ECONOMICS

General Instructions

- There are 34 questions. All questions are compulsory. Internal choices should be considered, where indicated.
- Question Nos. 1 to 10 and 18 to 27 are multiple choice/very short answer type questions of 1 mark each. They are required to be answered in one sentence.
- Question Nos. 11 to 12 and 28 to 29 are short answer-I type questions of 3 marks each. Answer to these questions should not exceed 60 words each.
- Question Nos. 13 to 15 and 30 to 32 are short answer-II type questions of 4 marks each. Answer to these questions should not exceed 70 words each.
- Question Nos. 16 to 17 and 33 to 34 are long answer questions of 6 marks each. Answer to these questions should not exceed 100 words each.

Time : 3 hours   **Max. Marks : 80**

PART A

1. "Sales of firm Sigma has gone up". Can this statement be considered as an example of statistics?

2. Consider the following distribution.

Marks	Less than 20	20 – 60	More than 60
Number of Students	80	65	42

   Which measure of dispersion will be suitable for the above distribution?

   (a) Range   (b) Standard deviation   (c) Mean deviation   (d) Quartile deviation

3. The sex-ratio of India, as per the census conducted in 2011, was 940. What does this tell you about the Indian society?

4. What is the slope of "more-than frequency curve"?

   or   What are the two ways in which frequency polygon for continuous frequency distributed can be constructed?

5. Mean is affected by extreme values because

   (a) it is based on all the items of the series

   (b) it is based on extreme values (i.e. open-ended class)

   (c) it is not affected by extreme values

   (d) Both (a) and (b)

   or   Which of the following are essentials of a good average (like mean)?

   (a) Clear and stable by definition   (b) Representative of the group

   (c) Capable of algebraic treatment   (d) All of these

6. What will be the value of mode for the given series?

   X : 15 25 25 30

F : 10 20 20 12

(1)

(a) 20
(b) 25

(c) 30
(d) Both (a) and (b)

(1)

7. Which average distributes the series into 100 equal parts? (1)

8. Which of the following is a relative measure of dispersion? (1)

(a) Range
(b) Coefficient of range

(c) Quartile deviation
(d) All of these

9. Mean deviation from which of the following may be illdefined? (1)

(a) Mean
(b) Median

(c) Mode
(d) None of these

10. While calculating standard deviation, the deviations, as computed from mean are squared. Why? (1)

11. The sum of 10 values is 100 and the sum of their squares is 1090. Find the coefficient of variation. (3)

or Suppose mean of a series of 5 items is 60. 4 values are 10, 25, 30 and 35 respectively. Find the missing 5th value of the series. (3)

12.

Set A	500	700	1000
Set B	100000	120000	130000

The values in Set A are the daily sales recorded by an ice-cream vendor, while Set B has the daily sales of a big departmental store. Calculate the range of the above data. Can the two series be compared on the basis of the range so computed? Which according to you is a better measure of comparing the two sets? (3)

13. A beauty contest is being judged by three judges. Which method of computing correlation should be used to assess which pair of judges have similar perception of beauty? Why should this method be used? (4)

or Raj wants to conduct a study on the changes in the level of industrial production in 2016, as compared to 2010. Which index number will be suitable in such an instance? Also give the steps for the computation of this index number. (4)

14. Calculate the index number by weighted relatives method from the following data for the year 2016 with year 2000 as the base year. (4)

Commodity	Quantity in 2000 (units)	Price in 2000 (₹)	Price in 2016 (₹)
A	80	5	8
B	65	8	14
C	42	12	18
D	37	4	5
E	31	4	5
F	15	2	4

15. What are the essentials of a good questionnaire? (4)

16. Construct a frequency polygon with histogram from the following data (6)

Class Interval	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
Frequency	4	6	7	14	16	14	8	6

or From the following frequency distribution, prepare the less than 'ogive' (6)

Capital (₹ in lakh)	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
Number of Companies	2	3	7	11	15	7	2	3

17. The following table shows monthly wages of 10 workers. Calculate lower and upper quartile (6)

Monthly Wages	120	150	170	180	181	187	190	192	200	210

PART B

18. Which of the following is related to microeconomics? (1)
    (a) Inflation in the economy   (b) Problem of unemployment
    (c) National income   (d) Income from railways

or With improvement in technology for both goods, production possibility curve will (1)
    (a) Rotate outwards   (b) Shift outwards
    (c) Shift inwards   (d) Rotate inwards

