 14% and the incremental capital output ratio is 4, and the population rate of growth is 3%, there is constant returns to scale and not technical progress (2010)**

(a) Warranted rate of growth is greater than the natural rate of growth
(b) Warranted rate of growth is less than the natural rate of growth
(c) The economy will always grow at 3% rate of growth.

(d) The economy will always grow at more than 3% rate of growth.

Ans. (a) Warranted rate of growth

$$= \frac{Savings\ propensity}{incremental\ capital\ output\ ratio}$$

$$= \frac{14}{4} = 3.5\%$$

Natural rate of growth $=$ Population growth rate, which is 3% in the given question

$\therefore$ Warranted rate of growth $(3.5\%) >$ Natural rate of growth (3%)

8. In the following statements, 'investment' is meant to be investment from a macroeconomic point of view. The following transactions 1, 2 and 3 have taken place in the economy.

1. Your family has taken out a mortgage from a bank and purchased a new house with the loan advanced to your family by the bank.

2. You have used your salary to buy shares of the Steel Authority of India Ltd.

3. You draw money from your savings bank account of State Bank of India (SBI) and invest in SBI mutual fund share.

Indicate which combination of statements is correct. (2010)

(a) Transactions in 1 represents an act of net zero investment, transaction in 2 represents an act of net positive saving, transaction in 3 represents an act of net positive investment.

(b) Transaction in 1 represents an act of net positive investment, transaction in 2 represents an act of net positive saving, transaction in 3 represents an act of net positive saving.

(c) Transaction in 1 represents an act of net positive investment, transaction in 2 represents an act of net investment, transaction in 3 represents an act of saving.

(d) Transaction in 1 represents an act of net positive investment, transaction in 2 represents an act of net positive saving, transaction in 3 represents an act of net zero saving.

Ans. (d) Purchasing a house by taking loan from bank qualifies as investment, buying shares from salary qualifies as savings and drawing money from saving account to purchases shares amounts to net zero savings, as it is merely a transfer from one form of saving to another.

9. An economy has a proportionate income tax at the rate t, marginal propensity to consume of α and marginal propensity to import of m, with values $\alpha = 0.8, t = 0.2, m = 0.1$. The short–run investment multiplier of the economy will be (2010)

(a) $1/[1 - \alpha(1 - t) + m] = 50/53$

(b) $1/[1 - (\alpha - m)(1 - t)] = 25/11$

(c) $1/[1 - \alpha(1 - t) - m] = 50/3$

(d) $1/[1 - \alpha + t + m] = 2$

Ans. (a) Investment multiplier measures the change in income due to a change in investment. Symbolically, investment Multiplier

$$= \frac{1}{1 - MPC(1 - Tax\ Rate) + Marginal\ propensity\ to\ import}$$

$$= \frac{1}{1 - 0.8(1 - 0.2) + 0.1} = \frac{50}{23}$$

10. The acceleration principle states that the rate of investment in the economy is proportional to (2009)

(a) The rate of increase in aggregate demand

(b) The rate of increase in unplanned inventories

(c) The rate of increase in business savings

(d) The rate of increase in the rate of profit

(e) None of the above

Ans. (b) According to the acceleration principle, the rate of investment in the economy is proportional to the rate of increase in unplanned inventories.

11. The essence of Engel's law is that as household incomes rise (2009)

(a) The savings rate increases.

(b) The proportion of income spent on food declines

(c) The expenditure on food declines

(d) The proportion of income spent on luxuries declines

(e) None of the above

Ans. (b) Engel's law studies the relation between income level and consumption of goods at given prices. According to this law, necessities of life exhibit inelastic demand, therefore as income rises the proportion of income spent on food (being a necessity)also declines.

12. The marginal propensity to consume is usually expressed as (2009)

(a) A pure number

(b) Paise per unit of time

(c) Rupees per unit of time

(d) A number per unit of time

(e) None of the above

Ans. (a) Marginal propensity to consume is a ratio between change in consumption to change in income. Symbolically,

$$MPC = \frac{\Delta C}{\Delta Y}.$$

It is expressed as a pure number.

13. The capital output ratio in an economy is the ratio of (2009)

(a) A flow variable to a stock variable

(b) Two flow variables

(c) Two stock variables

(d) A stock variable to a flow variable

(e) None of the above

Ans. (c) The capital output ratio in an economy is the ratio between capital employed and output generated. Both capital and output are stock variables as they are measured at a point of time.

14.

Year	X−M	G−T	S−I
2005	150		150
2006		−50	−130
2007	−200	345	

The missing values in the table above are (2008)

(a) $\boldsymbol{G-T=0, X-M=-80\ and\ S-I=145}$

(b) $\boldsymbol{G-T=0, X-M=80\ and\ S-I=145}$

(c) $\boldsymbol{G-T=80, X-M=0\ and\ S-I=145}$

(d) $\boldsymbol{G-T=0, X-M=80\ and\ S-I=-145}$

Ans. (a) The following relationships exists between the above variables $S-I=(G-T)+(X-M)$

15. Mr. A uses his salary of Rs. 2 lakh of a month to buy AT and T shares to earn dividend. Mr. B borrows Rs. 2 lakhs from the bank to buy a new machine to expand his business.

Mr. C deposits his salary of Rs. 2 lakhs of a month in a term deposit bank account to earn long−term interest. In macroeconomics, the actions of A, B and C will be characterized as (2007)

(a) A: investment, B: investment, C: savings

(b) A: investment, B: investment, C: investment

(c) A: savings, B: investment, C: savings

(d) A: investment, B: savings, C: investment

Ans. (a) Mr. A's act of buying shares from his salary to earn dividends is investment. Mr. B's act of buying a machine, financed from a bank, is also an investment. Mr. C's act of depositing in a term account amounts to savings.

16. In the IS−LM model of an economy, if the economy is in a liquidity trap and aggregate investment expenditure is unaffected by current income, a rise in government expenditure (other things remaining constant) would lead to a rise in the equilibrium value of (2007)

(a) The demand for money
(b) The rate of interest
(c) Aggregate savings
(d) Aggregate investment

Ans. (d) Liquidity trap is a situation in which real interest rates cannot be reduced by any action of the monetary authorities. In such a situation, a rise in government expenditure would lead to a rise in the equilibrium value of aggregate investment.

17. Consider a closed controlled economy with unlimited supplies of labour in which the incremental capital–output ratio is 4 and the rate of population growth is 1.5% per annum. If the economy wants to attain a growth rate of per capita income of 6% per annum, what must be the savings rate (in percent) in the economy? (2007)
(a) 24
(b) 27.5
(c) 30
(d) 36

Ans. (c) Rate of population growth $= 1.5\%$ or 0.015.

Desired rate of growth per capita 6% or 0.06

So, the combined growth rate required after giving due consideration to population growth

$$= 0.015 + 0.06 = 0.075$$

Rate of savings required $= 0.075 \times 4 = 0.3\ or\ 30\%$

18. A nation invests all its saves and its rate of saving is 30%. If the annual rate of growth of that country is 6%, then its production conditions must be such that it delivers a unit increment in output for every (2006)
(a) 2 units of investment
(b) 3 units of investment
(c) 5 units of investment
(d) 10 units of investment

Ans. (b) Increment in investment = Rate of savings/Rate of interest

$$= \frac{30}{10}(as\ per\ the\ golden\ rule)$$

$$= 3\ units$$

SECTION B [2 Marks Each]

19. Consider an economy operating at less than full employment, in which the government has a balanced budget. The marginal propensity to consume is 0.8 and the GDP falls short of full employment output by 5000. What is the minimum required increase in government spending that could bring about full employment in a closed economy? (2009)

(a) 4000
(b) 1000
(c) 1500
(d) None of these

Ans. (b) Minimum required increase

$$= 5000(1 - MPS) = 5000 \times 0.2 = 1000$$

20. Suppose aggregate income in an economy is equal to total wages plus total profits. 40% of all profits are saved. If the share of wage in aggregate income is 60% and the rate of saving in the economy is 0.25, the fraction of wages saved in the economy is (2008)

(a) 0.09
(b) 0.15
(c) 0.16
(d) 0.24

Ans. (a) Total savings in a economy = Savings from profits + Savings from wages

$$\Rightarrow 0.25 = (40 \times 40\%) + x$$

$$\Rightarrow 0.25 - 0.16 = x$$

$$\Rightarrow x = 0.09$$

21. Suppose in an economy, $Y = C + I, C = 500 + 0.8Y,\ I = 1000$, supply of money $(M_S) = 1000$, transaction demand for money $(M_{DT}) = 0.1Y$, speculative demand for money $(M_{DS}) = 1000 - 75r$, where r is the percentage rate of interest. What is the equilibrium value of r in the economy? (2008)

(a) 0.05
(b) 0.1
(c) 5
(d) 10

Ans. (d) We know that, $Y = C + I = 500 + 0.8Y + 1000$

$$\Rightarrow Y = 1500 + 0.8Y = 7500$$

Also, at equilibrium level, Money supply = Money demand

$$\Rightarrow 1000 = 0.1Y + 1000 - 75r$$

$$\Rightarrow 0.1Y = -75r \; or \; 750 = 75r$$

$$\therefore r = \frac{750}{75} = 10$$

SECTION C [1 Mark Each]

DIRECTIONS (Q Nos. 22–24) **Study the following information very carefully and answer the questions that follow.**

Consider the economy in which the consumption function is given by $C = 400 + 0.6(Y - T)$. Investment (I) is 120, government purchases (G) and taxes (T) are both 100. **(2013)**

22. The equilibrium level of income is

(a) 1000
(b) 1200
(c) 1300
(d) 1400

Ans. (d) Equilibrium level of income $(Y) = C + I + G$

$$\Rightarrow Y = 400 + 0.6(Y - T) + 120 + 120$$

$$\Rightarrow Y = 400 + 0.6(Y - 100) + 120 + 120$$

$$\Rightarrow Y = 400 + 0.6Y - 60 + 120 + 100$$

$$\Rightarrow Y - 0.6Y = 560$$

$$\Rightarrow Y = 1400$$

23. If government purchases increase to 240, the new equilibrium level of income would be

(a) 1700
(b) 1200
(c) 1400
(d) 1600

Ans. (a) When government purchases increases to 240, then new equilibrium level of income will be

$$Y = C + I + G$$

$$\Rightarrow Y = 400 + 0.6(Y - T) + 240 + 120$$

$$\Rightarrow Y = 400 + 0.6(Y - 100) + 240 + 120$$

$$\Rightarrow Y - 0.6Y = 700$$

$$\therefore Y = 1750$$

24. The government expenditure multiplier is

(a) 2.5

(b) 3.5

(c) 4.5

(d) 1

Ans. (a) Government expenditure multiplier

$$= \frac{1}{MPS} = \frac{1}{0.4} = 2.5$$

DIRECTIONS (Q Nos. 25–28) **Study the following information very carefully and answer the questions that follow.**

Suppose in equilibrium, aggregate income (in units of money per year) in an economy $Y = C + I$, where investment expenditure (in units of money per year) $I = 1000$ and aggregate consumption expenditure (in units of money per year) C satisfies the following conditions.

1. C is a function of current disposable income in the economy (Y_d).
2. If $Y_d = 0, then\ C = 500$
3. Marginal propensity to save out of Y_d is constant in the economy and equal to 30%.

Suppose the government collects direct tax revenues equal to 15% of Y and makes direct transfer payments equal to 750 units of money per year. **(2013, 10)**

25. What is the value of the investment multiplier in the economy?

(a) Between 1.7 and 1.9

(b) Between 1.9 and 2.1

(c) Between 2.1 and 2.3

(d) Between 2.3 and 2.5

Ans. (d) Investment multiplier

$$= \frac{1}{1 - MPC}; where$$

$$MPC = 1 - 0.30 - (0.70 \times 0.15)$$

$$= 0.7 - 0.105 = 0.595 = \frac{1}{1 - 0.595} = 2.47$$

26. What is the equilibrium value of Y in the economy?

(a) Between 3250 and 3750

(b) Between 3750 and 4250

(c) Between 4250 and 4750

(d) Between 4750 and 5250

Ans. (d) At the equilibrium level $Y = C + I$

$$\Longrightarrow Y = 500 + 0.7(y - 15y + 750) + 1000$$

$$\Longrightarrow Y = 500 + 0.7y - 0.105y + 525 + 1000$$

$$\Longrightarrow 0.405Y = 2025$$

$$\therefore Y = 5000$$

27. If instead of 750 units of money the government makes annual transfer payments equal to 10% of Y, then the value of the investment multiplier will

(a) Decrease by less than unity

(b) Decrease by more than unity

(c) Increase by less than unity

(d) Increase by more than unity

Ans. (c) $Y = C + I$

$$= 500 + 0.7(y - 0.15y + 0.10y) + 1000$$

$$= 1500 + 0.665Y$$

So, the value of MPC is 0.665.

$$\therefore K = \frac{1}{1 - MPC}$$

$$= \frac{1}{1 - 0.665} = 2.98$$

Change in multiplier $= 2.98 - 2.46 = 0.52$

28. If instead of 750 units of money the government makes an annual transfer payments equal to 10% of Y, then the equilibrium value of Y will

(a) Decrease by less than 1000

(b) Decrease by more than 1000

(c) Increase by less than 1000

(d) Increase by more than 1000

Ans. (a) As computed above,

$$Y = 1500 + 0.665Y$$

$$Y - 0.665Y = 1500$$

$$\therefore Y = 4477.6$$

Change in income $= 5000 - 4477.6 = 522.4$

DIRECTIONS (Q Nos. 29–33) **Study the following information very carefully and answer the questions that follow.**

Consider a closed economy in which aggregate output in short–run equilibrium is equal to the level of effective demand. There are only two types of expenditure on goods and services, private consumption expenditure and expenditure by the government (G). Workers earn only wage income and non–workers earn all remaining income. Non –workers always spend a fixed amount of consumption. Suppose to produce every rupee of final output, 0.005 labour–day is required and the wage for a working day is Rs. 150. **(2012)**

29. Suppose there is no taxation in the economy. If S denotes private savings and I denotes investment expenditure in the economy, which of the following is a condition for short–run equilibrium in the economy?

(a) $S = G$
(b) $S = I$
(c) $S = O$
(d) None of these

Ans. (a) In the absence of taxation in the economy, short–run equilibrium is achieved at a point at which private savings equals government expenditure.

30. Suppose workers consume their entire income and the only tax revenue comes from lumpsum direct taxes imposed on non–workers. What is the value of the balanced budget multiplier in this economy?

(a) 1
(b) 2.5
(c) 4
(d) None of these

Ans. (c) Budget multiplier (Balanced)

$$= \frac{1}{1 - (0.005 \times 150)} = \frac{1}{1 - 0.75} = \frac{1}{0.25} = 4$$

31. Suppose workers consume a fraction 0.8 of their income and the only tax revenue comes from lumpsum direct taxes imposed on non–workers. What is the value of the balanced budget multiplier?

(a) 1
(b) 2.5
(c) 4
(d) None of these

Ans. (b) Budget multiplier (Balanced)

$$= \frac{1}{1-(0.005 \times 150 \times 0.8)} = \frac{1}{1-0.6} = \frac{1}{0.4} = 2.5$$

32. Suppose workers consume their entire income and the lumpsum direct taxes are imposed on workers rather than on non−workers. What is the value of the balanced budget multiplier?

(a) 1

(b) 2.5

(c) 4

(d) None of these

Ans. (d) The value of balanced budget multiplier in this case would be zero.

33. Suppose workers consume a fraction 0.8 of their disposable income and the lumpsum direct taxes are imposed on workers rather than on non−workers. What is the value of the balanced budget multiplier?

(a) 0.5

(b) 1

(c) 2

(d) 2.5

Ans. (a) Balanced budget multiplier

$$= \frac{1}{(1-0.6)+(1+0.6)} = \frac{1}{2} = 0.5$$

DIRECTIONS (Q Nos. 34−40) **Study the following information very carefully and answer the questions that follow.**

Let Y: aggregate real output per year, P: the price level, C: money value of aggregate consumption expenditure per year, I: money value of aggregate investment expenditure per year, L: aggregate employment (in labour hours per year), L* : total labour supply (in labour hours per year) and w: hourly money wage rate. Let W denote the money value of aggregate wage income per year and R the money value of aggregate non−wage income per year.

Consider an economy in which labour is homogeneous, the aggregate productivity of labour (Y/L) is a constant 'a' and the price level (when output is below its full employment level) is a factor m times the wage cost per unit of aggregate output. The price at full employment is always greater than or equal to that at below full employment. In equilibrium, $PY = C + I$. **(2011)**

34. If $I = 4000, C = 1000 + 0.8W + 0.6R, w = 10, m = 4/3, a = 16$ $L^* = 2000$, what is the full employment level of output in the economy?

(a) 125

(b) 625

(c) 24000

(d) None of these

Ans. (d) At full employment level, the output will be

$$= a \times L^* = 16 \times 2000 = 32000$$

35. **If $C = 1000 + 0.8W + 0.6R, w = 10, m = 4/3, a = 16, L^* = 2000$ and output is below its full employment level, what is the increase in nominal income per unit increase in investment expenditure in the economy?**

(a) 2
(b) 4
(c) 8
(d) 16

Ans. (b) The nominal income per unit increase will be

$$4\left[\frac{32000}{0.8 \times 10 \times 1000}\right]$$

36. **If $I = 4000, C = 1000 + 0.8W + 0.6R, w = 10, m = 4/3, a = 16, L^* = 2000$, what is the price level in the economy?**

(a) 0.83 (approx)
(b) 0.93 (approx)
(c) 1.07 (approx)
(d) 1.16 (approx)

Ans. (a) The price level will be 0.83 units approx.

$$\frac{4 \times 0.6}{3} = 0.8$$

37. **If $I = 4000, C = 1000 + 0.8W + 0.6R, w = 10, m = \frac{4}{3}, a = 16, L^* = 2000$, what is the fraction of total labour supply which remains unemployed in the economy?**

(a) 5%
(b) 10%
(c) 12.25%
(d) 25%

Ans. (d) The fraction of labour which is employed

$$\frac{0.2}{0.8} \times 100 = 25\%$$

38. **If $C = 1000 + 0.8W + 0.6R, w = 10, m = \frac{4}{3}, a = 6, L^* = 2000$, but I increase from 4000 to 5000, what is the resulting change in the price level in the economy?**

(a) 0%
(b) 5% increase
(c) 10% increase

(d) 20% increase

Ans. (a) Increase in investment by 1000 will have no effect on the price level.

