F.Y.B.COM. (Sem-II) June-2023

Mathematical and Statistical Techniques - II **Q.P. Code:00857**

[Time:3.00 Hrs] **[Marks:100]**

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of non-programmable simple calculator is allowed.
4. Graph paper will be provided on demand of student.

Q.1 Attempt any FOUR of the following. **(20)**

a) The demand function P in terms of quantity demanded (D) is given by $P = 30 + 12D - 4D^2$. Find total revenue, average revenue and marginal revenue when demand is 4.

b) Find $\frac{dy}{dx}$ if **(i)** $y = x^3 - 2x^2 + 3x + 5$ **(ii)** $y = (x^3 + 2x + 1)(x + 5)$.

c) The total cost of x items of commodity is given by $C = 9 + 20x - x^2$. Find x when Marginal Cost is 14. Also find Average Cost at this value of x.

d) The total cost function is $C = x^3 - 9x^2 + 24x + 7$. Find x for which the total cost is minimum.

e) If the demand function is given by $D = 15 - 4p - p^2$, find price elasticity of demand when $p = 2$

Q.2 Attempt any FOUR of the following. **(20)**

a) Ravi borrowed Rs.1000 at 10% for 4 years for compound interest to be calculated half yearly. Find accumulated amount he has to repay.

b) Sunil invested in an annuity with half-yearly for 4 years at the rate of interest of 8% to be compounded half yearly. If he received Rs. 27642.68 as the maturity value. What was his periodic payment?

c) If the investment kept for simple interest doubles in 5 years, find the rate of interest.

d) A sum was borrowed at 24% interest to be compounded monthly. It was repaid in 12 equal instalments of Rs. 1300 each, paid at the end of each month. Find the sum borrowed.

e) A person borrowed Rs. 75000 at 12% p.a. If he wishes to return the sum within 1 year, find his EMI using interest on reducing balance method.

Q.3 Attempt any FOUR of the following. (20)

a) Find the rank correlation coefficient for the following data

Grade- I	30	80	70	60	50	90
Grade- II	70	61	87	45	40	57

b) Given the following information about the production and demand of a commodity, obtain the two regression lines. Coefficient of correlation r = 0.65

	Production (x)	Demand (y)
Mean	85	90
S.D.	5	6

c) Calculate Pearson's coefficient of correlation between the price and supply from the following data.

Price (Rs/unit)	5	4	3	6	2	10	8	7
Supply (in thousands)	8	6	4	9	3	10	9	8

d) If the regression lines of a bi-variate data are $3x - 2y = 6$ & $8x - 3y = 44$, find $\bar{x}$, $\bar{y}$, b_{xy} and b_{yx}.

e) Write short note on bivariate correlation.

Q.4 Attempt any FOUR of the following. (20)

a) Estimate the trend values using the data given below by taking four yearly moving averages.

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production in unit	25.2	27.3	28.4	29.7	30.4	32.8	33.4	30.5	30.7	32	36

b) Find Laspeyre's and Paasche's index numbers from the following data

Commodity	Base Year		Current year	
	Price	Quantity	Price	Quantity
A	40	4	50	9
B	50	3	70	3
C	60	2	90	2
D	80	4	100	1

c) Fit a straight-line trend for the following series. Estimate the number of production units for year 2002.

Year	1995	1996	1997	1998	1999	2000	2001
No. of production units	125	128	133	135	140	141	143

d) The following table gives the prices of certain commodities in the year 2003 and 2005 taking 2003 as the base year, **(i)** find the index numbers using Simple Aggregative method **(ii)** Find cost of living index number

Commodities	Price in 2003	Price in 2005	Weightage
Computer	40	32	5
Printer	5	2	3
Mobile Phone	10	4	50
V.C.D. Player	8	3	10
Two-in-one	4	1	15

e) What is Time Series? Describe the components of Time Series.

Q.5 Attempt any FOUR of the following. **(20)**

a) An unbiased coin is tossed 5 times. Find the probabilities of getting
(i) 3 heads **(ii)** at most 1 head.

b) A marksman's chance of hitting a target is 4/5. If he fires 5 shots. What is the probability of His hitting the target **(i)** exactly twice **(ii)** at least once?

c) Find mean, variance and S.D. of a Binomial distribution if n = 15, q = 1/3 and find n and p if mean is 10, S.D. is 3.

d) The average number of phone calls per minute in a call center is 4. Find the probability that during a specific minute, the number of calls is
(i) only 2 **(ii)** less that 2 (given that $e^{-4} = 0.0183$)

e) Write p.m.f of binomial distribution and its properties.

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