19. What do you understand by the term 'point of inflexion'? (1)

or What is meant by 'Implicit costs'? (1)

20. Due to improvement in technology, the Marginal Cost of production of LCD televisions has reduced. How will it affect the supply curve of LCD televisions? (1)

21. Area under the Marginal Cost curve represents (1)
    (a) Total Cost   (b) Total Fixed Cost
    (c) Total Variable Cost   (d) None of these

22. How does fall in Total Product affect Marginal Output? (1)

23. Fixed cost exists in the long-run. Do you agree? (1)

24. The MP of a factor in law of variable proportion. (1)
    (a) Is always negative   (b) Is always positive
    (c) can be positive, negative or zero   (d) Is always zero

25. Revenue of a firm is equal to (1)
    (a) cost   (b) profit
    (c) cost – profit   (d) cost + profit

26. 'Producer's equilibrium cannot be attained at falling MC'. Justify. (1)

27. What is the shape of MR curve under perfect competition? (1)
    (a) Parallel to Y-axis   (b) Parallel to X-axis
    (c) Positively sloped   (d) Negatively sloped

28. What are the two aspects of the problem of 'for whom to produce'? Explain. (3)

29. What value is reflected in the Law of Demand? (3)

or The Government in India keeps raising taxes on cigarettes and liquor. Yet, their demand continues to be high. How do you explain this phenomenon? (3)

30. State the features of perfect competition. Why is the demand curve facing a firm under perfect competition perfectly elastic? (4)

or Explain why are firms mutually interdependent in an oligopoly market. (4)

31. Complete the following table (4)

Output (units)	Total Revenue (₹)	Marginal Revenue (₹)	Average Revenue (₹)
1	—	—	8
2	12	—	—
3	—	4	
4	8	—	2

or Identify different phases of law of variable proportion from the following schedule. Give reasons. (4)

Variable inputs (units)	1	2	3	4	5	6
Total Product (TP) (units)	8	18	26	30	30	24
Marginal Product (MP)(units)	8	10	8	4	0	–6

32. When will a good be called inferior or normal? Explain by giving an example. (4)

33. Explain the concept of Marginal Rate of Substitution (MRS) by giving an example. What happens to MRS when a consumer moves downwards along the Indifference Curve and an economy moves downwards on a Production Possibility Curve (PPC)? (6)

34. Explain the implications of the following features of monopolistic competition.
(i) Differentiated products
(ii) Freedom of entry and exit to firms (6)
or Explain the implications of the following features of perfect competition.
(i) Very large number of buyers and sellers
(ii) Homogeneous product (6)

Answers

1. No, the given statement cannot be considered as an example of statistics.

2. (d) Quartile deviation
Hint: The given distribution is open ended.

3. This indicates that the Indian society is necessarily a male-dominated society.

4. A 'more-than frequency curve' has a negative slope.
or
A frequency polygon for a continuous frequency distribution can be drawn
(i) with help of histogram
(ii) without histogram

5. (a) It is based on all the items of the series
or
(d) All of these

6. (d) Both (a) and (b)

7. Percentile

8. (b) Coefficient of range

9. (c) Mode

10. The deviations are squared because the sum of deviations is zero.

11. Here,
$$n = 10, \Sigma X = 100, \Sigma X^2 = 1090$$
$$\sigma = \sqrt{\frac{\Sigma X^2}{n} - \left(\frac{\Sigma X}{n}\right)^2}$$
$$= \sqrt{\frac{1090}{10} - \left(\frac{100}{10}\right)^2} = \sqrt{109 - 100}$$
$$= \sqrt{9} = 3$$
Coefficient of Variation (CV) $= \dfrac{\sigma}{X} \times 100$
$$= \frac{3}{10} \times 100 = 30\%$$
or