39. If $C = 1000 + 0.8W + 0.6R, w = 10, m = \frac{4}{3}. a = 16, L^* = 2000$ but I increases from 4000 to 7000, what is the resulting change in the price level in the economy?

(a) 0%
(b) 10% increase
(c) 20% increase
(d) 50% increase

Ans. (c) The increase in investment by 3000 will, result in a 20% increase in price level.

40. If $C = 1000 + 0.8W + 0.6R, w = 10, m = \frac{4}{3}, a = 16, L^* = 2000$, but I increase from 4000 to 7000, what is the change in the share of non–wage income in the total income of the economy?

(a) No change
(b) Increases by 1/8
(c) Increases by 1/6
(d) Increases by 1/5

Ans. (b) The share will increase by 1/8.

Hint: Change in share

$$= \left[\frac{1000}{1000 + 7000}\right]$$

Chapter 8

Foreign Trade, World Economies and International Organisations

SECTION A [1 Mark Each]

1. An increase in the international reserves of an economy indicates that (2013)

(a) ex–ante savings are higher than ex–ante investment
(b) ex–ante savings are lower than ex–ante investment
(c) ex–ante savings are equal to ex–ante investment
(d) Nothing can be said about ex–ante savings or ex–ante investment.

Ans. (a) An increase in the international reserves of an economy indicates that ex–ante savings are higher than ex–ante investment. Ex–ante savings are anticipated savings and ex–ante investments are anticipated investments. Increase in international reserves can be attributed to increase in national

income and according to Keynes, national income increase only when ex−ante savings exceed ex−ante investments.

2. For the countries in the European Union that share a common currency, the euro, which of the following is correct? (2013, 10)

(a) It is impossible to have different real exchange rates from one another.

(b) It is possible to have real exchange rates that are different from one another.

(c) The nominal and real exchange rates will always vary according to capital flows.

(d) The concept of real exchange rate is not relevant.

Ans. (b) Euro is the unit of the single European currency adopted in 1999 as part of European monetary union. It has a fixed value in terms of each country's domestic currency, e.g., 1.6 Deutschmarks or 200 Portugese escudos etc. Initially, the euro was only a common unit of account and a not a medium of exchange. But in 2002, it was recognized as a medium of exchange. Presently euro notes and coins circulate in seventeen countries of the Euro Union. The countries in the European Union, that share the euro currency, have the same nominal rate but their real rate of exchange can differ because it is based on relative price levels.

3. If an economy is a price taker in world markets for both export and import, the real exchange rate devaluation (2013, 10)

(a) Will have no effect on the balance of trade

(b) Will cause the balance of trade to improve

(c) Will cause the balance of trade to deteriorate

(d) Will turn a trade deficit into a balance

Ans. (a) If an economy is a price taker, then it implies that it cannot determine the price for its exports and imports. So, devaluation of domestic currency will neither affect the price of exports, nor the price of imports. So, the balance of trade will remain unaffected.

4. In recent years, the bottom 20% of the world's population are estimated to receive global income (2013, 10)

(a) Less than 1%

(b) Around 3%

(c) Around 5%

(d) Around 10%

Ans. (a) It is estimated that the bottom 20% of the world's population receives less than 1% of the global income. This is representative of growing income disparities.

5. The 'Gold Standard' refers to an international currency regime under which (2013, 10)

(a) Only gold was used in international transactions

(b) Only gold was used as money in domestic transactions

(c) Countries officially linked their money supply to a specific value of gold

(d) Countries officially linked the value of their money to a specific weight of gold

Ans. (d) Gold standard refers to a system for fixing exchange rates by the Central Bank or government of each country, making its currency freely convertible into gold at a fixed price. In this system, the par value of exchange rates is set by the amount of each currency that can be obtained for a given quantity of gold.

6. A country that has a trade deficit, experiences a nominal exchange rate depreciation. As a result (2013)

(a) The trade deficit will necessarily decline

(b) The trade deficit will necessarily increase

(c) The exchange rate depreciation will cause domestic inflation: so there will be no impact on the trade deficit

(d) Nothing can be said about the trade deficit without more information

Ans. (d) A depreciation in nominal exchange rate has two conflicting effects.

(i) The volume of exports will tend to increase.

(ii) The value of imports will also increase. So, the net effect on trade deficit can go either way. However, if the Marshall Lerner condition is fulfilled, then the trade deficit will decline.

7. In the WTO's agreement on agriculture, 'blue box' subsidies refer to (2013)

(a) Measures to subsidise agricultural exports

(b) Measures to provide income support to farmers

(c) Measures to incentivize famers to make their cultivation more environment friendly

(d) Measures to protect certain crops

Ans. (a) Blue box subsidies are basically the measures to subsidise agricultural exports so that the global demand for agricultural products is accelerated and incentivize cultivation is undertaken.

8. In terms of current annual human caused greenhouse gas emissions (2011)

(a) The US is responsible for both the highest per capita and total emissions

(b) China is responsible for the highest total (but not per capita) emissions

(c) China is responsible for the highest per capita and total emissions

(d) The US is responsible for the highest total (but not per capita) emissions

Ans. (b) In terms of current annual human caused greenhouse gas emissions, China is responsible for the highest total emissions.

9. Income distribution of most countries follows (2011)

(a) Linear pattern

(b) Normal distribution

(c) Sinusoidal curve

(d) log–normal distribution

ans. (d) Income distribution of most countries follows a log−normal distribution. A log−normal distribution is one in which the logarithm of the variable is normally distributed. This distribution

naturally results from the effects of a large number of independent multiplicative sources of variation, which is a distinct feature of an income distribution. The log−normal distribution is upward skewed, with the value of mean greater than that of median.

10. The current account balance in an open economy (2010)

(a) Always includes the balance on investment income.

(b) Never includes the balance on investment income.

(c) Includes the balance on investment income and flows of investment.

(d) Includes flows of investment but not the balance on investment income.

Ans. (a) The current account balance records all those transactions which do not cause any change in assets and liabilities situations of the country. Investments affect the assets and liabilities position and not investment income. Therefore, investment incomes form a part of the current account balance.

11. Infant industry protection is (2010)

(a) The policy of ensuring that children are not adversely affected by industrial pollution.

(b) The policy of protecting a new domestic industry from lower cost imports.

(c) The policy of providing bank credit to industries run by weaker off sections.

(d) The policy of subsidizing imports in newly industrialized countries.

Ans. (b) The infant industry argument is based on the flowing maxim, "Nurse the baby, protect the child and free the adult". The above maxim means that an economy should follow the practice of protection of domestic industries only in the initial stages of economic development.

12. If Canada has a comparative advantage in the protection of wheat compared to the US, it means that (2010)

(a) The opportunity cost of producing wheat is higher in Canada than in US.

(b) The opportunity cost of producing wheat is lower in Canada than in the US

(c) With free trade, Canada will export all of its wheat

(d) With free trade, the US will not produce any wheat

Ans. (b) The 'comparative advantage theory' was given by Ricardo. According to Ricardo's theory, if a country has a comparative advantage of producing a commodity, then it implies that the opportunity cost of producing that commodity is lower in that particular country.

13. The Economics for the year 2009 was awarded to (2010)

(a) Elinor Ostrom and Oliver Williamson.

(b) Paul Krugman.

(c) John Nash

(d) Robert Aumann and Thomas Schelling

Ans. (a) The Economics Nobel Prize for the year 2009 was awarded to Elinor Ostrom for her analysis of economic governance and to Oliver Williamson for his analysis of economic governance related to the boundaries of firm.

14. The country with the largest external debt in the world today is (2010)

(a) Brazil

(b) Argentina

(c) China

(d) United States

Ans. (d) United States has the largest external debt in the world today.

15. In the list of four countries given below, choose the one which has a positive trade surplus (2010)

(a) USA

(b) Great Britain

(c) Greece

(d) China

Ans. (d) China has a positive trade surplus among the countries mentioned because of its huge volume of exports.

16. The 'sub−prime lending' crisis was originated in (2010, 08)

(a) India

(b) USA

(c) UK

(d) China

Ans. (b) The 'sub−prime lending' crisis originated in the USA. Sub−prime lending means lending to an individual with a low credit rating and high risk of default. Sub−prime lending was common in USA in the real estate sector.

17. The terms of trade are (2010)

(a) The countries production possibilities curve

(b) The autarky equilibrium

(c) The exchange rate of the two goods being traded

(d) The value of exports

Ans. (c) The terms of trade refer to the rate at which one country exchanges its goods for the goods of the other countries. Thus, terms of trade determines the international value of commodities.

18. Autarchy means that (2010)

(a) A country's consumption possibilities are given by its production possibilities

(b) Equilibrium attained with the maximum gains from specialization and trade

(c) Equilibrium has been reached with the maximum amount of international trade

(d) The nation has such a high standard of living that there are no poor people

Ans. (a) Autarchy literally means 'absence of trade'. It refers to the state of equilibrium attained by the country by reaping maximum gains of specialization and trade.

19. The United States is a major exporter of (2010)

(a) Diamond

(b) Bauxite

(c) Coffee

(d) Corn

Ans. United States is a major exporter of corn.

20. The Marshall Lerner conditions relate to the effect on the balance of trade of (2009)

(a) Deflation

(b) Deindustrialization

(c) Depression

(d) Devaluation

Ans. (d) The Marshall Lerner conditions studies the effect of devaluation of a currency on its balance of trade.

21. During the great depression (2009)

(a) Unemployment and prices increased and output decreased

(b) Unemployment increased and output and prices decreased

(c) Unemployment and prices decreased and output increased

(d) Unemployment and output decreased and prices increased

(e) Unemployment and output increased and price decreased

Ans. (b) The world witnessed a great depression in the year 1930−32. During this period, the unemployment levels were quite high and output and prices decreased due to a lack in demand.

22. The Gini coefficient provides a measure of (2009)

(a) The level of poverty

(b) The level of relative inequality

(c) Disguised unemployment

(d) The rate of growth

(e) None of the above

Ans. (b) The Gini coefficient is a measure of relative inequalities in income distribution. It was proposed by Italian statistician Corrado Gini in 1912. This coefficient varies between 0, which reflects compete equality and 1, which reflects complete inequality.

23. The terms of trade for a country refers to (2008)

(a) The ratio of its currency to other countries

(b) The ratio of its export prices to import prices

(c) The ratio of the value of its exports to the value of its imports

(d) The ratio of its exports production costs to import production costs

(e) None of the above

Ans. (b) The terms of trade for a country refers to the ratio of its export prices to imports prices.

24. Over the last two years the US Dollar has been (2008)

(a) Appreciating with respect to other major currencies

(b) Depreciating with respect to other major currencies

(c) Showing no trend with respect to other major currencies

(d) All of the above

(e) None of the above

Ans. (b) Over the period between 2006 to 2008, the US Dollar has been depreciating with respect to other major currencies.

25. Suppose Japanese shareholders own 49% and Indian shareholders 51% of the shares of a firm producing automobiles in India. The profits earned by Japanese shareholders of the firm form (2007)

(a) Part of Indian GDP and part of Japanese GNP

(b) Part of Indian GDP and part of Indian GNP

(c) Part of Indian GNP and part of Japanese GNP

(d) None of the above

Ans. (a) The profits earned by Japanese shareholders will form a part of Indian GDP as the firm producing automobiles is within the domestic territory of India and also a part of Japan's GNP as net factor income from abroad.

SECTION B [2 Marks Each]

26. A 10 kg basket of Royal Delicious Grade A apples sells for $15 in the US and the same apples are prices in India at Rs. 100 per kg. The nominal exchange rate is Rs. 50 per US dollar. What will be the real exchange rate based on apples alone? (2009)

(a) 25

(b) 0.25

(c) 0.15

(d) None of these

Ans. (c) The real exchange rate is defined as the ratio of prices of the two countries.

Real exchange rate

$$= \frac{Price\ in\ foreign\ country}{Price\ in\ domestic\ country} = \frac{15}{100} = 0.15$$

27. Consider an economy where the balance of payments in a particular year is characterized by the following in million dollars

Current account balance $= -400$

Capital exports $= 700$

Imports $= 800$

Change in reserves$= -100$

Net visible receipts $= 100$

What is the value of export from this economy? **(2007)**

(a) **400**
(b) **300**
(c) **100**
(d) **None of these**

Ans. (b) Current account balance =Exports of goods –Imports of goods +Net invisible receipts

$$400 = x - 800 + 100$$

$$\therefore x = 300$$

SECTION C [1 Mark Each]

DIRECTIONS (Q Nos. 28–31) **Read the following passage very carefully and answer the questions that follow.**

Unless an appropriate relationship exist between the growth rates of agriculture and industry, the terms of exchange between them must alter. Since agricultural prices typically tend to respond much more rapidly than do the prices of industrial products to changes in the balance between supply and demand, their behavior determines in large part the behavior of the general price level. Thus, in a situation where agricultural growth is tending to lag to an inappropriate extent behind both the growth of industrial output and the growth of real income, excess demand pressure tend to appear in the agricultural product market.

Whether excess demand or excess supply pressures exist in the industrial market depends on the balance between investment and saving; but in either case, if agricultural prices are more flexible than industrial prices, then the required improvement in the terms of exchange of agriculture tends to be brought by an absolute rise in agricultural prices, rather than by a fall in industrial prices. This is not just an immediate or short−run effect, for the rise in agricultural prices tends to generate consequential pressures on costs of production in industry, partly through a direct effect on raw materials costs in industry, and partly, perhaps, through an induced effect on industrial money wages. Industrial prices may therefore be prevented from falling, even in a market where, there tends to be excess supply; and indeed, if the cost pressures are substantial enough, they may even begin to rise. In this way, the improvement in agriculture's terms of exchange produces a rise in the general price level.

Such a development is more likely to take place as the result of a spontaneous slowing down in the rate at which agricultural output is growing, relatively to other outputs; but it may also occur if the improvement in agriculture's terms of exchange is being produced by an acceleration in the rate of growth of industry. For opposite reasons, an acceleration in the rate of growth of agricultural output can produce a fall in the general price level. **(2011)**

28. According to the author, agricultural prices largely determine the behavior of the general price level, because

(a) Agricultural growth, tends to lag behind industrial growth

(b) Agricultural prices respond to changes in demand supply balances faster than industrial prices.

(c) An appropriate relationship exists between agricultural and industry.

(d) Excess demand pressures always appear in this sector

Ans. (b) According to the author, agricultural prices largely determine the behavior of general price level because they respond to change in demand and supply faster than industrial prices.

29. Excess demand in the industrial market depends upon

(a) The excess demand in agriculture

(b) Whether agricultural prices are more flexible than industrial prices

(c) Whether cost pressures are substantial enough

(d) The balance between saving and investment

Ans. (d) As per the passage, excess demand in the industrial market depends upon the balance between savings and investment.

30. The rise in agricultural prices

(a) Has only a short–run effect on industrial prices

(b) Increases industrial costs of production

(c) Creates excess supply in industry

(d) Generates a spontaneous slowing down of agriculture output

Ans. (b) The rise in agricultural prices increase the industrial costs of production because agricultural products serve as raw material for industrial products.

31. An improvement in agriculture's terms of trade with industry

(a) Can occur when there is balance between investment and saving

(b) Occurs when industrial prices are prevented from falling

(c) Can produce a rise in the general price level

(d) Is the result of substantial cost pressure in industry

Ans. (c) An improvement in agriculture's terms of trade with industry can produce a rise in general price level.

Chapter 9

Indian Economy

SECTION A [1 Mark Each]

1. **Between 1750 and 1900, India's shares in world manufacturing output (2013)**

(a) Increased from 2% to 15%.
(b) Increased from 7% to 25%.
(c) Fell from 25% to 2%.
(d) Stayed at around 15%.

Ans. (c) Because of the discriminatory policy of the Britishers between the period of 1750 and 1900, India's share in world manufacturing output fell from 25% to 2%.

2. **Which of the following is used to determine the value added in agriculture in India? (2013)**

(a) Input –output approach
(b) Weather predictions
(c) Crop cutting experiments
(d) Cost surveys of the Ministry of Agriculture

Ans. (a) Value added in the agriculture sector is determined by the input−output approach. Symbolically,

Value added $=$ Value of output –value of input

3. **Which of the following indicators is not included in computing the Human Development Indices calculated by the UNDP? (2013)**

(a) Life expectancy at birth
(b) Adult literacy rate
(c) Combined primary, secondary and tertiary enrollment
(d) Headcount poverty ratio

Ans. (c) Human Development Index is a composite statistic of life expectancy, education and income indices used to rank countries in four groups of human development. It was created by Pakistani economist Mahbub−Ul−Haq and Indian economist Amartya Sen in 1990.

4. **Stagflation describes a situation of (2013, 11)**

(a) Rising prices and rising output
(b) Rising prices and falling or stagnant output
(c) Falling or stagnant prices and rising output
(d) Falling or stagnant prices and falling or stagnant output

Ans. (b) Stagflation describes a situation of rising prices and falling or stagnant output. India witnessed this phenomenon in 1990−91, where inspite of inflation, the production was falling.

5. Which of the following institutions in India is not a constitutional body? (2013)

(a) The National Finance Commission

(b) State Finance Commissions

(c) The National Planning Commission

(d) District Planning Committees

Ans. (c) The National Planning Commission is not a constitutional body. It is a statutory body.

6. In 1990–91, the price index of agricultural commodities was 200 and that of manufactured products 150. In a year's time both the indices increased by 15 (i.e., the price index of agricultural commodities became 215 and that of manufactured products 165). Consequently, the terms of trade between agriculture and industry (2013)

(a) Moved in favour of agriculture

(b) Moved in favour of industry

(c) Remained unchanged

(d) None of the above

Ans. (b) The terms of trade between agriculture and industry moved in favour of industry.

Terms of trade can be calculated as

$$= \frac{Price\ index\ of\ agricultural\ commodities}{Price\ index\ of\ manufactured\ commodities}$$

Terms of trade for 1990–91$= \frac{200}{150} = 1.33$

Terms of trade for 1991–92$= \frac{215}{165} = 1.30$

A fall in the ratio indicates that the proportionate share of manufacturing sector has risen.

