

10.01.2020

REVISION-1

Marks: 90

Std:XI (E-I)

Business Mathematics

Time:3 Hrs

I. Choose the correct answer:

20x1=20

1. The elasticity of demand for the demand function $x = \frac{1}{p}$ is

- a) 0 b) 1 c) $-\frac{1}{p}$ d) 0

2. For the cost function $C = \frac{1}{25} e^{5x}$, the marginal cost is

- a) $\frac{1}{25}$ b) $\frac{1}{5} e^{5x}$ c) $\frac{1}{125} e^{5x}$ d) $25e^{5x}$

3. A company begins to earn profit at

- a) Maximum point b) Breakeven point
c) Stationary point d) Even point

4. The brokerage paid by a person on the sale of 400 shares of face value Rs.100 at 1% brokerage

- a) ₹600 b) ₹500 c) ₹200 d) ₹400

5. Purchasing price of one share of face value 100 available at a discount of $9\frac{1}{2}\%$ with brokerage $\frac{1}{2}\%$ is

- a) ₹89 b) ₹90 c) ₹91 d) ₹95

6. The annual income on 500 shares of face value 100 at 15% is

- a) ₹7,500 b) ₹5,000 c) ₹8,000 d) ₹8,500

7. An annuity in which payments are made at the beginning of each payment period is called

- a) Annuity due b) An immediate annuity
c) Perpetual annuity d) none of these

8. Example of contingent annuity is

- a) Life insurance premium
b) An endowment fund to give scholarships to a student
c) Personal loan from a bank d) All the above

9. The correct relationship among A.M, G.M and H.M is

- a) $A.M < G.M < H.M$ b) $G.M \geq A.M \geq H.M$
c) $H.M \geq G.M \geq A.M$ d) $A.M \geq G.M \geq H.M$

10. Median is same as

- a) Q_1 b) Q_2 c) Q_3 d) D_2

11. The mean of the values 11, 12, 13, 14 and 15 is

- a) 15 b) 11 c) 12.5 d) 13

12. If the mean of 1,2,3,...,n is $\frac{6n}{11}$, then the value of n is

- a) 10 b) 12 c) 11 d) 13

13. If the values of two variables move in opposite direction then the correlation is said to be

a) Negative b) Positive c) Perfect positive d) No correlation

14. The variable whose value is influenced or is to be predicted is called

- a) dependent variable b) independent variable
c) regressor d) explanatory variable

15. The variable which influences the values or is used for prediction is called

- a) Dependent variable b) Independent variable
c) Explained variable d) Regressed

16. The correlation coefficient

- a) $r = \pm \sqrt{b_{xy} \times b_{yx}}$ b) $r = \frac{1}{b_{xy} \times b_{yx}}$
c) $4 = b_{xy} \times b_{yx}$ d) $r = \pm \sqrt{\frac{1}{b_{xy} \times b_{yx}}}$

17. The person suggested a mathematical method for measuring the magnitude of linear relationship between two variables say X and Y is

- a) Karl Pearson b) Spearman
c) Croxton and Cowden d) Ya Lun Chou

18. One of the conditions for the activity (i, j) to lie on the critical path is

- a) $E_j - E_i = L_j - L_i = t_{ij}$ b) $E_i - E_j = L_j - L_i = t_{ij}$
 c) $E_j - E_i = L_i - L_j = -t_{ij}$ d) $E_j - E_i = L_j - L_i \neq t_{ij}$

19. A solution which maximises or minimizes the given LPP is called

- a) a solution b) a feasible solution
 c) an optimal solution d) none of these

20. Network problems have advantage in terms of the project

- a) Scheduling b) Planning
 c) Controlling d) All the above

II. Answer any 7 of the following: 7x2=14

Q.No.30 is compulsory

21. Which is better investment, 20% stock at ₹140 or 10% stock at ₹70?

22. The price of a commodity increased by 5% from 2004 to 2005, 8% from 2005 to 2006 and 77% from 2006 to 2007. Calculate the average increase from 2004 to 2007.

23. The total cost of x units of output of a firm is given by $C = \frac{2}{3}x + \frac{35}{2}$

Find the average cost when output is 10 units.

24. If $Z = (ax+b)(cy+d)$ then find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$

25. Define EOQ.

26. Show that the function $f(x) = x^3 - 3x^2 + 4x$, $x \in R$ is strictly increasing function on R.

27. Let $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$ find $P(A \cap B)$ if A and B are independent events.

28. The following table shows the sales and advertisement expenditure of a form:

	Sales	Advertisement expenditure
Mean	40	6
SD	10	1.5

Coefficient of correction $r=0.9$

Estimate the likely sales for a proposed advertisement expenditure of ₹10 crores.