Let 5th value be X_5
Given, $X_1 = 10, X_2 = 25, X_3 = 30,$
$X_4 = 35, X_5 = ?, \bar{X} = 60, n = 5$
Now, $\bar{X} = \dfrac{X_1 + X_2 + X_3 + X_4 + X_5}{n}$
$$\Rightarrow 60 = \frac{10 + 25 + 30 + 35 + X_5}{5}$$
or $60 = \dfrac{100 + X_5}{5}$
$$\Rightarrow 60 \times 5 = 100 + X_5$$
$$\Rightarrow 300 = 100 + X_5$$
$$\Rightarrow X_5 = 300 - 100 = 200$$
Thus, value of the 5th item = 200
Range for Set A = Largest Value (L) – Smallest Value (S)
$$= 1000 - 500 = 500$$

12. Range for Set B = Largest Value (L) – Smallest Value (S)
$$= 130000 - 100000 = 30000$$
No, the two series cannot be compared on the basis of range. A more appropriate measure will be 'coefficient of range'.
Coefficient of Range (Set A) $= \dfrac{L - S}{L + S}$
$$= \frac{1000 - 500}{1000 + 500} = \frac{500}{1500} = 0.33$$
Coefficient of Range (Set B) $= \dfrac{L - S}{L + S}$
$$= \frac{130000 - 100000}{130000 + 100000} = \frac{30000}{230000} = 0.13$$
On the basis of coefficient of range, it can be concluded that Set A exhibits higher variation.

13. Rank correlation method should be used to assess which pair of judges have similar perception of beauty.
This method of computing correlation is more precise than Karl Pearson's coefficient in the following cases

(i) **What the Measurements of the Variables are Suspect** When the measurements of variable are not exact or are not measurable due to lack of measuring rods or weighing scales, then rank correlation should be used.

(ii) **When Data is Qualitative** It is difficult to quantify qualities such as fairness, honesty, etc. Ranking may be a better alternative to quantification of qualities.

(iii) **When Data has Extreme Values** Sometimes the correlation coefficient between two variables with extreme values may be quite different from the coefficient without the extreme values. Under these circumstances, rank correlation provides a better alternative to simple correlation.

Since in the given situation qualitative phenomenon is under consideration, therefore rank correlation is preferred.

or

The index number suitable in such an instance will be industrial production index.

The index number of industrial production measures changes in the level of industrial production comprising many industries. It includes the production of the public and the private sector. It is a weighted average of quantity relatives.

Following are the steps involved in the construction of index number on industrial production

(i) Industries are classified under three heads, *viz.* mining, manufacturing and electricity.

(ii) A suitable base year is selected.

(iii) The data relating to the production of different industries are collected.

(iv) Weights are assigned on the basis of the relative importance of different industries.

(v) Index number on industrial production is calculated by using following formula

$$\text{Index Number} = \frac{\Sigma \left[\dfrac{q_1}{q_0} \times 100 \right] W}{\Sigma W}$$

Here, q_1 = Current year's quantity,
q_0 = Base year's quantity, W = Weights

14. Construction of Weighted Index Number

| Commodity	Weights q_0	Price (₹) 2000 (p_0)	Price (₹) 2007 p_1	Value weights $(p_0 q_0) W$	$R = \dfrac{p_1}{p_0} \times 100$	RW
A	80	5	8	400	160	64000
B	65	8	14	520	175	91000
C	42	12	18	504	150	75600
D	37	4	5	148	125	18500
E	31	4	5	124	125	15500
F	15	2	4	30	200	6000
				$\Sigma W = 1726$		$\Sigma RW = 270600$

Weighted Average of Price Relatives

$$P_{01} = \frac{\Sigma RW}{\Sigma W} = \frac{270600}{1726} = 156.77$$

15. *Following are the essentials of a good questionnaire*

(i) Questions should be few in numbers leg between 10 and 25.

(ii) Questions should be short, clear, brief and easy to understand.

(iii) Questions should be relevant to the investigation.

(iv) Questions should be logically arranged.

(v) Necessary instructions or meaning should be given.

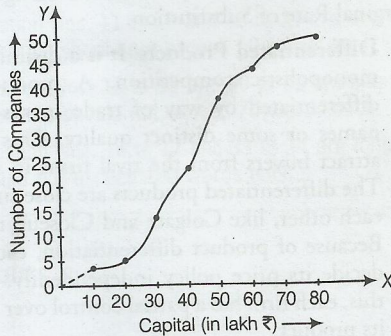(vi) Questions of sensitive and personal nature should be avoided.