7. The Right to Education Act, 2009 covers all children (2013)

(a) Upto 11 years of age

(b) Upto 14 years of age

(c) In the age –group of 6 to 14 years of age

(d) In the age–group of 6 to 16 years of age

Ans. (c) The Right to Education Act, 2009 covers all children in the age–group of 6–14 years. Thus act aims at providing free and compulsory education to all children in the above specified age group.

8. During the last two decades of the 2oth century, India's labour force has grown at the rate of (2011)

(a) 1.5% per annum

(b) 2.5% per annum

(c) 3.5% per annum

(d) 4.5% per annum

Ans. (b) During the last two decades of the 20th century, India's labour force has grown at the rate of 2.5% per annum.

9. The famous book titled, Poverty and Un−British Rule in India was authored by (2011)

(a) WC Bonnerjee

(b) Dadabhai Naoroji

(c) RC Dutt

(d) Lala Lajpat Rai

Ans. (b) The famous book 'Poverty and Un−British Rule in India' was authored by Dadabhai Naoroji.

10. The annual average rate of employment generation in India during the decade of 1990s, compared to 1980s, was approximately (2011)

(a) Thrice

(b) Twice

(c) Same

(d) Half

Ans. (d) The annual average rate of employment generation during the decade of 1990s was half of that in 1980s.

11. The share of the primary sector in the Indian Labour Force in 2000 was approximately around (2010)

(a) 50%

(b) 60%

(c) 67%

(d) 80%

Ans. (c) The share of primary sector in the Indian Labour Force in 2000 was approximately around 67%.

12. The beginning of modern industry in India occurred in (2010)

(a) The late 18th century

(b) The beginning of the 19th century

(c) The middle of the 19th century

(d) The turn of the 20th century

Ans. (c) The advent of the modern industry in India was initiated in the middle of the 19th century.

13. Which one of the statements given below is correct for the year 2000−01? (2010)

(a) The primary sector of the Indian economy is 50% of the GDP.

(b) The tertiary sector of the Indian economy is 50% of the GDP.

(c) The GDP contribution of the primary sector of the Indian economy is larger than that of the secondary sector.

(d) The GDP contribution of the sec0ondary sector of the Indian economy is larger than that of the tertiary sector.

Ans. (b) In 2000–01, the share of the tertiary sector in the India economy was 50% of the GDP.

14. According to the official estimates, the proportion of people living below the poverty line in India is (2009)

(a) Below 15%
(b) Between 15 and 25%
(c) Between 25 and 45%
(d) Above 45%

Ans. (b) According to the official estimates, the proportion of people living below the poverty line in India is 22%. Poverty line has been defined with reference to calorie intake. The relevant levels are 2400 calories for rural population and 2100 calories for urban population.

15. The dependency ratio is the ratio of (2009)

(a) Children to adults in the population
(b) Unemployed to employed workers in the labour force
(c) Foreign aid to total GNP
(d) non–working age–group population to working age–group population
(e) none of the above

Ans. (d) Dependency ratio is the ratio of non–working age–group population to the working age–group population. Population below 15 years and above 65 years are assumed to be non–working.

16. Which of the following constitutional amendments deals with the Panchayati Raj Institutions? (2008)

(a) 43rd amendment
(b) 73rd amendment
(c) 86th amendment
(d) 93rd amendment
(e) 2nd amendment

Ans. (b) The 73rd Amendment deals with the Panchayati Raj Institutions.

17. India's current annual income per head of population (i.e., net national product per capita at factor cost), as given in the Economic Survey, 2008 is (2008)

(a) Rs. 16000
(b) Rs. 33000
(c) Rs. 22000
(d) Rs. 12000
(e) Rs. 40000

Ans. (b) India's current annual income per head of population, as given in the economic survey of 2008 is Rs. 33000.

18. Which of these is used in calculation the Human Development Index? (2007)

(a) Level of income measured by per capita GDP.
(b) Educational attainment measured by literacy and school attendance.
(c) Condition of health measured by life expectancy.
(d) All of the above

Ans. (d) Human Development Index is calculated on the basis of the three parameters given, i.e., level of income, level of education and life expectancy.

19. In 2006–07, the National Rural Employment Guarantee Programme entitled (2007)
(a) 100 days of employment to all rural families in 200 districts of India.
(b) 100 days of employment to all adults in 200 districts of India
(c) 100 days of employment to all rural families in India
(d) 100 days of employment to all adults in India.

Ans. (a) The National Rural Development Guarantee Programme aims at providing 100 days of guaranteed wage employment in a financial year in 200 districts, to every household whose adult members volunteers to do unskilled manual work.

20. Savings rate in India is (2007)
(a) About 10%
(b) About 30%
(c) About 50%
(d) About 70%

Ans. (b) Savings rate in India is about 30%.

SECTION C [1 Mark Each]

DIRECTIONS (Q Nos. 21–22) **Study the following information very carefully and answer the questions that follow.**

According to the Constitution of India, "Where any law makes any provision for the acquisition by the state of any estate or where any land comprised therein is held by a person under his personal cultivation, it shall not be awful for the state to acquire any portion of such land as is within the ceiling limit applicable to him under any law for the time being in force or any building or structure standing thereof, unless the law relating to the acquisition of such land, building or structure, provides for payment of compensation at a rate which shall not be less than the market value thereof." [Article 31 A(e)] **(2013)**

21. On this basis, which of the following statements is correct?
(a) The state must pay full market value for all land acquired from a cultivator.
(b) Only land without buildings and structures can be acquired by the state.
(c) Only a person cultivating the land personally is eligible for compensation.
(d) Land above designated ceiling limits can be acquired by the state without compensating for its market value.

Ans. (d) On the basis of the given passage, the government will compensate at a rate which is not less than the market rate, for the land acquired, if the holder's total holding is below the ceiling limits. For land above designated ceiling, government can acquired it without compensating for it at its market value.

22. On this basis, which of the following statements is not correct?
(a) Laws relating to land acquisitions by the state must provide for some compensation.
(b) Landlords with tenant cultivators on the acquired land must share some of the compensation with their tenants.
(c) Acquisition laws supply to land and to built structures on land.
(d) Even without a law relating to land acquisition, states can acquire land.

Ans. (b) On this basis, it is not correct that landlords with tenant cultivators should share the amount of compensation with tenants.

DIRECTIONS (Q Nos. 23–25) **Read the following passage very carefully and answer the questions that follow.**

India is a country which will severely impacted by climate change. This puts additional hurdles in its developmental path in addition to the challenges of poverty eradication and growing population. The projected impacts of climate change cut across various sectors, natural system such as coastal areas, water resources, forests, agriculture and health. With a large agrarian population, India is vulnerable to changes in weather parameters.

Further, rainfall variability and melting of glaciers will impact replenishment of rivers, thereby affecting availability of water in river basins and watersheds. In India, most of the rivers flowing in the Northern regions are dependent on snow and glacier melt; thus climate change threatens the perennial nature of these rivers. This has huge implications for agriculture and allied activities and resultant livelihoods. This is a serious concern for an economy that is tied to its natural resources base along its developmental path. **(2012)**

23. The primary issue dealt with in this paragraph is
(a) Population growth
(b) Climate change
(c) Agriculture
(d) Glaciers

Ans. (b) The primary issue dealt with in this passage relates to 'climate change'.

24. It is argued in the paragraph that climate change will by itself
(a) Increase poverty
(b) Make no difference to poverty in India
(c) Put hurdles in the way of poverty eradication
(d) Reduce inequalities in society

Ans. (c) In the paragraph, it is stated that climate change put hurdles in the way of poverty eradication by adversely affecting the agricultural production.

25. It is argued in the paragraph that climate change is a result of
(a) Large agrarian population
(b) India's long coastline
(c) Lots of glaciers in the mountains
(d) None of the above

Ans. (d) The paragraph only discusses the impact of the climate change and not the reasons behind the climate change.

Chapter 10

Statistics and Business Mathematics

SECTION A [1 Mark Each]

1. The function $f(x) = log_{10}\, x$ is continuous over the interval (2013, 10)
(a) $(-\alpha, \alpha)$ **where a > 0**
(b) $(-\infty, +\infty)$
(c) $[-a, a]$**, where a > 0**
(d) $(0, 1)$

Ans. (d) Log x is not defined for zero and negative values of x. Therefore, the function $f(x) = log_{10}\, x$ will be continuous over the interval (0, 1).

2. Let X and Y be random variables with $V[X] = 2, V[Y] = 4, and\ Cov\ (X, Y) = 2$. Let $W = 2X + 3Y$. Then, V[W] is (2013)
(a) 68
(b) 44
(c) 48
(d) 16

Ans. (a) $V[W] = 2^2 \times Var\ [X] + 3^2 \times Var\ [Y] + 2 \times 2 \times 3 \times Cov\ (X, Y) = 4 \times 2 + 9 \times 4 + 12 \times 2 = 68$

3. Which of the following is indicative of an inverse relationship between X and Y? (2013)
(a) A scatter plot whose points are shaped like a circle.
(b) A scatter plot with points mostly in the lower left and upper right quadrants.
(c) A negative correlation coefficient.
(d) A negative P–value for the correlation coefficient

Ans. (c) A negative correlation coefficient is indicative of an inverse relationship between X and Y.

4. **Which of the following is not correct regarding the estimated slope of the regression line? (2013)**

(a) It is divided by its standard error to obtain its t−statistic.
(b) It shows the change in Y for a unit change in X.
(c) It is chosen so as to minimize the sum of squared errors.
(d) It may effectively be regarded as zero, if its P−value is below 0.01.

Ans. (d) The estimated slope of the regression line can effectively be regarded as zero, if its P−value is below 0.01.

Hence, P−value is the value of correlation coefficient.

5. **Fuel and power have a weight of 15% in India's official Wholesale Price Index (WPI). If there is a 20% increase in the price index for the fuel and power sub group, then the contribution this would make to inflation measured by the WPI would be (2013)**

(a) Exactly 3% points
(b) Less than 3% points
(c) More than 3% points
(d) More than 10% points

Ans. (a) The increase in inflation will be $15 \times 20\% = 3\%$, because of a 20% increase in the wholesale price index for fuel and power.

6. **Consider the following statements about a two−person simultaneous−move game in which each person has two pure strategies.**

1. **If the game has a unique Nash equilibrium which is Pareto−dominated by some other strategy profile, then it has a prisoner's dilemma game.**
2. **If the game is a Prisoner's dilemma game, then it has a unique Nash equilibrium which is Pareto−dominated by some other strategy profile.**

Which of the following is true? (2013)

(a) 1 is true but 2 is false.
(b) 1 is false but 2 is true.
(c) Both 1 and 2 are true.
(d) Both 1 and 2 are false.

Ans. (d) Nash equilibrium is a condition when no player has an initiative to change their strategies, given the strategies chosen by other players. Pareto –dominated equilibrium is a form of allocation in which there is no feasible reallocation that can raise the welfare of one economic agent without lowering the welfare of the other.

A prisoner's dilemma game is a two players game that illustrates the conflict between private and social incentives and the gains that can be obtained from making binding commitments. A Prisoner's dilemma game has a Nash equilibrium which is not Pareto−efficient. Hence, both the statements are false.

7. The intersection of three distinct planes in the three−dimensional space is (2013)

(a) A point

(b) A straight line

(c) A point or a straight line

(d) Neither a point nor a straight line

Ans. (a) The intersection of three distinct planes in a three−dimensional space is given by a point.

8. The sampling distribution refers to (2013)

(a) The distribution of various sample sizes which might be used in a given study.

(b) The distribution of different possible values of a statistic together with their respective probabilities of occurrence.

(c) The distribution of the values of the items in the population

(d) The distribution of the values of the items actually selected in a given sample.

Ans. (d) Sampling distribution gives distribution of the values of items actually selected from a given sample.

9. Which of the following statements must be incorrect to describe a set of properties for the probability distribution of a random variable X? (2013)

(a) $\boldsymbol{E(X) = 0}$

(b) Standard Deviation $\boldsymbol{(X) = -1}$

(c) Variance $\boldsymbol{(X) = 1}$

(d) The distribution of X is not symmetric about E(X).

Ans. (b) The standard deviation of a probability distribution of a random variable X, cannot be negative.

10. Suppose interest is compounded half−yearly at the rate of $\boldsymbol{10\%}$ **per annum. If the present value of an asset, which returns a fixed sum of Rs. X after one year and nothing thereafter, is Rs. 50000, then X is equal to (2013, 10)**

(a) Rs. 54750

(b) Rs. 55000

(c) Rs. 55125

(d) Rs. 55250

Ans. (c) By using the formula,

Amount = Present value $\left(1 + \frac{r}{200}\right)^{2n}$

$$\therefore X = 50000\left(1 + \frac{10}{200}\right)^{2\times1}$$

$$= 50000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= Rs.55125$$

11. Suppose two trials of a random experiment, in which a fair coin is tossed and a fair die is rolled simultaneously, are carried out under the same condition. What is the probability that the outcome 'the coin shows a head and the die shows a number divisible by 3' is observed in atleast one trial? (2013)

(a) 9/144
(b) 44/144
(c) 60/144
(d) 80/144

Ans. (b) Sample space of the above experiment is given by: [H1, H2, H3, H5, H6, T1, T2, T3, T4, T5, T6], i.e., total of 12 outcomes are possible. Out of the given outcomes, 2 outcomes of H3 and H6 are favorable, i.e., probability of a favorable outcomes =2/12 and probability of unfavorable outcome= 10/12.

∴ Probability of favorable outcomes in atleast 1 trial

$= 1 -$Probability of unfavorable outcomes in both trials

$$= 1 - \left[\frac{10}{12} \times \frac{10}{12}\right]$$

$$= 1 - \frac{100}{144} = \frac{44}{124}$$

12. Which of the following conditions is not necessary for ordinary least squares to be the Best Unbiased Linear Estimator (BULE)? (2013)

(a) All errors are normally distributed.
(b) All errors are independent and uncorrelated to each other.
(c) All errors have expectation zero.
(d) All errors have the same variance.

Ans. (c) According to the Gauss−Markov theorem, the Best Unbiased Linear Estimator (BLUE) would be one in which all errors have an expectation of zero.

13. Populations of two species A and B at time 0 are equal. If the instantaneous rate of growth of populations of species A and B are u and (u+1) respectively, u > 0, then at time 1 the population of species B would be
(2013)

(a) Twice the population of species A
(b) Log 10 times of the population of species A.
(c) e^u times the population of species A.
(d) e times the population of species A.

Ans. (d) Ratio of population of species B to species A

$$= \frac{a + \frac{(u+1)a}{100}}{a + \frac{ua}{100}}$$

The above ratio will be more than zero. Therefore, the population of species B would be e times the population of species A, where 'e' is a variable.

14. A theorem states that 'if P then Q'. from empirical observations, it is known that P is false. Therefore, it can be inferred that (2013)
(a) Q is false
(b) Q is true
(c) The theorem 'if P then Q' is false
(d) None of the above

Ans. (d) From the given value of P, nothing can be inferred about Q. it can either be true or false. So, none of the above holds true.

15. In an election, half the electors voted for candidate A and two−third voted for candidate B. 10 electors voted for both A and B. 6 electors voted neither for A nor B. How many electors were there? (2013)
(a) 18
(b) 24
(c) 36
(d) None of the above

Ans. (b) According to the information given, the total number of electors can be given by

$$x = \frac{1}{2}x + \frac{2}{3}x - 10 + 6$$

$$\Rightarrow \frac{7x}{6} - x = 4$$

$$\Rightarrow x = 24$$

16. If you integrate 1/x over the interval [1, y], where y > 1, you get (2013)
(a) log y (which is the natural logarithm of y)
(b) log (y+1) (which is the natural logarithm of y+1)
(c) e^y

(d) None of these

Ans. (a) The integration of 1/x over the interval [1, y]; where y > 1 is equal to log y (which is the natural logarithm of y).

17. Let set A contains m elements and set B contains n elements. Then the number of distinct from set A to set B which can be constructed is (2013)

(a) $\boldsymbol{m^n}$
(b) $\boldsymbol{n^m}$
(c) $\boldsymbol{m+n}$
(d) mn

Ans. (b) The number of distinct function from set A to set B which can be constructed are n^m.

18. Which of the following sets is empty? (2013)

(a) {x is a real number |$\boldsymbol{x = x}$**}**
(b) {x is a real number |$\boldsymbol{x \neq x}$**}**
(c) {x is a real number |$\boldsymbol{x = x^2}$**}**
(d) {x is a real number |$\boldsymbol{x \neq x^2}$**}**

Ans. (b) x is a real number such that $x \neq x$ will be an empty set.

Hint: $x = x^2$ will hold true for 1, i.e., $x \neq x^2$ will hold true for all values except 1.

19. For events A and B,

1. **The probability of event A is p.**
2. **The probability of event B is q.**
3. **The probability of event AB is r.**

Which of the following is true?

(a) Probability {either A or B or both} $\boldsymbol{= p+q}$
(b) Probability {either A or B or but not both}$\boldsymbol{= p+q-r}$
(c) Probability {either A or B but not both}
(d) None of the above

Ans. (c) Probability that only event 'A' occurs $= P(A) - P(A \cap B) = p - r$

Probability that only event 'B' occurs $= P(B) - P(A \cap B) = q - r$

Probability that either event A or event B will occur $= p - r + q - r = p + q - 2r$

20. Let 'a' be strictly negative real number and let b be a strictly positive real number. Which of the following is true? [Note that, |x| stands for the absolute value of x] (2013)

(a) |a| < b if and only if –b < a < b
(b) |a| < b if and only if –b > a > b

(c) |a| < b if and only if –b > a

(d) None of the above

Ans. (a) Condition specified in option (a) will hold true.

21. Let |x| stands for the absolute value of x. Then, the function $f(x) = |x|$ is (2013)

(a) Differentiable everywhere including the point '0'

(b) Differentiable everywhere excluding the point '0'

(c) Differentiable everywhere excluding the points '0', '1', –'1'

(d) None of the above

Ans. (b) Function $f(x) = |x|$ is differentiable everywhere excluding the point '0'.