29. Define LPP.

30. Draw the logic network for the following:

Activities C and D both follow A, activity E follows C, activity F follows D, activity E and F precedes B.

III. Answer any 7 of the following: 7x3=21

Q.No.40 is compulsory

31. Find the equilibrium price and equilibrium quantity for the following function:

Demand: $x = 100 - 2p$ and supply $x = 3p - 50$

32. Find the amount of annuity of ₹5000 payable at the end of each year for 4 years of money is worth 10% compounded annually ($(1.1)^4 = 1.4641$).

33. If $y = \frac{2x+1}{3x+2}$ then obtain the elasticity at $x=1$

34. The average cost function associated with producing and marketing x units of an item is given by $AC = 2x - 11 + \frac{50}{x}$. Find the range of values of the output x, for which AC is increasing.

35. Let $u = x \cos y + y \cos x$. Verify $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$

36. Find the marginal productivities of capital (K) and labour (L) if $P = 10L + 0.1L^2 + 5K - 0.3K^2 + 4KL$ when $K=L=10$.

37. Mohan invested ₹ 29,040 is 15% of ₹ 100 shares of a company quoted at a premium of 20% calculate

- the number of shares bought by Mohan
- his annual income from shares.

38. Find D_2 and D_6 for the following series:

22, 4, 12, 2, 16, 6, 10, 18, 14, 20, 8

39. A person purchases tomatoes from each of the 4 places at the rate of 1kg, 2kg, 3kg and 4kg per rupee respectively. On the average, how many kilograms has he purchased per rupee?

40. Calculate the correlation coefficient from the following data $N=9$, $\sum x=45$, $\sum y=108$, $\sum x^2=285$, $\sum y^2=1356$, $\sum xy=597$

41. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that the problem is (i) solved (ii) exactly one of them solves the problem.

IV. Answer the following questions: $7 \times 5 = 35$

42. a) For the demand function $P=550-3x-6x^2$ where x is quantity demand and P is unit price. Show that $MR=P\left[1 - \frac{1}{nd}\right]$

(or)

b) Kamal sold 9000 worth 7% stock at 80 and invested the proceeds in 15% stock at 120. Find the change in income.

43. a) Compute the earliest start time, earliest finish time, latest start time and latest finish time of each activity of the project given below.

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration in days	8	4	10	2	5	3

(or)

b) The demand for a commodity x is $q=5-2p_1+p_2-p_1^2 p_2$. Find the partial elasticities $\frac{Eq}{Ep_1}$ and $\frac{Eq}{Ep_2}$ when $P_1=3$ and $P_2=7$.

44. a) A bank pays 8% per annum interest compounded quarterly. Find the equal deposits to be made at the end of each quarter for 10 years to have ₹ 30,200 $[(1.02)^{40}=2.2080]$

(or)

b) Verify the relationship among AM, GM and HM for the following data

X	7	10	13	16	19	22	25	28
f	10	22	24	28	19	9	12	16

45. Calculate the regression coefficient and obtain the lines of regression for the following data:

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

(or)

b) Minimize $Z=20x_1+40x_2$ subject to the constraints $36x_1+6x_2 \geq 108$, $3x_1+12x_2 \geq 36$, $20x_1+10x_2 \geq 100$ and $x_1, x_2 \geq 0$.

46. a) A company has three machines A,B,C which produces 20%, 30% and 50% of the product. Their respective defective percentage are 7, 3 and 5. From these products one is chosen and inspected. If it is defective what is the probability that it has been made by machine C?

(or)

b) Calculate the mean deviation about mean for the following data

Size	2	4	6	8	10	12	14	16
Frequency	2	2	4	5	3	2	1	1

47. a) Find the elasticity of demand in terms of x for the demand law $P=(a - bx)^{\frac{1}{2}}$. Also find the output (x) when elasticity of demand is unity.

(or)

b) A photographer purchases a camera on installments. He has to pay 7 annual installments each of ₹ 36,000 right from the date of purchase. If the rate of compound interest is 16% then find the cost price (present value) of the camera $((1.16)^7=2.828)$.

48. a) A company buys a lot of 500 boxes which is a 3 month supply. The cost per box is ₹ 125 and the ordering cost is ₹ 150. The inventory carrying cost is estimated at 20% of unit value.

- Determine the total amount cost of existing inventory policy.
- How much money could be saved by applying the economic order quantity?

(or)

b) Calculate the rank correlation coefficient of the following data.

Subject 1	40	46	54	60	70	80	82	85	87	90	95
Subject 2	45	46	50	43	40	75	55	72	65	42	70