16. Frequency polygon with histogram
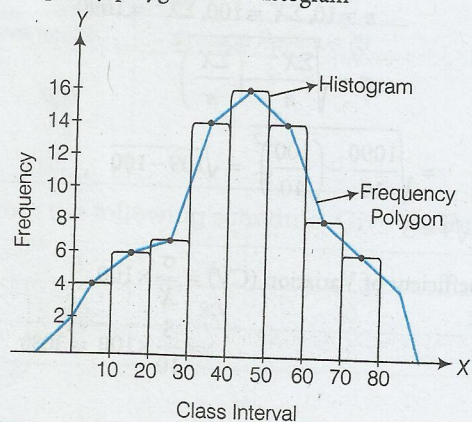
or

For less than 'ogive', we will have to prepare cumulative frequency distribution

Capital (in lakh ₹)	Number of Companies	Cumulative frequency (cf)
Below 10	2	2
Below 20	3	5
Below 30	7	12
Below 40	11	23
Below 50	15	38
Below 60	7	45
Below 70	2	47
Below 80	3	50

17.

S.No.	1	2	3	4	5	6	7	8	9	10
Monthly Wages	120	150	170	180	181	187	190	192	200	210

Here, $n = 10$

Lower Quartile

$$Q_1 = \text{Size of} \left[\frac{n+1}{4}\right] \text{th item}$$

$$= \left[\frac{10+1}{4}\right] \text{th item} = 2.75\text{th item}$$

= 2nd item + 0.75 (size of 3rd item − size of 2nd item)

$$= 150 + 0.75[170 - 150] = 150 + 15 = 165$$

Upper Quartile

$$Q_3 = \text{Size of } 3\left[\frac{n+1}{4}\right] \text{th item}$$

$$= 3\left[\frac{10+1}{4}\right] \text{th item} = 8.25\text{th item}$$

= 8th item + 0.25

[size of 9th item–size of 8th item]

$$= 192 + 0.25[200 - 192] = 192 + 2 = 194$$

18. (d) Income from Railways

or

(b) Shift outwards

19. It is the point on a curve where the curve changes its slope from convex to concave or vice-versa.

or The cost of self-owned and self-employed resources is called implicit cost. e.g. interest on self-capital, etc.

20. The supply curve of LCD televisions will shift to the right, showing increased supply at the same price.

21. (c) Total variable cost.

22. Marginal output becomes negative.

23. No, there are no fixed costs in the long-run as all the factors are variable. Fixed cost exists only in the short-run.

24. (c) Can be positive, negative or zero.

25. (d) Cost + Profit

26. A producer cannot attain equilibrium at a falling MC bacause, a falling MC indicates that producer can earn more profits by raising level of production, hence the firm will keep the production rising, despite of rise in MC, if it is below MR curve.

27. (b) Parallel to X-axis.

28. *Two aspects of the problem 'for whom to produce' are*

(i) **Personal Distribution** It is related to how production should be distributed among different individuals and households. It is related to the problem of inequality in the distribution of income.

(ii) **Functional Distribution** It is related to how the output should be distributed among different factors of production. It is not related to the problem of inequality of income.

29. The value of rational consumer behaviour is reflected in the law of demand. The consumers will demand more at less price and demand less at more price, e.g. as consumer consumes more units of a particular good he gets lesser satisfaction from the previous units, hence he would like to pay lesser price in order to get his satisfaction maximised.

or This is because Elasticity of Demand for these products (cigarettes and liquor) is very low, *owing to the fact that*

(i) There are no close substitutes of these products in the market.

(ii) These are habit-forming goods.

30. *The main features of perfect competition are*

(i) Large number of buyers and sellers.

(ii) Homogeneous product.

(iii) Perfect knowledge of market amongst buyers and sellers.

(iv) Perfect mobility of factors of production.

(v) Free entry and exit of the firms.

(vi) Absence of selling costs

Demand curve of a firm is perfectly elastic in a perfectly competitive market form because a firm can sell any number of units at the prevailing price. If the firm raises its price then it will not be able to sell even a single good. This is due to the fact that a homogeneous product is sold in the market having large number of buyers who are fully aware of the price prevailing in the market.

or Under oligopoly, there is a high degree of interdependence between the firms because of a few number of firms dealing in goods which are close substitutes of each other. Price and output policy of one firm has a significant impact on the price and output policy of the rival firms in the market. When one firm lowers its price, the rival firms may also lower the price. And when one firm raises its price, the rival firms may not do so.