22. In regression analysis, a standardized variable (2012)

(a) Has a mean of 0 and a standard deviation of 1.

(b) Is always normally distributed

(c) Has a bell–shaped distribution

(d) None of the above

Ans. (a) In regression analysis, a standardized variable has a mean of 0 and a standard deviation of 1.

23. Consider the following null and alternative hypothesis:

$$\boldsymbol{H_0 : \pi = 0.16}, \qquad \boldsymbol{H_1 : \pi} > 0.16$$

The above setup (2012)

(a) Indicates a one–tailed test with a rejection area in the right tail.

(b) Indicates a one–tailed test with a rejection area in the left tail.

(c) Indicates a two–tailed test with an acceptance region in the right tail.

(d) Indicates a two–tailed test with a rejection area in the right tail.

Ans. (a) The above setup is indicative of a one–tailed test with a rejection area in the right tail, since the value of $H_1 > H_0$.

24. If the population of a country increases by 20% in 10 years, the annual exponential growth rate of the population is (2012)

(a) 2%

(b) More than 2%

(c) Less than 2%

(d) None of these

Ans. (c) The annual exponential growth rate of population will be less than 2% in case of compound rate of growth.

25. If three corners of a parallelogram are (1, 1), (4, 2) and (1, 3) then the fourth corner is (2012)

(a) (4, 4)

(b) (4, 0)

(c) (−2, 2)

(d) (4, 4) or (4, 0) or (−2, 2)

Ans. (c) Since, the diagnosis of parallelograms intersect at midpoint, so the coordinates of the point of intersection of the diagonal joining the coordinates (1, 1) and (1, 3) will be (1, 2).

Where coordinates of X−axis

$$= \frac{x_1 + x_2}{2}$$

$$= \frac{1+1}{2} = 1$$

And where coordinate of Y−axis

$$= \frac{y_1 + y_2}{2}$$

$$= \frac{1+3}{2} = 2$$

Let the coordinate of fourth corner be a and b, then

$$\frac{a+4}{2} = 1$$

$$a = -2$$

$$and \frac{b+2}{2} = 2$$

$$b = 2$$

Therefore, the coordinates of fourth corner will be −2 and 2.

26. Let $S = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \frac{1}{5^2} + \cdots$ Which of the following is true? (2012)

(a) $S = 6$

(b) $S = 8$

(c) The sum does not converge to any finite value.

(d) None of the above.

Ans. (d) The sum of the above progression will converge to a finite value of either 2 or 3. Therefore, none of the above holds true.

27. Given two numbers, $a = \left(3\sqrt{7} + 4\sqrt{7}\right)^2$ and $b = 343$, which of the following must be true? (2012, 10, 08)

(a) $a > b$

(b) $b > a$

(c) $a = b/2$

(d) $a = b$

Ans. (d) Value of $a = \left(3\sqrt{7}\right)^2 + \left(4\sqrt{7}\right)^2 + 2 \times 3\sqrt{7} + 4\sqrt{7} = 343$

$$\therefore a = b$$

28. A_1, A_2 and A_3 are independent events. The probability of event A_i is $p_i, i = 1, 2, 3$. The probability of the event $U_{i=1}^{3} A_i$ is equal to (2012)

(a) $p_1 + p_2 + p_3$

(b) $1 - (1 - p_1) \times (1 - p_2) \times (1 - p_3)$

(c) $p_1 \times p_2 \times p_3$

(d) None of the above

Ans. (b) The probability of the event, $U_{i=1}^{3} A_i$ will be equal to

$$1 - (1 - p_1) \times (1 - p_2) \times (1 - p_3)$$

29. A student must choose one of the subjects –Physics, Chemistry or Mathematics for study. She is equally likely to choose Physics or Chemistry and twice as likely to choose Mathematics. The probability that the student chooses Mathematics is (2012)

(a) 1/3

(b) 1/4

(c) 1/2

(d) None of these

Ans. (c) Let her chances of selecting Physics and Chemistry be x. Then her chance of selecting Mathematics will be 2x.

$$\therefore Required\ probability = \frac{2x}{x + x + 2x} = \frac{2x}{4x} = \frac{1}{2}$$

Hence, the probability that a student chooses Mathematics will be ½.

30. 0.036×0.02 is equal to (2012)

(a) 0.0072

(b) 72×10^{-5}

(c) 0.000072

(d) None of these

Ans. (b) $\because 0.036 \times 0.02 = 0.00072$

$$Or, 72 \times 10^{-5} = 72 \times \frac{1}{100000} = 0.00072$$

Therefore, option (b) is correct.

31. x and y are real numbers such that x < y. Which of the following claims must be correct? (2012)

(a) $x^2 < y^2$

(b) $y^2 < x^2$

(c) $x < x^2$

(d) None of these

Ans. (d) None of the above mentioned claims hold true. X and Y are real numbers, i.e., they can be positive, as well as, negative numbers. Condition (a) will hold true in case of positive numbers only. Condition (b) will hold true in case of negative numbers only. Condition (c) will not hold true for 1 or −1. Therefore, none of the conditions necessarily hold true.

32. The probability of drawing two spades from a deck of 52 cards without replacement is (2012)

(a) Greater than 1/16

(b) Equal to 1/16

(c) Less than 1/16

(d) None of these

Ans. (c) Probability of drawing two spades from a deck of 52 cards without replacement

$$= \frac{13}{52} \times \frac{12}{51} = \frac{156}{2652} = 0.0588 < \frac{1}{16} \; or \; 0.0625$$

Hence, the probability of drawing two spades from a deck of 52 cards without replacements is less than 1/16.

33. The probability of drawing two aces from a deck of 52 cards is (2012)

(a) Greater with replacement than without replacement.

(b) The same with replacement as without replacement.

(c) Less with replacement than without replacement.

(d) None of the above

Ans. (a) Probability of drawing two aces without replacement

$$= \frac{4}{52} \times \frac{3}{51} = \frac{12}{2652} = 0.0045$$

Probability of drawing two aces with replacement

$$= \frac{4}{52} \times \frac{4}{52} = \frac{16}{2704} = 0.0059$$

Hence, the probability of drawing two aces from a deck of 52 cards is greater with replacement than without replacement.

34. X is a positive integer satisfying the following conditions:

1. $\mathbf{50 \leq X \leq 49}$
2. **If X is not a multiple of 3, then** $\mathbf{50 \leq X \leq 59}$**.**
3. **If X is not a multiple of 4, then** $\mathbf{60 \leq X \leq 69}$**.**
4. **If X is not a multiple of 6, then** $\mathbf{70 \leq X \leq 79}$**.**

Therefore, we can infer than (2012)

(a) $\boldsymbol{X = 54}$
(b) $\boldsymbol{X = 65}$
(c) $\boldsymbol{X = 76}$
(d) None of the above

Ans. (c) $X = 76$ satisfies all the stipulated conditions.

35. Only one of the following three statements regarding the number of balls in an urn is true.

1. **There are atleast 100 balls in the urn.**
2. **There are less than 100 balls in the urn.**
3. **There is atleast one ball in the urn.**

How many balls are there in the urn? (2012)

(a) 1
(b) 100
(c) 101
(d) Nothing can be inferred on the basis of the given information.

Ans. (d) On the basis of given information, nothing can be inferred.

36. A 95% **confidence interval for a population mean will be….. a** 99% **confidence interval for the same population mean. (Both calculations are based on the same set of data). (2012)**

(a) Longer than
(b) Shorter than
(c) The same length as
(d) None of these

Ans. (b) A 95% confidence interval for a population mean will be shorter than a 99% confidence interval for the same population mean.

37. If two typists can type 2 pages in 2 minutes, how many typists will it take to type 18 pages in 6 minutes? (2012)

(a) 4
(b) 6

(c) 12
(d) 36

Ans. (b) 6 typists will be required to type 18 pages in 6 minutes, which is computed as follows

$$\frac{18 \times 2 \times 2}{2 \times 6} = 6\ typists$$

38. Two men, starting at the same point, walk in opposite directions for 4 metre, turn left and walk another 3 metre. What is the distance between them? (2012)
(a) 2 metre
(b) 6 metre
(c) 10 metre
(d) 14 metre

Ans. (c) The position of two men X and Y is illustrated with the help of the diagram given below.

The distance between XY is given by $AC + AE$.

$$\therefore AC = \sqrt{AB^2 + BC^2}$$

$$= \sqrt{4^2 + 3^2} = \sqrt{25} = 5\ metre$$

And $AE = \sqrt{AD^2 + DE^2}$

$$= \sqrt{4^2 + 3^2} = \sqrt{25} = 5\ metre$$

Now, $XY = AC + AE = 5 + 5 = 10$ metre

39. Four years ago, Arka was twice as old as Saina. Four years on from now, Saina will be ¾ of Arka's age. How old is Arka now? (2012)
(a) 10 years
(b) 12 years
(c) 8 years
(d) 16 years

Ans. (b) Let Arka's present age be 'x' years and Saina's present age be 'y' years.

According to the condition specified,

$$x - 4 = 2(y - 4)$$

$$and\ y + 4 = \frac{3}{4}(x + 4)$$

These two equations are reduced to

$$x - 2y = -4$$

And $3x - 4y = 4$

On solving these two equations, the value of x comes out to be 12, i.e., Arka is presently 12 years old.

40. In a lake there is a patch of lily pads. Everyday, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half the lake? (2012)

(a) 24 days
(b) 12 days
(c) Cannot be determined from the statements of the problem.
(d) None of the above

Ans. (d) The patch would cover half of the lake on the 47th day, and by doubling itself on the 48th day, the patch would cover whole of the lake.

41. Let f be a twice differentiable real–valued function defined on the set of all real numbers greater than or equal to 0 and less than or equal to 1. Suppose f attains the maximum value in its domain at x^*. Which of the following must be true? (2012)

(a) $f'(x^*) = 0$
(b) $f''(x^*) < 0$
(c) $x^* = 0$ *or* $x^* = 1$ *or* $f'(x^*) = 0$
(d) None of the above

Ans. (c) On the basis of given information,

Either $x^* = 0 \; or \; x^* = 1 \; or \; f'(x^*) = 0$

42. If $z = e^{f(x,y)}$ where $f(x, y) = x^2 + y^2$, what is the elasticity of z with respect to x at $(x, y) = (1, 2)$? (2012)

(a) 1
(b) 2
(c) 4
(d) None of these

Ans. (b) We have, $z = x^2 + y$

$$\therefore \frac{dz}{dx} = 2x, as \; x = 1$$

Hence, the elasticity of z with respect to x will be

$$2 \times 1 = 2$$

43. Suppose $f(x) = a_1 x + a_2 + \{a_3/x\}$, where $a_1, a_2 \; and \; a_3$ are positive constants and x is assumed to take only positive values. Which of the following statements is true? (2012)

(a) $f(x)$ has a minimum value but no maximum value.

(b) $f(x)$ has a maximum value but no minimum value.

(c) $f(x)$ has neither a minimum value nor a maximum value.

(d) $f(x)$ has both a minimum value and maximum value.

Ans. (a) Since, f(x) takes only positive values, then it follows that it has a minimum value but no maximum value.

44. What is the value of derivative of the function $[(2x+1)/(2x-1)]^2$ at $x = 1.5$? (2012)

(a) −4

(b) −2

(c) 2

(d) None of these

Ans. (a) Let

$$y = \left[\frac{(2x+1)}{(2x-1)}\right]^2$$

On differentiating the given function w.r.t. x, we get

$$\frac{dy}{dx} = \frac{d}{dx}\left[\frac{(2x+1)}{(2x-1)}\right]^2$$

On applying the chain rule, we get

$$\frac{dy}{dx} = 2\left[\frac{(2x+1)}{(2x-1)}\right]^{2-1} \times \frac{\frac{dy}{dx}(2x+1)(2x-1) - \frac{d}{dx}(2x-1)(2x+1)}{(2x-1)^2}$$

$$= 2\left[\frac{2x+1}{2x-1}\right] \times \frac{2(2x-1) - 2(2x+1)}{(2x-1)^2}$$

On substituting the value of $x = 1.5$, we get

$$\frac{dy}{dx} = -4$$

45. On which of the following intervals is the function $x/(x^2-1)$ continuous? (2012)

(a) $(-1, \infty)$

(b) $(-\infty, 1)$

(c) $[-1, 1]$

(d) None of these

Ans. (d) The given function is not continuous at all the given values, because the denominator is being reduced to zero.

46. The function f(x) approaches infinity as x approaches infinity and the limit of the derivative of the function f(x) is 0 as x approaches infinity. What is the limit of $\frac{f(x)}{x}$ as x approaches infinity? (2012)

(a) Infinity
(b) 0
(c) 1
(d) Cannot be determined

Ans. (b) The limit of $f(x)/x$ as x approaches infinity will be 0.

47. Suppose two fair, six−sided, dice are rolled. The probability of obtaining a value from the first dice is atleast two greater than the value from the second dice is (2011)

(a) 1/6
(b) 9/12
(c) 5/18
(d) 1/18

Ans. (c) The total sample space on rolling out two fair six−sided dice constitutes 36 events. Favorable outcomes on the basis of the stipulated conditions are as follows:

(i) The value on first dice is two greater than the value on the second dice (3, 1), (4, 2), (5, 3), (6, 4) i.e., 4 outcomes.
(ii) The value on first dice is three greater than the value on the second dice (4, 1), (5, 2), (6, 3) i.e., 3 outcomes.
(iii) The value on first dice is four greater than the value on the second dice (5, 1), (6, 2) i.e., 2 outcomes.
(iv) The value on first dice is five greater than the value on the second dice (6, 1) i.e., 1 outcome.

$$\therefore Required\ probability\ = \frac{4+3+2+1}{36} = \frac{10}{36} = \frac{5}{18}$$

48. If p and q are two roots of the equation $x^2 - bc + c = 0$, then what is the equation if the roots are (pq+p+q) and (pq−p−q)? (2011)

(a) $x^2 - 2cx + (c^2 - b^2) = 0$
(b) $x^2 - 2bx + (c^2 + b^2) = 0$
(c) $bcx^2 - 2(b + c)x + c^2 = 0$
(d) $x^2 + 2bx - (c^2 - b^2) = 0$

Ans. (a) A quadratic equation is $x^2 - sx + p = 0$, where s is the sum of the roots and p is the product of the roots.

The given equation is $x^2 - bx + c = 0$ and the roots of this equation are p and q.

$$\therefore p + q = -\frac{b}{a}\ and\ pq = \frac{c}{a}$$

Now, sum of the roots is given by

$$= (pq + p + q) + (pq - p - q)$$

$$= 2pq \; or \frac{2c}{a}$$

And the products of the roots is given by

$$= (pq + p + q)(pq - p - q)$$

$$= (pq)^2 - p^2q - pq^2 + p^2q - p^2 - pq + pq^2 - pq - q^2$$

$$= p^2q^2 - p^2 - q^2 - 2pq$$

$$= (pq)^2 - (p + q)^2$$

$$= \left(\frac{c}{a}\right)^2 - \left(\frac{-b}{a}\right)^2 = \frac{c^2}{a^2} - \frac{b^2}{a^2}$$

So, the required equation will be

$$x^2 - \frac{2cx}{a} + \frac{c^2}{a^2} - \frac{b^2}{a^2} = 0$$

$$x^2 - 2cx + c^2 - b^2 = 0 \;\; (\because a = 1)$$

49. If $f(x) = \frac{1}{x^2}$ is integrated over the interval [1,2], then one gets **(2011)**

(a) 0

(b) log 2

(c) ½

(d) 1

Ans. (c) We have, $f(x) = x^{-2}$

$$\int f(x) = \frac{x^{-2+1}}{-2+1} = \left[\frac{x^{-1}}{-1}\right]_1^2$$

$$= -\left[\frac{1}{x}\right]_1^2$$

$$= -\left[\frac{1}{2} - \frac{1}{1}\right] = -\left[-\frac{1}{2}\right] = \frac{1}{2}$$

50. The domain of the function $f(x) = \frac{5}{\sqrt{x+7}}$ is **(2011)**

(a) $(7, \infty)$

(b) $(-7, \infty)$

(c) $(-\infty, \infty)$
(d) $(-\infty, -7) \cup (-7, \infty)$

Ans. (b) The domain of the function will be from $(-7, \infty)$, where these two intervals will be excluded (being open−ended).

51. A population consists of the following seven numbers

2003, 1999, 2001, 1997, 2000, 2005, 1995

The variance of the population is (2011, 07)

(a) 11.6
(b) 10
(c) 2010
(d) None of these

Ans. (b) Variance of the population can be calculated with the help of the following formula

$$Variance\ (\sigma^2) = \frac{\sum X^2}{N} - (\bar{X})^2$$

Here, $\sum X^2 = 28000070, N = 7$

$$and\ \bar{X} = \frac{\sum X}{N} = 2000$$

On substituting the value s, variance is found to be 10.

52. Let x, y and z be distinct integers. 'x' and 'y' are odd and positive, and 'z' is even and positive.

Which one of the following statements cannot be true? (2011)

(a) $(x - z)^2 y$ **is even**
(b) $(x - z)y^2$ **is odd.**
(c) $(x - z)y$ **is odd**
(d) $(x - y)^2 z$ **is even**

Ans. (a) After considering the given situation it can be concluded that, option (a) cannot be correct because $(x - z)^2$ will give an odd number.

53. If the radius of a circle is increased by 20%, then the area is increased by (2011)
(a) 44%
(b) 120%
(c) 144%
(d) 40%

Ans. (a) If the radius of a circle is increased by 20%, then the area of a circle will increase by 44%.

$$\because Area\ of\ the\ circle = \pi r^2$$

∴Area of a circle with increased radius $= \pi(1.2r)^2 = 1.44\pi r^2$

Increase in area $= 1.44\pi r^2 - \pi r^2 = 0.44\pi r^2$

Percentage increase in area

$$= \frac{0.44\pi r^2}{\pi r^2} \times 100\% = 44\%$$

54. A line that is 13 units long has (4, 1) as one of the end points. Which of the following could be the other endpoint? (2011)

(a) (–1, 13)
(b) (9, 14)
(c) (3, 7)
(d) (5, 12)

Ans. (a) The coordinates of other point can be computed with the help of distance formula, which is as under

Distance $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$\Rightarrow 13 = \sqrt{(x_2 - 4)^2 + (y_2 - 1)^2}$$

The above equation holds true only when $x_2 = -1\ and\ y_2 = 13$.

55. Suppose |a| < 3. Which of the following conditions is enough to empty to imply that |b| < 5? (2011)

(a) |a + b| < 8
(b) 2 < |a – b|< 8
(c) |a–b| $\leq$ 2
(d) 3 < |a–b| < 5

Ans. (c) $|a - b| \leq 2$ is enough to imply that |b| <5.

56. In a bookshop, the sales of scientific books increased by 40% while the sales of engineering books decreased by 50% from 2001 to 2002. If R is the ratio of the number of scientific books to the number of engineering books in 2001 and r the same ratio in 2002, what is k, if it is given by $k = r/R$? (2011)

(a) 2.8
(b) 1.25
(c) 0.2
(d) 1

Ans. (a) Sale of scientific books in 2002 $= \frac{140x}{100}$

Sale of engineering books in 2002 $= \frac{50y}{100}$

$$\therefore \ \ Ratio\ (r) = \frac{140x}{50y}$$

Ratio of sale in 2001 (R) $= \frac{x}{y}$

$$k = \frac{r}{R} = \frac{140x}{50y} \div \frac{x}{y} = \frac{140x}{50y} \times \frac{y}{x} = 2.8$$

57. Suppose the rate of profit is 20%, the profit income is taxed at the rate of 30% and the rate of inflation is 5%. The real post−tax profit rate is (2011)

(a) 9%
(b) 10.5%
(c) -15%
(d) None of these

Ans. (a) Real post−tax profit rate= Rate of profit –Tax on profit –Rate of inflation

$$= 20 - 20 \times 30\% - 5\% = 9\%$$

58. Let P(m, n) be a property about two integers n and m. if we want to disprove the claim that 'for every integer n, there exists an integer m such that P(n, m) is true', then we need to prove that (2011, 10)

(a) There exists integers n, m such that P(n, m) is false.
(b) There exists an integer m such that P(n, m) is false for all integers n.
(c) There exists an integer n such P(n, m) is false for all integers m.
(d) For every integer n, there exists an integer m such that P(n, m) is false.

Ans. (c) If we want to disprove the above stated claim, then we will have to prove that there exists an integer n such that P(n, m) is false for all integers m.

59. Consider the following :

Option I: You receive Rs. 112 after one year.

Option II: You receive Rs. 55 after nine months and Rs. 56 after one year.

Give that, the market rate of interest is 12% per annum, it follows that (2011)

(a) Option I is better than option II.
(b) Option II is better than Option I.
(c) Option I and Option II are equally good.
(d) No conclusion can be drawn on the basis of the given information.

Ans. (a) Option I is better than Option II, because by investing less more returns are generated.

60. A box contains red and green balls. The number of green balls is 1/3 the number of red balls. If a ball is taken randomly from the box, what is the probability that the ball is red? (2011)

(a) 2/3

(b) 1/3

(c) 3/4

(d) None of these

Ans. (c) Let the number of red balls be x. Then, the number of green balls will be $x/3$.

$$\therefore Total\ number\ of\ balls = x + \frac{x}{3} = \frac{4x}{3}$$

$$\therefore Required\ probability = x \div \frac{4x}{3} = x \times \frac{3}{4x} = \frac{3}{4}$$

61. Suppose Rs. 100000 is deposited in an account for 3 years at 11% per annum compounded annually. How much money would be there at the end of 3 years? (2011)

(a) Rs. 133000

(b) Rs. 134331.1

(c) Rs. 136763.1

(d) None of the above

Ans. (c) Here, $P =$ Rs. 100000, $R = 11\%$ and $n = 3$ years

$$\therefore Amount = P\left[1 + \frac{R}{100}\right]^n$$

$$= 100000\left[1 + \frac{11}{100}\right]^3 = Rs.\,136763.1$$

62. The probability distribution of a random variable X is given in the table below:

X	**Probability**
0	0.24
1	0.38
2	0.20
3	0.13
4	0.05

The mean and variance of X are respectively (2011)

(a) 2; 2

(b) 2; 1.4142

(c) 1.37; 1.2731

(d) None of these

Ans. (d) Mean of the probability distribution

$$= \frac{\sum XP}{\sum P} = \frac{1.37}{1} = 1.37$$

$\therefore$Varinace $= \sum X^2 P(x) - (Mean)^2 = 2.15 - (1.37)^2$

$$= 2.15 - 1.8769 = 0.2731$$

63. In a certain country, telephone numbers have 8 digits. The first two digits are the area code and are the same within a given area. The last 6 digits are the local number and cannot begin with 0. How many different telephone numbers are possible within a given area code in this country? (2011)

(a) 10^6

(b) 9^6

(c) 900000

(d) None of these

Ans. (c) Different telephone numbers in a given area code $= 9 \times 10^5 = 900000$

64. Two dice rolled. We define events E1, E2, E3 and E4 as follow:

E1: Getting a sum equal to 10

E2: Getting a double

E3: Getting a sum less than 4

E4: Getting a sum less than 7

Which of the following statement is true? (2011)

(a) Events E1 and E2 are mutually exclusive.

(b) Events E3 and E4 are mutually exclusive.

(c) Events E2 and E3 are mutually exclusive.

(d) Events E1 and E4 are mutually exclusive.

Ans. (d) A set of events is known to be mutually exclusive, if the occurrence of one event implies the non−occurrence of the other event. In the light of this interpretation, events E1 and E4 are mutually exclusive.

65. The limit of $\frac{e^x - 1}{x}$ as x approaches 0 equal to (2011)

(a) 0

(b) 1

(c) ∞

(d) None of these

Ans. (b) We have,

$$\lim_{x\to 0}\frac{e^x-1}{x}$$

On differentiating the numerator and denominator w.r.t. x, we get

$$=\lim_{x\to 0}\frac{e^x}{1}=e^0=1$$

66. The equation $x^2+\frac{1}{2}mx+1=0$ has two distinct real solutions, if (2011)

(a) $m=3$

(b) $m=4$

(c) $m=5$

(d) None of these

Ans. (c) A quadratic equation will have two distinct real solutions, if the value of $b^2-4ac>0$. This value exceeds zero, if $m=5$.

67. The functions g and h are given by $g(x)=\sqrt{(x-1)}$ and $h(x)=x^2+1$. The composite function (g. h) (x) is given by (2011)

(a) x

(b) $|x|$

(c) $\sqrt{x}$

(d) None of these

Ans. (b) We have,

$$g(x)=\sqrt{(x-1)}$$

$$h(x)=(x^2+1)$$

∴ Composite function $(g.h)(x)=g(x^2+1)$

$$=\sqrt{x^2+1-1}$$

On substituting $x=x^2+1$ in g(x), we get

$$=\sqrt{x^2}\ or\ \pm x\ or\ |x|$$

68. If f(x) and g(x) are differentiable functions such that $f'(x)=3x\ and\ g'(x)=2x^2$, then the limit

$$\frac{[\{f(x)+g(x)\}-\{f(1)+g(1)\}]}{(x-1)}$$

as x approaches 1 is equal to **(2011)**

- **(a) 5**
- **(b) 0**
- **(c) 20**
- **(d) None of these**

Ans. (a) We have, $f'(x) = 3x$

$$\therefore \quad f(x) = \frac{3x^{1+1}}{1+1} = \frac{3x^2}{2}$$

$$and\ g'(x) = 2x^2$$

$$\therefore \quad g(x) = \frac{2x^{2+1}}{2+1} = \frac{2x^3}{3}$$

$$Now, f(1) = \frac{3\times(1)^2}{2} = \frac{3}{2}$$

$$and\ g(1) = \frac{2\times 1^3}{3} = \frac{2}{3}$$

$$\therefore \quad \lim_{x\to 1}\frac{\left[\{f(x)+g(x)-\{f(1)+g(1)\}\}\right]}{x-1}$$

On substituting the given values, we get

$$= \lim_{x\to 1}\frac{\left[\left(\frac{3x^2}{2}+\frac{2x^3}{3}\right)-\left(\frac{3}{2}+\frac{2}{3}\right)\right]}{x-1}$$

$$= \lim_{x\to 1}\frac{9x^2+4x^3-9-4}{6(x-1)}$$

On substituting the value $x = 1$, both numerator and denominator are reducible to 0.

Therefore, we will apply L Hospital's rule, where both numerator and denominator will be differentiated w.r.t. x, we get

$$= \lim_{x\to 1}\frac{18x+12x^2}{6}$$

On substituting $x = 1$, we get

$$= \frac{18 + 12}{6} = \frac{30}{6} = 5$$

69. If m > n, then which of the following is necessarily true? (2011)

(a) $\boldsymbol{m^2 > n^2}$

(b) $\boldsymbol{mn} > 0$

(c) $\boldsymbol{mn} > -mn$

(d) None of these

Ans. (d) Option (d) necessarily holds true. $m^2 > n^2$, if m and n are both positive numbers and mn will be greater than zero, if m and n are non−zero, and positive numbers and $mn > -mn$, if mn are positive numbers.

70. If x and y are any real numbers such that 0 < x < 2 < y, which of the following is necessarily true? (2011)

(a) $\boldsymbol{x < \frac{xy}{2} < y}$

(b) $\boldsymbol{0} < xy < 2\boldsymbol{x}$

(c) $\boldsymbol{x} < xy < 2$

(d) $\boldsymbol{xy} < y$

Ans. (a) According to the condition specified, option (a) will hold true.

71. A number of the form 213xy, where x and y are digits, has a remainder less than 10 when divided by 100. The sum of all the digits in the above number is equal to 13. The digit y is (2011)

(a) 5

(b) 7

(c) 6

(d) 8

Ans. (b) The digit y is 7 and the number is 21307, as $x + y = 7$.

On dividing 21307 by 100, we get a remainder of 7, which is less than 10.

Hint: This question should be solved with the help of options.

72. The graphs of the two equations $\boldsymbol{y = dx^2 + bx + c\ and\ y = Ax^2 + Bx + C}$, such that a and A have different signs and that the quantities $\boldsymbol{b^2 - 4ac\ and\ B^2 - 4AC}$ are both negative (2011)

(a) Intersect at two points

(b) Intersect at one point

(c) Do not intersect

(d) None of the above

Ans. (d) If the value of the discriminant $(b^2 - 4ac)$ is less than 0, then in that case the equation has imaginary roots in the form of $\sqrt{-i}$ and as such cannot be plotted on graph.

73. Four dice are thrown. What is the probability that the same number appears on each of them? (2011)

(a) 1/36
(b) 1/18
(c) 1/216
(d) None of these

Ans. (c) Probability that same number appear on all the four dices

$$= \frac{6}{1296} = \frac{1}{216}$$

74. If $1.56^x = 2$, then x is equal to (2011)

(a) $\frac{log\ 1.56}{log\ 2}$
(b) $\frac{log\ 2}{log\ 1.56}$
(c) $\frac{2}{log\ 1.56}$
(d) $\frac{log\ 2}{1.56}$

Ans. (b) We have, $1.56^x = 2$

Taking log on both sides, we get

$$x \log 1.56 = \log 2$$

$$\therefore \quad x = \frac{\log 2}{\log 1.56}$$

75. If $log_{10}(x - y) = 3$ and $log_{10}(x + y) = 4$, then x is equal to (2011)

(a) 3.5
(b) 11000
(c) 5500
(d) 103.5

Ans. (c) Given, $log_{10}(x - y) = 3 \Rightarrow x - y = 1000$.....(i)

And $log_{10}(x + y) = 4 \Rightarrow x + y = 10000$.....(ii)

On equating Equations (i) and (ii), we get $x = 5500$

76. The real solution(s) to the equation

$|x - 1| = 2x + 1$ is/are (2011)

(a) −2
(b) −2, 0
(c) −1
(d) 0

Ans. (d) We have, $|x-1| = 2x+1$

On substituting, $x = 0$, we get

$$|0-1| = 2 \times 0 + 1$$

$$|-1| = 1 \Rightarrow 1 = 1$$

Hence, the real solutions to the equation will be0.

77. If $f(x) = -e^x - 2$, then the range of f is given by the interval (2011)
(a) $(-\infty, -2)$
(b) $(-\infty, +\infty)$
(c) $(-2, +\infty)$
(d) $(-\infty, +2)$

Ans. (a) The range of f will be from $(-\infty, -2)$, the intervals being excluded (open−ended classes).

78. Three solutions of the equation $f(x) = 0$ are −2, 0 and 3. Therefore, the three solutions of the equation $f(x-2) = 0$ are (2011)
(a) $-4, -2, 1$
(b) $-2, 0, 3$
(c) $4, 2, 5$
(d) 0, 2, 5

Ans. (d) The solutions will be 0, 2, 5 which can be get by adding 2 to −2, 0, 3.

79. The mean of a data set is equal to 10 and its standard deviation is equal to 1. If we add 5 to each data value, then the mean and standard deviation become (2011)
(a) mean$= 15$, standard deviation $= 6$
(b) mean$= 10$, standard deviation $= 6$
(c) mean$= 15$, standard deviation $= 1$
(d) mean $= 10$, standard deviation $= 1$

Ans. (c) The mean of the new data set will be 10+5 i.e., 15 and the standard deviation will be 1, because mean is affected by change in origin but standard deviation is not affected by change in origin.

80. The sum $\sum_{k=1}^{100}(3+k)$ is equal to (2011)
(a) 5053
(b) 5050
(c) 300

(d) 5350

Ans. (d) The given progression will be

$$4 + 5 + 6 + 7 + \cdots + 103$$

$$\therefore Sum = \frac{n(n+1)}{2} - 6\ (Sum\ of\ 1 + 2 + 3)$$

$$= \frac{103\ (104)}{2} - 6 = 5356 - 6 = 5350$$

81. How many of the 4–digit numbers can be formed, if no digit is used more than once which are divisible by 5? (2011)

(a) 1008

(b) 952

(c) 896

(d) None of these

Ans. (b) To find the numbers formed two conditions should be considered:

Condition 1: Assuming last digit to be 5, the possible numbers that can be formed

$$= 8_{P_1} \times 8_{P_1} \times 7_{P_1} = 448$$

Condition 2: Assuming last digit to be 0, the possible numbers that can be formed

$$= 9_{P_1} \times 8_{P_1} \times 7_{P_1} = 504$$

∴Total permutations $= 448 + 504 = 952$

82. How many 4–digit numbers can be formed, if no digit is used more than once? (2011)

(a) 5040

(b) 3024

(c) 4536

(d) None of these

Ans. (c) According to the condition specified

Number of permutations $= 9_{P_1} \times 9_{P_1} \times 8_{P_1} \times 7_{P_1} = 4536.$

83. The probability that Mr. A will be booked for illegal parking in the Central Market is 1/3. During the last nine days, Mr. A has illegally parked everyday but has not been booked. Today, on the 10th day, he again decides to park illegally. The probability that he will be booked today is (2011)

(a) Greater than 1/3

(b) Less than 1/3

(c) Equal to 1/3

(d) There is not enough information to make the required inference.

Ans. (c) The probability will be equal to 1/3, because each day is to be treated as an independent event, not being affected by past happenings.

84. A circle of area A passes through the points (8, 0) and (0, 6). Then we must have (2011)

(a) $\boldsymbol{A < 25\pi}$

(b) $\boldsymbol{A \geq 25r}$

(c) $\boldsymbol{A = 100\pi}$

(d) None of these

Ans. (b) We know that, the line joining the two points can either be a chord or a diameter.

Assuming it to be the diameter and applying distance formula, we get

Length of diameter $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(0-8)^2 + (6-0)^2}$

$= \sqrt{100} = 10\ units$

$$\therefore Radius = \frac{10}{2} = 5\ units$$

∴ Required area $= \pi r^2 = \pi \times 5 \times 5 = 25\pi$ sq units

Now, this is the lowest possible value, on the assumption that the line joining the end points of the given coordinates is the diameter. If it is not a diameter, then the area of a circle will be greater than 25π.

Note: Diameter is the longest chord of a circle.

85. For what value(s) of the parameter m does not the equation $\boldsymbol{-2x^2 + mx = 2}$ have one solution only? (2011)

(a) 0

(b) −2, 2

(c) −1, 1

(d) −4, 4

Ans. (d) For getting the same roots (one solution) the value of discriminant, $b^2 - 4ac$ should be equal to zero.

Given equation can be written as

$$-2x^2 + mx - 2 = 0$$

$$Now, b^2 - 4ac = 0$$

$$\Rightarrow (m)^2 - 4 \times -2 \times -2 = 0$$

$$\Rightarrow m^2 - 16 = 0 \Rightarrow m^2 = 16$$

$$\therefore m = \sqrt{16} = \pm 4$$

86. Let A be the set {f(x)| : 0 < x < 1}. What does it mean if we say that y is not an element of A? (2011)

(a) $f(y)$ is not an element of A.

(b) $f(y)$is not between 0 and 1.

(c) y is not between f(0) and f(1).

(d) None of the above

Ans. (c) If y is not an element of A, then it follows that y does not lie between f(0) and f(1).

87. Which of the following statements is false? (2011)

(a) The numbers 4, 5, 6, 7 have the same standard deviation as the numbers 1231, 1232, 1233, 1234.

(b) The number 1, 5, 7, 9 have a smaller standard deviation then the numbers 1232, 1235, 1237, 1239.

(c) The numbers 1, 5, 6, 10 have a larger standard deviation than the numbers 1231, 1232, 1233, 1234.

(d) The numbers 1, 2, 9, 0 have the same standard deviation as the numbers 1231, 1232, 1239, 1240.

Ans. (d) The number 1, 2, 9, 10 will have the same standard deviation as the numbers 1231, 1232, 1239 and 1240 as standard deviation is not affected by change in origin.

88. A fair dice has given the number 6 on five consecutive throws. What is the probability that the next throw will also give the number 6? (2010, 08)

(a) 1/30

(b) 1/6

(c) 5/6

(d) None of these

Ans. (b) The probability will be 1/6 only, because probability of an event is not affected by occurring in the previous event.