Accordingly, while taking a decision on price or output, a firm must take into account the possible reaction of the rival firms in the market.

31.

Output (units)	Total Revenue (₹)	Marginal Revenue (₹)	Average Revenue (₹)
1	8	8	8
2	12	4	6
3	16	4	5.33
4	8	(–) 8	2

Formulae used

$$TR = AR \times Q \text{ or } \Sigma MR$$

$$MR_n = TR_n - TR_{n-1}, \quad AR = \frac{TR(4)}{Q}$$

or

Variable inputs (units)	TP (units)	MP (units)	Stages of law of variable proportion	
1	8	8	Stage I	TP is increasing at an increasing rate and MP is also increasing.
2	18	10		
3	26	8	Stage II	TP is increasing at a diminishing rate and MP starts declining.
4	30	4		
5	30	0		
6	24	–6	Stage III	MP becomes negative and TP falls.

32. If rise in income increases the demand for a good, then that good is called normal good, e.g. milk. When income of the consumer increases, he will increase the consumption of milk. As a result, demand for milk increases. These goods have positive income effect.

If rise in income decreases the demand for a good, then that good is called inferior good, e.g. dalda refined. When income of the consumer increases, he will increase the consumption of pure ghee in place of dalda refined. As a result, demand for dalda refined decreases. These goods have negative income effect.

33. Marginal Rate of Substitution refers to the rate at which the consumer is willing to sacrifice one good to obtain one more unit of the other good.

Symbolically,

$$MRS_{XY} = \frac{\text{Quantity of the Good Y Sacrificed}}{\text{Quantity of the Good X Obtained}} = \frac{\Delta Y}{\Delta X}$$

Combinations	Good X	Good Y	MRS
A	1	8	—
B	2	4	4 : 1
C	3	2	2 : 1
D	4	1	1 : 1

Marginal Rate of Substitution is falling in Indifference Curve. Due to the Law of Diminishing Marginal Utility, as a consumer increases his consumption, the Marginal Utility that he gets, goes on diminishing. Therefore, he will be willing to sacrifice less and less units of a commodity to gain an additional unit of the other commodity. It is because of this reason that MRS is diminishing along an indifference curve.

On the other hand, in a Production Possibility Curve, the Marginal Rate of Substitution is rising, because factors of production are not perfect substitutes of each other. So, when one factor is shifted from one product to another, its productivity declines leading to a rising Marginal Rate of Substitution.

34. (*i*) **Differentiated Products** It is a distinct feature of monopolistic competition. A product is often differentiated by way of trade marks and brand names or some distinct quality. This is done to attract buyers from the rival firms in the market. The differentiated products are close substitutes of each other, like Colgate and Closeup toothpastes. Because of product differentiation, each firm can decide its price policy independently. Because of this, each firm has a partial control over the price of its product.

(*ii*) **Freedom of Entry and Exit to Firms** Firms are free to enter the industry or leave it. However, new firms have no absolute freedom of entry into industry. Products of some firms may be legally patented. New firms cannot produce those products, e.g. no rival firm can produce or sell a patented item like Woodland shoes.

or

(*i*) **Very Large Number of Buyers and Sellers** A perfectly competitive market is dominated by the presence of large number of buyers and sellers of a commodity, which means that there is no such buyer or seller in the market whose purchase or sale is so large as to impact the total sale or purchase in the market. Each buyer/seller has only a fractional share in the market demand/market supply.

Hence, price is determined by the forces of market demand and market supply. No individual buyer or seller has any control over it. Each buyer/seller has to accept the price as it is in the market.

(*ii*) **Homogeneous Product** Homogeneous product mean the products which are identical in quality, shape, size and colour. In a perfectly competitive market, commodity is homogeneous (identical). So no producer is in a position to charge a different price of the product it produces. A uniform price prevails in the market. Thus, the buyers find no reason to prefer the product of one seller to the product of another. Hence, the firms are price takers.