89. A function is selected at random from all the functions of the set A$= \{1, 2, 3, \ldots n\}$ into itself. The probability that the function selected is one–to–one is (2010)

(a) $1/n^2$

(b) $\frac{2}{(n-1)!}$

(c) $1/n!$

(d) $\frac{(n-1)!}{n^{n-1}}$

Ans. (d) The total functions that can be formed are n^n. Therefore, n^n is the total sample space. The number of one−to−one functions that can be formed are n!. Therefore, required probability

$$= \frac{n!}{n^n}$$

$$or, \frac{n(n-1)!}{n^n} \; or \frac{(n-1)!}{n^{n-1}}$$

90. Let $S = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots$ Then (2010, 08)

(a) S is equal to 4.

(b) S is equal to 6.

(c) S is equal to 8.5.

(d) Sum S does not converge to any finite value.

Ans. (d) The sum S does not converge to any finite value.

91. Beena's average score after 8th class tests is 84. In her 7th class tests, Beena's average score was 85. In her last class test, Beena has scored (2010, 08)

(a) 82

(b) 87

(c) 77

(d) None of these

Ans. (c) Marks scored in 8th class test

$$= [(8 \times 84) - (7 \times 85)]$$

$$= 672 - 595 = 77$$

92. If the elasticity of f(x) with respect to x is 0.5 [f(x) > 0 and x > 0], then the elasticity of f(x)/x with respect to x is (2010)

(a) −0.5

(b) 0

(c) 0.5

(d) 1

Ans. (a) Fixed elasticity function is given by $f(x) = x^b$, where 'b' is the elasticity.

$$\therefore \; \frac{f(x)}{x} = x^{b-1} = x^{0.5-1} = x^{-0.5}$$

Hence, the elasticity of f(x)/x w.r.t. x is −0.5.

93. The number 0.999999… is (2010, 08)

(a) Exactly equal to 1

(b) Slightly less than 1

(c) Slightly more than 1

(d) Between 0.99 and 0.999

Ans. (a) The number of 0.99999… is exactly equal to 1.

Let $x = 0.999$ ……(i)

Then $10x = 9.999$ ……(ii)

On subtracting eq. (i) from eq. (ii), we get

$$9x = 9 \Rightarrow x = \frac{9}{9} = 1$$

Hence, the given number is equal to 1.

94. Let X_1, X_2 and X_{20} and $Y_1, Y_2, \ldots, Y_n$ be two collections of sets. Suppose every X_i contains 5 elements and every Y_j contains 2 elements and $\cup_{i=1}^{20} X_i = S + \cup_{j=1}^{n} Y_j$. If each element of S belongs to exactly 10 of the X_i is and to exactly 4 of the Y, then n is equal to (2010)

(a) 10

(b) 20

(c) 100

(d) 50

Ans. (d) Number of elements in Y, i.e., n will be $5 \times 4 = 20$.

95. Which of the following is not a function? (2010)

(a) A rule that assigns the circumference of a rectangle to its area.

(b) A rule that assigns to each number its square root.

(c) A rule that assigns to each person in a classroom his or her height.

(d) A rule that assigns the salary of a person to his or her years of education.

Ans. (c) A rule that assigns to each person in a classroom his or her height is not a function. The rest are function as they're clearly defined.

96. If $a.b = M$, where M is different from 0 and $(a + b) = 4$, then (2010)

(a) There are always real values for a, b.

(b) Whenever $4 \geq M \geq 0$, there are real values for a, b.

(c) Whenever 0 > M, there are positive values for both a, b.

(d) Whenever 0 > M, there are negative values for both a, b.

Ans. (b) a and b will have real values only if $4 \geq M \geq 0$. Option (a) will not hold true for real value of zero. If M is less than zero, then a and b cannot be positive or negative values.

97. In an examination, there are three multiple choice questions and each question has 4 choices. The number of ways in which a student can fail to get all answer correct is (2010)

(a) 12
(b) 27
(c) 63
(d) 72

Ans. (b) To get all incorrect answers the student should not choose the correct option which is unique in every question.

∴ Number of ways to get wrong answers $= 3 \times 3 \times 3 = 27.$

98. If $\left(\frac{x}{b}\right) > \left(\frac{b}{c}\right)$ then **(2010, 08)**

(a) $xc > b^2$
(b) $xc < b^2$
(c) $xc = b^2$
(d) Cannot say anything about relation between x, b and c.

Ans. (d) Nothing can be predicted about the relation between x, b and c. Their relation is subject to change, if x, b and c are negative, positive or zero.

99. There are two egg delivery boys you can order eggs from. The probability of the first boy falling and breaking all the eggs is ½ and the probability of the second boy falling and breaking all the eggs is 1/5. How would you distribute your order for eggs so as to minimize expected total loss of eggs? **(2010)**

(a) Order all your eggs from the first boy.
(b) Order all your eggs from the second boy.
(c) Distribute the order for eggs between the two boys equally.
(d) Order three–fourth of your eggs from the first boy and the rest from the second boy.

Ans. (b) The expected value of loss will be minimum, if all eggs are ordered from the second boy.

$$\therefore \quad E(X) = \frac{1}{5} \times 1 = \frac{1}{5} = 0.2$$

100. If you integrate the function $f(x) = 1/x$ from 1 to 3 you get **(2010, 08)**

(a) 2
(b) log 3
(c) log 4
(d) none of these

Ans. (b)

$$\int_1^3 \left(\frac{1}{x}\right) dx = [\log x]_1^3 = \log 3 - \log 1 = \log 3$$

101. If $x < y + \varepsilon$, for all $\varepsilon > 0$, then **(2010, 08)**

(a) $x > y$
(b) $x < y$
(c) $x > 0 > y$
(d) $x < 0 < y$

Ans. (d) On the basis of given information, it can be inferred that x < 0 < y.

102. Suppose an asset provides returns of Rs. 315 after one year, Rs. 661.50 after two years and Rs. 1389.15 after three years and nothing thereafter. If interest is compounded yearly and the rate of interest is 5% per annum, what is the present discounted value of the assets? (2010)

(a) Rs. 2050
(b) Rs. 2100
(c) Rs. 2200
(d) Rs. 2250

Ans. (b) The present discounted value of the asset will be Rs. 2100, which is computed as follows:

Year	**Cash flows (a)**	**Discount factor (b)**	**Discounted cash flows $(a \times b)$**
I	315	0.9523	299.97 ≈ Rs. 300
II	661.50	0.9070	599.98 ≈ Rs. 600
III	1389.15	0.8638	1199.947 ≈ Rs. 1200
Total			**Rs. 2100**

Where, Discount factor

$$= \frac{1}{(1+i)^n}$$

103. Two events are said to be independent if (2010)

(a) Prob (A and B) = Prob (A). Prob (B)
(b) Prob (A and B) = Prob (A)+ Prob (B)
(c) Prob. (A/B) = Prob (A) – Prob (B)
(d) Prob (A/B) = Prob (A) – Prob (B) + Prob (A and B)

Ans. (a) Two events are said to be independent, if Probability of A and B = Probability of A × Probability of B.

104. There are four bus routes between A and B and three bus routes between B and C. A man can travel round trip in number of ways by bus from A to C via B. If he does not want to use a bus route more than once, then in how many ways can he make round trip? (2010)

(a) 72
(b) 144
(c) 14
(d) 19

Ans. (a) There are 72 ways in which a person can make a round trip in which he does not use a bus route more than once and it is computed as

$$4_{P_1} \times 3_{P_1} \times 2_{P_1} \times 3_{P_1} = 72$$

105. Consider the set $A = \{x: 0 < x < 1\}$. What is the minimum number that belongs to set A? (2010)

(a) 0
(b) 0.001
(c) 0.00002
(d) There is no minimum number in set A.

Ans. (d) There is no minimum number in set A as there are infinite minimum values between 0 and 1.

106. The sum of the first n odd integers is (2010)

(a) n^2
(b) n^3
(c) n
(d) $4n$

Ans. (a) The sum of first n odd integers is given by n^2.

∴ Sum of 1+3= $4 = 2^2$

Sum of 1+3+5= $9 = 3^2$ and so on.

107. Which of the following will be an inverse function of $f(x) = x^2$? (2010)

(a) $g(y) = \frac{1}{y}$
(b) $y(y) = y^2$
(c) $y(y) = \frac{1}{2}y$
(d) There is no inverse function

Ans. (d) The inverse function of the given function would be x.

108. A student discovers that the marks she has obtained (63 out of 100) in a recent test was the 73rd percentile in the frequency distribution of test scores. Suppose 1000 students wrote the test. This means that (2009)

(a) At least 72% of the students got 73 or more
(b) At least 270 students got 63 or more
(c) At least 270 students got 63 or less
(d) At least 27% of the students got 73 or more
(e) None of the above

Ans. (e) The given statement means that atleast 73% of students got 63 or more marks.

109. The elasticity of a variable X with a variable Y is a constant. Therefore, (2009)

(a) X is a linear function of Y.

(b) X is a linear function of in Y.

(c) In X is a linear function of Y.

(d) In X is a linear function of in Y.

(e) None of the above

Ans. (a)If the elasticity is constant, then it implies that X is a linear function of Y.

110. If $E(X^2) = 16, Var\ (X) = 4, then\ E[(2 \div 3X)^2]$ is approximately equal to (2009)

(a) 123

(b) 156

(c) 143

(d) 150

(e) None of these

Ans. (e) $Var\ (X) = Ex^2 - \{E(x)\}^2$

On substituting the values, we get

$$\{E(x)\}^2 = Ex^2 - Var\ (X)$$

$$= 16 - 4 = 12\ or\ E(x) = \sqrt{12} = 3.464$$

$$\therefore \quad E(2 + 3x)^2 = E(4 + 9x^2 + 12x)$$

$$= 4 + 9 \times 16 + 12\sqrt{12} = 189.57$$

111. Suppose two fair, six–sided dice are rolled. The probability of obtaining a value from the first dice is equal to the value from the second dice is (2009)

(a) 1/6

(b) 5/18

(c) 9/12

(d) 1/2

(e) 1/12

Ans. (a) Required probability $= 6/36 = 1/6$

112. I had Rs. 25 with me when I went to the market and I spent Rs. 7 in all. What percentage of the total did I have at the end of my market visit? (2009)

(a) 72%

(b) 71.5%

(c) 28%

(d) 63.5%

(e) None of these

Ans. (a) Percentage of total left after the market visit

$$= \frac{25 - 7}{25} \times 100\% = 66.67\%$$

113. If a riskless bond promises a fixed annual payment rate of interest is 7% per annum, then the market value of the bond is (2008)

(a) Rs. 50
(b) Rs. 500
(c) Rs. 5000
(d) Rs. 2450
(e) None of these

Ans. (e) Nothing can be inferred on the basis of the given information.

114. If every unit increases in a variable X is associated with a half unit decrease in a variable Y, then the correlation coefficient between X and Y is (2008)

(a) −1
(b) −0.5
(c) 0.5
(d) 1
(e) None of the above

Ans. (a) Since, the series exhibit a fixed inverse relationship, therefore the value of $r = -1$.

115. In a given group, the correlation between height, measured in feet and weight, measured in pounds, is +0.68. Which of the following would later the value of r? (2008)

(a) If height is expressed in centimeters.
(b) If weight is expressed in kilograms.
(c) Both of the above will affect r.
(d) Neither of the above changes will affect r.
(e) None of the above.

Ans. (d) Neither of the above changes will affect r, as it is a unit free measure.

116. A standard normal distribution has (2008)

(a) Mean equal to 1 and variance equal to 1
(b) Mean equal to 0 and variance equal to 1
(c) Mean equal to 0 and standard deviation equal to 0.
(d) Mean equal to −1 and variance equal to 1
(e) None of the above

Ans. (b) A standard normal deviation has mean equal to 0 and variance equal to 1.

117. Suppose A, B and C are three non−empty sets such that $B \subset C$ and $(C - A) \cap B = \phi$. Which of the following statements is necessarily true? (2008)

(a) $A \subset C$

(b) $B \subset A$

(c) $(A \cup B) \subset C$

(d) $C \subset (A \cup B)$

(e) None of these

Ans. (b) According to the conditions specified,

$(C - A) \cap B = \phi$ will be true only if $B \subset A$.

118. Suppose any one but the minimum of a set of 10 positive real numbers is replaced by a number which is greater than it. If the range of a set of numbers is taken as the measure of inequality amongst the numbers in that set then after replacement (2008)

(a) Inequality will increase

(b) Inequality will decrease

(c) Inequality cannot increase

(d) Inequality cannot decrease

(e) None of the above

Ans. (e) Inequality can either increase or decrease. If the number replaced is the greatest number, then inequality will increase. If the number replaced is one, other than the greatest number, inequality will not be affected.

119. Let Rs. 100000 are deposited in an account for five years at an interest rate of 10% per year, to be compounded annually. How much money would be there at the end of 5 years? (2007)

(a) Rs. 161051

(b) Rs. 160000

(c) Rs. 151051

(d) Rs. 150000

Ans. (a) Here, $P = Rs.100000, R = 10\%\ and\ n = 5 years$

$$\therefore amount\ = P\left(1 + \frac{R}{100}\right)^n$$

$$= 100000\left(1 + \frac{10}{100}\right)^5 = Rs.161051$$

120. If x, y are real numbers and it is known that x. y < 2 (the product of x and y is less than 2), it must be the case that (2007)

(a) x, y **are both less than 2**

(b) x, y **are both positive**

(c) Atleast one of x and y is positive

(d) At least one of x and y is less than 2

Ans. (d) For the product of two real numbers to be less that 2, at least one of the numbers should be less than 2, e.g., $\frac{1}{8} \times 4 = \frac{1}{2}$ which is less than 2.

121. Suppose n observations of a variable yield n different values with median m. Suppose the observations with the maximum value and the minimum value are omitted. The median of the remaining (n – 2) observations is (2007)

(a) > m

(b) $\leq m$

(c) $< m$

(d) None of the above

Ans. (a) The median would remain unchanged at m only, because median is not affected by extreme values.

122. If there are N distinct real numbers in a set A and their arithmetic mean is 0, then it must be the case that (2007)

(a) 0 is a member of A

(b) The sum of all non−negative numbers of A is equal to the absolute value of the sum of all non−positive numbers.

(c) N must be even and the number of non−negative numbers in A must be the same as the number of non−positive numbers in A.

(d) N is odd, A includes 0 and the number of non−negative numbers in A is equal to the number of non−positive numbers in A.

Ans. (b) If the mean of set of a distinct real numbers is zero, then it follows that the sum of negative values should be equal to the sum of positive values.

123. Consider the function $y = x^3$ **defined in the interval** $I = [-1, 1]. x - 0$ **is (2007)**

(a) A point of local maximum in I.

(b) A point of local minimum in I.

(c) A point of inflexion in I.

(d) A point of global extremum in I.

Ans. (d) x−0 will be the point of global extremum in the interval I.

124. Suppose an unbiased dice is thrown repeatedly thirty times under identical conditions. What is the expected number of throws in which the outcome will be an even number greater than two or an odd number less than four? (2007)

(a) Eight

(b) Twelve
(c) Twenty
(d) Twenty –four

Ans. (c) Expected value = Number of trials × Probability of success $= 30 \times 2/3 = 20.$

125. In a frequency distribution, what percent of the total number of observations lies between the first and third quantities? (2007)

(a) 50
(b) 68
(c) 75
(d) The question can't be answered without knowledge of the specific distribution.

Ans. (a) In a frequency distribution, 50% of the values lie between first and third quartiles

126. In the expression $(x-a)(x-b)(x-c)\ldots(x-z)$, a, b, c, d,… are the letters of the alphabet and appear atleast once. x is one of the letters of the alphabet. The value of the expression is (2006)

(a) Zero
(b) Infinite
(c) Unity
(d) None of these

Ans. (a) The product of the above expression will be zero, because the value of x–x will be zero.

127. If a. b < c. d, where a, b, c, d are non–zero numbers, then it must be that (2006)

(a) $\frac{a}{c} < \frac{d}{b}$
(b) $\frac{a}{c} < \frac{d}{b},\ if\ a.b > 0$
(c) $\frac{a}{c} > \frac{d}{b}\ if\ a.b > 0$
(d) None of these

Ans. (d) None of the conditions are necessarily true, because they are dependent on whether and which of the values are positive and negative.

128. A random variable is (2006)

(a) An elementary outcome
(b) An event in the sample space
(c) A number assigned to an event
(d) A probability of an event

Ans. (b) A random variable is an event in the sample space.

SECTION C [2 Marks Each]

129. Does the following maximization problem have a solution?
Maximize x^2 subject to 0 < x < 1 **(2009)**

(a) Yes
(b) No
(c) Cannot be computed
(d) None of the above

Ans. (b) Let $y = x^2$

$$\therefore \frac{dy}{dx} = 2x$$

For maximize, put

$$\frac{dy}{dx} = 0 \Rightarrow 2x = 0$$

$$\Rightarrow x = 0 \notin (0, 1)$$

Hence, no maximization solution exists.

130. A stratified sample of households is selected for a survey. The population is divided in two strata and 25% of households in stratum A and 10% of households in stratum B are selected through a process of random selection.

Data collected in the survey show that the income of sample households are as follows:

Stratum A	2000	1000	3000	4000	5000	
Stratum B	500	100	200	300	400	100

The average income of households in the population is **(2008)**

(a) 1509
(b) 1650
(c) 950
(d) None of the above

Ans. (a) Average income of households

$$= \frac{Sum\ of\ the\ income\ of\ stratums\ A\ and\ B}{Number\ of\ families}$$

$$= \frac{16600}{11} = 1509$$

Hence, the average income of the households will be 1509.

SECTION C [1 Mark Each]

DIRECTIONS (Q Nos. 131–134) Study the following information very carefully and answer the questions that follow.(2012)

Consider a cube having (0, 0, 0), (1, 0, 0), (0, 1, 0) and (0, 0, 1) as four of its corners.

131. Which of the following is true?

(a) The other corners are (1, 1, 0), (1, 0, 1), (0, 1, 1) and (1, 1, 1).

(b) The other corners are (–1, –1, 0), (–1, 0, –1), (0, –1, –1) and (–1, –1, –1).

(c) The other corners are $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}\right)$ and $(1, 1, 1)$

(d) The other corners of the cube cannot be determined.

Ans. (a) The cube would be represented in the following manner in a three–dimensional figure.

It is clear from the above figure that, the other corners are (1, 1, 0), (1, 0, 1), (0, 1, 1) and (1, 1, 1).

132. Which of the following is true?

(a) $\left(\frac{1}{4}, \frac{1}{4}, \frac{1}{4}\right)$ is the centre of the given cube.

(b) $\left(\frac{1}{8}, \frac{1}{8}, \frac{1}{8}\right)$ is the centre of the given cube.

(c) The centre of the cube cannot be determined.

(d) None of the above

Ans. (d) The centre of the cube will be the point of intersection of its diagonals which will be given by

$$\left(\frac{1+0}{2}, \frac{0+1}{2}, \frac{1+0}{2}\right) = \left(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}\right)$$

133. Which of the following is true?

(a) The volume of the cube is 1.

(b) The volume of the cube is 6.

(c) The volume of the cube is 8.

(d) None of the above

Ans. (a) Volume of the cube

$$= a^3 = 1 \times 1 \times 1 = 1$$

134. Which of the following is true?

(a) The area of the cube is 1.
(b) The area of the cube is 6.
(c) The area of the cube is 8.
(d) The area of the cube cannot be determined.

Ans. (b) Area of the cube $= 6a^2 = 6 \times 1^2 = 6.$

DIRECTIONS (Q Nos. 135–138) Study the following information very carefully and answer the questions that follow. (2012)

A random variable Y has the following distribution

Y	−1	0	1	2
P(Y)	3C	2C	0.4	0.1

135. The value of the constant C is
(a) 0.10
(b) 0.15
(c) 0.20
(d) None of these

Ans. (a) The probabilities of random variable Y should add upto one.

Therefore, $3C + 2C + 0.4 + 0.1 = 1$

$$\therefore \quad C = 0.1$$

136. The expected value of Y^2 is
(a) 0.90
(b) 0.80
(c) 1.50
(d) 1.10

Ans. (d) Expected value of $Y^2 = \sum Y^2 \, P(Y)$

Y	P(Y)	Y^2	$Y^2.P(Y)$
−1	0.3	1	0.3
0	0.2	0	0
1	0.4	1	0.4

2	0.1	4	0.4
			$\sum Y^2 . P(Y) = 1.1$

137. The variance of the random variable 4Y is

(a) 4.04

(b) 1.01

(c) 16.16

(d) None of the above

Ans. (a) Variance of random variable,

$$Y = \sum Y^2 . P(Y) = (\bar{Y})^2 = 1.1 - (0.3)^2$$

$$= 1.1 - 0.09 = 1.01$$

∴ Variance of random variable $4Y = 4 \times 0.01 = 4.04$

138. Consider the random variable $2 \times Y + r^2$, where r is a real number. The mean of this random variable 0.7. Which of the following must be true?

(a) $r = 0.10$

(b) $r = 0.05$

(c) $r^2 = 0.40$

(d) None of these

Ans. (d) Given, $2 \times Y + r^2 = 0.7$

$$\Rightarrow 2 \times 0.3 + r^2 = 0.7 \ (\because y = 0.3)$$

$$\Rightarrow r^2 = 0.1$$

DIRECTIONS (Q Nos. 139–143) Study the following information very carefully and answer the questions that follow. (2012)

The name of 7 students when ranked in ascending order of their weights are A, B, C, D, E, F and G. A's weight is 45 kg and G's weight is 75 kg.

139. If no pair of students has the same weight, then the median weight of the group is

(a) Always equal to C's weight

(b) The average of C's weight and E's weight

(c) C's weight or E's weight

(d) None of the above

Ans. (d) Median

$$= Value\ of\ \left(\frac{N+2}{2}\right) th\ item$$

$$= Value\ of\ \left(\frac{7+1}{2}\right) th\ item$$

$=$ Value of 4^{th} item, which is D's weight

140. Suppose the name of F is deleted from the list and the difference in weights between any two consecutively ranked students on the list is a constant positive number. The ratio between the standard deviation of the weights of the six students and the man absolute deviation of their weights is

(a) Equal to unity
(b) Less than unity
(c) Greater than unity
(d) Indeterminate

Ans. (c) For a moderately skewed distribution, mean deviation

$$= \frac{4}{5}\sigma$$

$$\therefore Ratio\ of\ SD\ to\ MD = \frac{\sigma}{\frac{4\sigma}{5}} = \sigma \times \frac{5}{4\sigma}$$

$$= \frac{5}{4}, which\ is\ greater\ than\ unity.$$

141. Suppose the name of F is deleted from the list and the difference in weights between any two consecutively ranked students on the list is a constant positive number. Calculate the arithmetic mean of the absolute deviations of the weights of the six students from the arithmetic mean of their weights. How many students in the list have a weight which differs from the median weight by more than this amount?

(a) 1
(b) 2
(c) 3
(d) 4

Ans. (b) Median weight of A, B, C, D, E and F

$$\frac{C+D}{2}$$

Hence, only two students have weight more than this amount.

142. If three students among B, C, D, E and F have the same weight and the remaining two have different weights, then the median weight of the group of 7 students is

(a) Always equal to C's weight
(b) The average of C's weight and E's weight
(c) C's weight or E's weight
(d) None of the above

Ans. (d) Since, the rank of students A, B, C, D, F and G are in ascending order. If we take any three weights of B, C, D, E and F are equal, then on the basis of this information, we do not assess any median weight.

143. Suppose the name of F is deleted from the list. Then, if the difference in weights between any two consecutively ranked students on the list is a constant positive number, the median weight is equal to

(a) B's weight
(b) The average of B's weight and E's weight
(c) B's weight or E's weight
(d) None of the above

Ans. (d) Median weight in this case would be the average of C and D's weight.

DIRECTIONS (Q Nos. 144–146) Study the following information very carefully and answer the questions that follow. (2012)

A relation f from set X to set Z is a function if and only if for every element x in X there is a unique element z in Z such that x and z are associated through f. X is called the domain of f and Z the codomain of f. The range of f is the set of all elements in the codomain which are associated with at least one element in the domain.

f is a surjective function if and only if every element in the codomian has an association in the domain.
f is an injective function if and only if no two distinct elements in the domain are associated with the same element in the co domain.

Consider the following statements:

1. There exists an element x in the domain of f such that no element in the co domain is associated with it.
2. There exists an element x in the domain of f and two distinct elements z and w in the co domain of f such that both z and w are associated with x.

144. Which of the following is true?

(a) To prove that f is not a function, it is necessary to demonstrate (i).

(b) To prove that f is not a function, it is necessary to demonstrate (ii).

(c) To prove that f is not a function, it is necessary to demonstrate (i) or (ii).

(d) None of the above

Ans. (a) To prove that f is not a function, it is necessary to demonstrate that there exists an element x in the domain of f, such that no element in the co domain is associated with it.

145. Which of the following is true?

(a) Demonstration of (i) is sufficient to prove that f is not a function but demonstration of (ii) is not sufficient to prove that f is not a function.

(b) Demonstration of (ii) is sufficient to prove that f is not a function but demonstration of (i) is not sufficient to prove that f is not a function.

(c) Demonstration of (i) and (ii) is sufficient to prove that f is not a function.

(d) None of the above

Ans. (a) Demonstration of condition (i) is sufficient to prove that f is not a function.

146. Which of the following is true?

(a) The range of a surjective function is always equal to its co domain.

(b) The range of a surjective function is never equal to its co domain.

(c) The range of a surjective function is equal to its co domain only if it is injective also.

(d) One of the conditions under which the range of a surjective function is equal to its co domain is that the function is injective also.

Ans. (a) The range of a surjective function is always equal to its co domain.

DIRECTIONS (Q Nos. 147–152) Study the following information very carefully and answer the questions that follow. (2012)

Ms. Chi can repay a loan taken from Mr. Tao either by giving him u kg of gold today or by giving him v kg of gold after two years. The price of gold today is Rs. x per gram. Ms. Chi is certain that after two years the price of gold will be Rs. y per gram. If Ms. Chi chooses to repay the loan after two years, she will open a fixed deposit account at her bank today with a maturity period of two years and use the proceeds at maturity to purchase the necessary gold. Interest on such a deposit is compounded annually and is paid on the date of maturity. The rate of interest for a two year fixed deposit is r percent per annum. Every year the interest paid into Ms. Chi's fixed deposit account will be taxed at the rate of $t\%$. Ms. Chi will decide when to repay the loan on the basis of which option will cost her the least amount of money today.

147. If $u = v = 0.16, x = 2000, y = 2500, r = 12.5$ and $t = 0$, when will Ms. Chi repay the loan?

(a) Today
(b) After two years
(c) She will be indifferent between (a) and (b)
(d) More information is necessary to provide the answer.

Ans. (b) Ms. Chi should repay the loan after two years. If she repays today, she will be required to pay

$$2000 \times 0.16 = 320$$

If she repays after two years, she will be required to pay

$$2500 \times 0.16 = 400$$

If the amount she has to pay today is deposited in a term deposit, interest being compounded annually, then after two years, she will get

$$Amount = 320\left(1 + \frac{12.5}{100}\right) = Rs.405$$

If from this amount she uses Rs. 400 to repay her debt, then she would be left with a surplus of Rs. 5. Therefore, she should repay the loan after 2 years.

148. If $u = v, x = 2000, y = 2500, r = 12$ and $t = 0$, when will Ms. Chi repay the loan?
(a) Today
(b) After two years
(c) She will be indifferent between (a) and (b)
(d) More information is necessary to provide the answer.

Ans. (b) Computing in the same manner as discussed above, we observe that repaying the loan after two years is beneficial for Ms. Chi.

149. If $u = 0.16, v = 0.165, x = 2000, y = 2500, r = 12.5$ and $t = 0$, when will Ms. Chi repay the loan?
(a) Today
(b) After two years
(c) She will be indifferent between (a) and (b)
(d) More information is necessary to provide the answer.

Ans. (a) It would be better if Ms. Chi repays her loan today.

150. If $u = v, x = 2000, y = 2500, r = 12.5$ and $t = 0.04$, when will Ms. Chi repay the loan?
(a) Today
(b) After two years
(c) She will indifferent between (a) and (b)

(d) More information is necessary to provide the answer

Ans. (b) It will be beneficial for Ms. Chi repay the loan after two year.

Hint: Rate of interest $= 12.5 - (0.04\ of\ 12.5) = 12.5 - 0.5 = 12\%$

151. If $u = 0.16, v = 0.165, x = 2000, y = 2500, r = 12$ and $t = 0$, when will Ms. Chi repay the loan?

(a) Today

(b) After two years

(c) She will be indifferent between (a) and (b)

(d) More information is necessary to provide the answer.

Ans. (a) It would be better if Ms. Chi repays her loan today.

152. If $u = 0.16, v = 0.165, x = 2000, y = 2500, r = 12, and\ t = 0.04$, when will Ms. Chi repay the loan?

(a) Today

(b) After two years

(c) She will be indifferent between (a) and (b)

(d) More information is necessary to provide the answer.

Ans. (a) It would be better if Ms. Chi repays her loan today.

DIRECTIONS (Q Nos. 153–157) Study the following information very carefully and answer the questions that follow. (2012)

In a village, there is a field. If n cows simultaneously graze on this field, the value of milk produced by each cow is v(n).

$v(1)$	$v(2)$	$v(3)$	$v(4)$	$v(5)$	$v(6)$	$v(7)$
22	18	15	12	10	9	8

Assume that the market price of a cow is Rs. 11.

153. Suppose all villagers are given free access to the field. This mean that any villager can buy as many cows as she wants, graze her cows on the field, and sell the milk obtained from her cows. In equilibrium, the total number of cows bought by villagers and grazed on the field equals

(a) 4

(b) 5

(c) 7

(d) None of the above

Ans. (a) On the basis of given information, the table is as follows:

Number of cows	Value of milk	Cost of cows	Profit/ Loss
1	22	11	11
2	36	22	14
3	45	33	12
4	48	44	4
5	50	55	−(5)
6	54	66	−(12)
7	56	77	−(21)

It is clear from the above table that, when the villagers purchase the number of cows from 1 to 3, they get the profit of Rs. 37 (i.e., $11 + 14 + 12 = 37$) and when the villagers purchase the number of cows from 5 to 7, then the villagers has loss of Rs. 38 (i.e., $-5 - 12 - 21 = -38$)

Thus, to make a equilibrium portion, the villagers has to bought 4 cows grazed field equals.

154. Define the aggregate income of the village as follows:

The value of milk produced by cows grazed on the field−Total cost of buying the cows. How many cows must graze in the field for village's aggregate income to be maximized?

(a) 1
(b) 2
(c) 3
(d) None of these

Ans. (b) As illustrated in the table, the income of villagers is maximized when they purchase two cows.

155. Assume that the villagers implement the following rule:

Each time a person buys a cow, she must pay Rs. t to the village council. Thus, a person incurs a cost of Rs. (11+t) for each cow that she buys.

For which of the following values of t will the equilibrium number of cows bought and grazed on the field equal the number that maximizes the village's aggregate income?

(a) 11
(b) 6

(c) 0
(d) None of these

Ans. (b) At $t = 6$, the equilibrium number of cows bought and grazed on the field will equal the number that maximizes the village's aggregate income.

156. If villagers are given free access to the field, the aggregate income of the village, in equilibrium, equals to
(a) 0
(b) 48
(c) 4
(d) None of these

Ans. (c) As per the table, aggregate income of villagers at the level of equilibrium is 4.

157. Suppose t is set to 10. The revenue earned by the village council equals
(a) Rs. 10
(b) Rs. 20
(c) Rs. 30
(d) Rs. 0

Ans. (a) If the value of t is set to 10, then the cost of each cow will be 21 (11+10). In this case, the villagers will have a positive income only in case of 1 cow.

So, the revenue earned by the village council will be Rs. 10.

DIRECTIONS (Q Nos. 158–161) Study the following information very carefully and answer the questions that follow. (2011)

Suppose there is a consumer whose life is divisible into three periods which follow each other consecutively –youth, middle age and post–retirement age. The length of each period is 20 years and the consumer earns no labour income on post–retirement. In his youth the consumer earns about income at the rate of Rs. 2500 per month. In his middle age the consumer's earnings are uncertain – there is a 25% probability that he will earn at the rate of Rs. 5000 per month, alternatively, he will earn at the rate of Rs. 10000 per month.

The consumer's gets to know what his rate of earnings in middle age will be at the end of his youth. Assume that the consumer expects to pay no taxes, the nominal rate of return on saving and the rate of interest is always zero and there is no inflation expected throughout his life.

158. What is the expected value of the consumer's earnings (Rs. in lakh) in middle age?
(a) 18
(b) 20
(c) 30

(d) None of these

Ans. (d) Expected value of consumer's earnings in the middle age

$$= Rs.(5000 \times 25\% + 10000 \times 75\%) \times 12 \times 20 = Rs.21\ lakhs$$

159. What is the present discounted value of the consumer's expected lifetime labour income (Rs. in lakh)?

(a) 24
(b) 26
(c) 27
(d) 36

Ans. (c) Present discounted value of the consumer's expected lifetime labour income would be the same as his life time earnings because there is no inflation in the economy. Individual's lifetime earnings $=$ $2500 \times 12 \times 20 + 21$ (as computed above) $=$ Rs. 27 lakhs

160. Suppose the consumer's attitude towards risk is as follows:

He prefers an alternative which promises him an amount of Rs. X with probability p and an amount of Rs. Y (X > Y) with probability (1−p) to an alternative which promises him an amount of Rs. Z for sure if and only if Z < Y + (2p/3) (X−Y). An insurance company approaches the consumer in his youth and offers to pay Rs. 7615 per month to the consumer in his middle age in exchange for his flow of income during that period. Will the consumer accept the offer?

(a) Yes
(b) No
(c) The consumer will be indifferent between accepting and declining the offer.
(d) The consumer's acceptance is a random event.

Ans. (a) Yes, the consumer will accept the offer. On the basis of the given information, the variables can be defined as

$$X = 10000, Y = 5000, Z = 7615, p = 0.75$$

$$\therefore P = 1 - 0.75 = 0.25$$

Now according to the condition specified, the consumer would accept the offer of the insurance company if computed value is less than the offer made by the insurance company.

$$\therefore Computed\ value = Y + \left[\frac{2p}{3}\right](X - Y)$$

$$= 5000 + \left[\frac{2 \times 0.75}{3}\right](10000 - 5000)$$

$$= 7500$$

The offer of the insurance company exceeds the computed amount, therefore the individual will accept the offer.

161. Suppose the consumer can borrow any amount in a year but must repay the loan out of future labour income. The consumer wishes to end his life with no assets or liabilities. He plans to have the same constant flow of consumption in the last two periods of his life and wishes to minimize the difference between the expected rate of consumption in these two periods and a constant rate of consumption during his youth. What should be his savings per month (in Rs.) during his youth?

(a) −750
(b) −1250
(c) 250
(d) None of the above

Ans. (b) If the consumer wants to have a constant pattern of consumption, then his consumption per month

$$= \frac{2700000}{60 \times 12} = Rs.3750$$

∴Savings per month in youth $= 2500 - 3750 = -1250$

DIRECTIONS (Q Nos. 162–165) Study the following information vey carefully and answer the questions that follow. (2010)

Consider a country in which there are four different types of people red, blue, green and yellow. All red earn the same income. The same is true about the blues, greens and yellows. However, the red income, the blue income, the green income and yellow income can be different from each other. A distribution of income of the country (D_i) specifies the red income, blue income, green income and yellows income and also the number of reds, blues, greens, and yellows. The following table gives the possible income distributions for the country.

	Income				Number of individuals			
	Red	Blue	Green	Yellow	Red	Blue	Green	Yellow
D_1	1	2	3	4	1	1	1	1
D_2	3	4	1	2	1	1	1	1
D_3	5	10	15	20	1	1	1	1
D_4	0.8	1.6	2.4	5.2	1	1	1	1
D_5	2.5	2.5	2.5	2.5	1	1	1	1
D_6	1	2	3	4	5	5	5	5

162. Let G_i denote the Gini coefficient for the income distribution i. Which of the following is true?

(a) $\boldsymbol{G_5 < G_1 = G_2 = G_3 = G_6 = G_4}$

(b) $\boldsymbol{G_5 < G_1 = G_2 = G_3 = G_6 < G_4}$

(c) $\boldsymbol{G_1 > G_2 > G_3 > G_4 > G_5 > G_6}$

(d) $\boldsymbol{G_1 < G_2 < G_3 < G_4 < G_5 < G_6}$

Ans. (b) Gini coefficient

$$= \frac{100 + (100 - 2S)}{n}$$

Where, $S = Y_1 + Y_2 + \cdots + Y_n$

By using the formula, we get

$$G_1 = 25, G_2 = 25, G_3 = 25$$

$$G_4 = 35, G_5 = 0, G_6 = 25$$

It is clear from that,

$$G_5 < G_1 = G_2 = G_3 = G_6 < G_4$$

163. Let σ_i denote the standard deviation for the income distribution i. Which of the following is true?

(a) $\boldsymbol{\sigma_5 < \sigma_1 = \sigma_2 = \sigma_6 < \sigma_4 < \sigma_3}$

(b) $\boldsymbol{\sigma_5 < \sigma_1 = \sigma_2 = \sigma_6 < \sigma_3 < \sigma_4}$

(c) $\boldsymbol{\sigma_5 < \sigma_1 = \sigma_2 < \sigma_6 < \sigma_4 < \sigma_3}$

(d) $\boldsymbol{\sigma_5 < \sigma_1 = \sigma_6 < \sigma_2 < \sigma_4 < \sigma_3}$

Ans. (a) The relation specified in option (a) holds true.

Hint: Since, the gini coefficient of D_5 is the lowest, then SD of D_5 is the lowest, then SD of D_5 will also be the lowest.

164. Let μ_i denote the median for the income distribution i. Which of the following is true?

(a) $\mu_4 < \mu_1 = \mu_2 = \mu_5 < \mu_6 < \mu_3$

(b) $\mu_4 < \mu_1 = \mu_2 = \mu_5 = \mu_6 < \mu_3$

(c) The mean is equal to the median for each of the given distributions.

(d) The mean is different from the median for each of the given distributions.

Ans. (b) Option (b) will hold true.

Hint: Since, the Gini coefficient of D_4 will also be the highest.

165. Consider the five income distributions D_1, D_2, D_3, D_4 and D_5. Which of the following is true?

(a) There is no Pareto –optimal distribution.

(b) All distributions are Pareto–optimal.

(c) D_3 is the only Pareto–optimal distribution.

(d) D_1 and D_3 are the only Pareto–optimal distributions.

Ans. (b)All the five distribution are Pareto optimal.

Chapter 11

Reasoning

SECTION A [1 Mark Each]

1. If A is sufficient for B to occur and C is necessary for B to occur, then (2013)

(a) From occurrence of B, we can conclude that A has occurred.

(b) From occurrence of B, we can conclude that C has occurred

(c) From occurrence of C, we can conclude that A has occurred

(d) From occurrence of C, we can conclude that B has occurred

Ans. (b) Since, C is necessary for B to occur, therefore from occurrence of B we can conclude that C has occurred.

2. Following are given

1. All P are Q

2. No Q is R.

From (1) and (2), we can infer that (2013)

(a) Some P are R
(b) No P is R
(c) All P are R
(d) None of the above

Ans. (b) From (1) and (2), it can be inferred that no P is R. The Venn diagram would take the following form:

3. Following are given

1. Some P are Q
2. No R is Q.

From (1) and (2), we can infer that (2013)

(a) Some P are R
(b) No P is R
(c) All P are R
(d) None of these

Ans. (b) From (1) and (2), it can be inferred that no P is R, as illustrated in the diagram given below.

4. Linda is 31, single, outspoken and very bright. She studied philosophy in college. As a student, she was deeply concerned with discrimination and other social issues and participated in anti−nuclear demonstrations. Consider the following two situations

1. Linda is a bank teller.
2. Linda is a bank teller and active in the feminist movement.

Which of the following claims must be correct? (2012)

(a) Situation 2 is strictly more likely than Situation 1
(b) Situation 1 is strictly more likely than Situation 2
(c) Situation 1 is at least as likely as Situation 2
(d) None of the above

Ans. (a) On the basis of the given information, it is more likely that Linda is a bank teller and active in the feminist movement.

5. Three trucks A, B and C are used for transporting wheat and rice. The following information is given

1. If A carried wheat, then B carried rice.
2. If A carried rice, then C carried wheat.
3. If B carried wheat, then C carried rice.

Which truck always carried the same thing? (2012)

(a) A
(b) B
(c) C
(d) None of these

Ans. (d) On the basis of the given information, no truck always carried the same thing.

6. Continue the following number series with the group of numbers below which best continues the series. (2012)

1, 10, 3, 9, 5, 8, 7, 7, 9, 6

(a) 11, 5
(b) 10, 5
(c) 10, 4
(d) 11, 6

Ans. (a) The given series comprises of two series –one of odd numbers and other of natural numbers in backward, starting from 10.

7. If you count from 1 to 100, how many 7's will you pass on the way? (2012)
(a) 11
(b) 19
(c) 20
(d) 21

Ans. (c) From 1 to 100, there are 20 7's as given below

1, 17, 27, 37, 47, 57, 67, 87, 97, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79 =20

8. Which number comes next in the following series of numbers? (2012)

2, 3, 5, 7, 11, 13

(a) 14
(b) 15
(c) 16
(d) 17

Ans. (d) The given series is of prime numbers. After 13, the next prime number is 17.

9. Suppose one wishes to prove that if some X are Y, then some Z are W. To do this, it would suffice to show that (2011, 10)

(a) Some X are Z and some Y are W
(b) Some Z are X and some W are Y
(c) All X are Z and all Y are W
(d) All Z are X and all W are Y

Ans. (c) To prove that if some X are Y, then some Z are W, we would be required to show that all X are Z and all Y are W. the Venn Diagram will look like the one given below.

10. Let X, Y, Z be statements. Suppose we know that X implies Y and that Y implies Z. If we also know that Y is false, we can conclude that (2011)
(a) X is true
(b) X is false
(c) Z is true
(d) Z is false

Ans. (d) If we know that Y is false and Z is implied from Y, then it follows that Z is false.

11. Let X, Y, Z be statements. Suppose we know 'X is true implies Y is true' and 'X is false implies Z is true'. If we know that Z is false, then we can conclude that (2011)
(a) Both X and Y are true
(b) Both X and Y are false
(c) X is true and Y is false
(d) X is false and Y is true

Ans. (b) It can be concluded that both X and Y are false.

12. There are four candidates for an award A, B, C and D.

Only one of the four candidates had cleared both Tests I and II.

Only one candidate had cleared both Tests I and III.

Only one candidate had cleared both Tests I and IV.

Only one candidate had cleared both Tests II and III.

Only one candidate had cleared both Tests II and IV.

Only one candidate had cleared both Tests III and IV.

Both A and B had cleared Test I.

Both C and D had cleared Test II.

Both B and C had cleared Test III.

Both B and D had cleared Test IV.

The award went to the candidate who had cleared more tests than any other candidate. The award was given to (2011)

(a) A
(b) B
(c) C
(d) D

Ans. (b) B has cleared tests I, III and IV. Therefore, the award was given to B.

13. If x, y and z are consecutive negative integers, and if x > y > z, then which of the following must be a positive odd integer? (2010)

(a) xyz
(b) $(x-y)(y-z)$
(c) $x-yz$
(d) $x(y+z)$

Ans. (b) if x, y and z are consecutive negative integers, then $(x-y)(y-z)$ is a positive odd integer.

SECTION C [1 Mark Each]

DIRECTIONS (Q Nos.14–19) Study the following information very carefully and answer the questions that follow.

An exclusive club is trying very hard to pick its members from the social elite. An exact election mechanism has been agreed upon that will ensure the entrance of only the most suave members from the group A, B, C, D, E, F, G and H. Being 'in' or 'out' of the club is determined by the following rules

If A is in, then G is out.

If H is out, then B is in.

If D is out, then E is out.

If H is in, then C is in.

If B is out, then G and D are out. **(2013)**

14. Which of the following is a complete group of people who could be in?

(a) A, F, G

(b) F, G, H, C, E, D
(c) E, D, H, C, B
(d) B, F, G, D, A

Ans. (b) F, G, H, C, E and D would be the complete group of people who could be in according to the rules specified.

15. If B is out, then who must be in?
(a) A
(b) C
(c) D
(d) E

Ans. (a) If B is out, then G and D are out. If D is out, then E is also out. C cannot be considered as C is in only when H is in. So, A is the logical choice.

16. If E and G are in the club, then what other two people must also be in the club?
(a) B, A
(b) G, H
(c) H, D
(d) D, B

Ans. (d) If E and G are in the club, then as per the rules specified, D and B must also be in the club.

17. If B and D are out of the club, then which of the following must be true?
(a) At least two people are in the club
(b) At least three people are in the club
(c) At most four people are out of the club
(d) Exactly three people are out of the club

Ans. (c) If B and D are out, then at most four people are out. If B is out, then G and D are out, and if D is out, then E is also out.

So, B, D, G and E will out.

18. If seven people are in the club, then who could be out?
(a) A
(b) B
(c) E
(d) C

Ans. (a) If seven people are in the club, then as per the rule, only A could be out.

19. Who could be the only person in the club?

(a) A
(b) B
(c) C
(d) F

Ans. (d) F has no restriction. Therefore, he could be the only person in the club.

DIRECTIONS (Q Nos. 20–25) Study the following information very carefully and answer the questions that follow.

A number of species faced extinction during the Mesozoic era. Species R, S, T, U, V, W and X were species that all became extinct during this era and scientists have determined that their extinction occurred based on the following constraints:

W became extinct before X.

U became extinct after T.

S became extinct before T.

X became extinct before U.

V became extinct after U.

S became extinct before W.

R became extinct before S. **(2013)**

20. Which of the following species were the last two to go extinct?
(a) X, V
(b) T, U
(c) X, U
(d) U, V

Ans. (d) U and V are the last two species to go extinct according to the given constraints.

21. Which of the following species could have been the fourth one to go extinct?
(a) S
(b) V
(c) W
(d) R

Ans. (c) W is the fourth species to go extinct as per arrangement: $R - S - T - W$

22. Which of the following must be true if X went extinct after T?

(a) Three species went extinct before T
(b) Three species went extinct after T
(c) Four species went extinct before T
(d) At least three species went extinct after T

Ans. (b) As per the given constraints, three species went extinct after T.

23. Which is the smallest number of species that could have gone extinct before T?
(a) Two
(b) Three
(c) Four
(d) Five

Ans. (a) At least two species (R and S) becomes extinct before T.

24. How many possible orders are three for the species extinction pattern?
(a) One
(b) Two
(c) Three
(d) Four

Ans. (c) There are three possible patterns for the species extinction. They are

Pattern I: $R - S - W - X - T - U - V$

Pattern II: $R - S - W - T - X - U - V$

Pattern III: $R - S - T - W - X - U - V$

25. If the constraints were changed and X were not required to become extinct before U, then which of the following is a possible order for the species' extinction?
(a) W, R, S, T, U, X, V
(b) R, S, X, W, T, U, V
(c) R, X, S, W, T, U, V
(d) R, S, T, U, V, W, X

Ans. (d) The possible order would be

$$R - S - T - U - V - W - X$$

DIRECTIONS (Q Nos. 26–28) Study the following information very carefully and answer the questions that follow.

A student has taken 5 courses–Philosophy, Biology, Economics, Mathematics and Literature. She studies for these courses according to the following pattern

Every week, the student studies for exactly three courses.

If she studies Biology in a week, then she also studies Philosophy that week.

If she studies Economics in a particular week, then she does not study it in the following week.

In any particular week, she studies not more than one of the subjects studied in the preceding week. **(2013, 10)**

26. Which of the following is a possible sequence of combinations for the student in the two successive weeks?

(a) Week–1: Philosophy, Biology and Economics
Week 2: Biology, Mathematics and Literature

(b) Week –1: Philosophy, Biology and Mathematics
Week –2: Philosophy, Biology and Literature

(c) Week –1: Philosophy, Mathematics and Literature
Week –2: Philosophy, Biology and Economics

(d) Week –1: Biology, Mathematics and Literature
Week –2: Philosophy, Economics and Mathematics

Ans. (c) The possible sequence of combinations for the students in two successive weeks, as per the constraints given, would be the one specified in option (c).

27. If the student studies Philosophy, Biology and Economics in the first week, then which of the following combinations must be studied in the third week?

(a) Philosophy, Biology and Economics
(b) Philosophy, Biology and Mathematics
(c) Philosophy, Economics and Mathematics.
(d) Economics, Mathematics and Literature.

Ans. (a) Philosophy, Biology and Economics would be studied in the third week.

28. If the student studies Philosophy, Literature and Mathematics in the first week, then which of the following combinations must be studied in the eleventh week?

(a) Philosophy, Literature and Mathematics

(b) Philosophy, Biology and Mathematics
(c) Philosophy, Economics and Mathematics
(d) Economics, Mathematics and Literature

Ans. (a) In the eleventh week, then given combination would be repeated.

DIRECTIONS (Q Nos. 29–30) Study the following information very carefully and answer the questions that follow. **(2012)**

Four students, named P, Q, R and S all opted for different subjects –Economics, History, Physics and Chemistry.

(i) Q opted neither for Physics nor for History.
(ii) S opted neither for Physics nor for Chemistry.
(iii) If Q did not opt for Chemistry, then R did not opt for Physics.
(iv) P opted neither for Physics nor for History.

29. Q opted for
(a) Physics
(b) Chemistry
(c) Economics
(d) History

Ans. (b) As per the given conditions, it follows that Q opted for Chemistry.

30. Economics was opted by
(a) P
(b) Q
(c) R
(d) S

Ans. (a) From the given conditions, it follows that P opted for Economics.

DIRECTIONS (Q 31–32) Study the following information very carefully and answer the questions that follow. (2012)

Three sportspersons A, B and C each made two statements given below

A's statements

(i) I do not belong to the hockey team.
(ii) Mr. D is on the soccer team.

B's statements

(i) I do not belong to the soccer team.
(ii) Mr. D's is on the cricket team.

C's statements

(i) I do not belong to the cricket team.
(ii) Mr. D is on the hockey team.

Both statements made by the person who belongs to the hockey team are true; both statements made by the person who belongs to the soccer team are false; and the person who belongs to the cricket team made one true statement and one false statement.

31. Mr. D is on the
(a) Cricket team
(b) Hockey team
(c) Soccer team
(d) None of these

Ans. (b) On the basis of the given information, it can be inferred that Mr. D is on the hockey team.

32. The person belonging to the cricket team is
(a) A
(b) B
(c) C
(d) None of these

Ans. (a) According to the given information, Mr. A belongs to the cricket team.

DIRECTIONS (Q Nos. 33–34) Study the following information very carefully and answer the questions that follow. (2011)

One of A, B, C and D has cheated in the examination with the help of another one of them. Here are the statements that these individuals made to the investigator.

A: If B is guilty of some wrong doing, then C must be innocent.

B: If A is innocent, then C must be guilty.

C: If B cheated in the examination, then D must have had nothing to do with any wrong doing.

D: I am innocent.

The statements of the person who has cheated and his accomplice are false and those of the remaining two are true.

33. The person who cheated in the examination was

(a) A

(b) B

(c) C

(d) D

Ans. (d) As per the given information, D cheated in the examination.

34. The accomplice of the person who cheated in the examination was

(a) A

(b) B

(c) C

(d) D

Ans. (b) B was the accomplice of D.

DIRECTIONS (Q Nos. 35–37) Study the following information vey carefully and answer the questions that follow. (2011)

Five teachers R, S, T, U, V teach five different subjects –Mathematics, History, Sociology, Economics, Literature. Each teacher teaches once in a week on a fixed week–day (Monday to Friday); and each one teaches on a different day from others.

V does not teach Economics and does not teach on Tuesday.

S teaches History and does not teach on Monday or Friday.

The Mathematics teacher teaches on Thursday.

T does not teach Economics and teaches on Wednesday.

The Literature teacher, who is not U, teaches on Friday.

R teaches on Monday.

35. On which day does S teach?

(a) Tuesday

(b) Thursday

(c) Friday

(d) None of the above

Ans. (a) According to the given information, S teaches on Tuesday.

36. Which subject does T teach?

(a) Economics

(b) Sociology
(c) Mathematics
(d) Literature

Ans. (b) T teaches Sociology, as per the information given.

37. On which day is Economics taught?
(a) Monday
(b) Tuesday
(c) Wednesday
(d) None of these

Ans. (a) According to the information given, Economics is taught on Monday.

DIRECTIONS (Q Nos. 38–40) Read the following passage very carefully and answer the questions that follow. (2010)

Ms. A wishes to renovate her cottage. She hires the services of a plumber, a carpenter, a painter, an electrician and an interior decorator. The renovation is to be completed in a period of one working week i.e., Monday to Friday. Every worker will be taking one complete day to do his job. Ms. A will allow just one person to work per day.

The painter can do his work only after the plumber and the carpenter have completed their jobs. The interior decorator has to complete his job before that of electrician. The carpenter cannot work on Monday or Tuesday.

38. In case the painter works on Thursday, which among the following alternatives is possible?
(a) The electrician works on Tuesday.
(b) The electrician works on Friday.
(c) The interior decorator does his after the painter.
(d) The plumber and the painter work on consecutive days.

Ans. (b) As per the given information, the electrician works on Friday.

39. In case the painter works on Friday, which among the following statements must be false?
(a) The carpenter may work on Wednesday.
(b) The carpenter and the electrician may work on consecutive days.
(c) In case the carpenter works on Thursday, the electrician has to work on the previous day, i.e., Wednesday.
(d) The plumber may work before the electrician does.

Ans. (c) In case the painter works on Friday, then as the given condition, the carpenter works on Thursday and electrician works on Wednesday.

40. Which arrangement among the following is possible?

(a) The painter will work on Wednesday and the plumber on Thursday.

(b) The carpenter will work on Tuesday and the painter on Friday.

(c) The painter will work on Monday and the carpenter on Thursday.

(d) The carpenter will work on Wednesday and the plumber on Thursday.

Ans. (a) The possible arrangement would be that the carpenter will work on Wednesday and the plumber on Thursday.