

[Time: 3 Hours]

[ Marks: 100]

Please check whether you have got the right question paper.

- N.B:**
- All questions are Compulsory.
  - In each question, attempt any four sub-questions out of the given five sub-questions.
  - Each questions carries 20 marks. Each sub-questions carries 5 marks.
  - Use of a simple calculator is allowed.
  - Use of a scientific calculator, digital diary or a phone is NOT allowed.
  - Graphs must be drawn on the graph paper provided.

### SECTION I

1. Attempt **any four** from (A), (B), (C), (D) and (E):

(A) Find the derivative of  $y$  with respect to  $x$ : 05

i.  $y = 6(x^5) + \log 90 + 2(4^x) + e^x$

ii.  $y = (\log x + x)(5x^5 + 55)$

(B) The Total Revenue  $R$  for quantity  $D$  is given by  $R = 100D - D^2$ . Find the Total Revenue, the Average Revenue and the Marginal Revenue when  $D = 10$ . 05

(C) The total cost function is given by  $C = x^2 - 10x + 525$ . Find  $x$  for which the total cost is minimum. Also find the minimum total cost. 05

(D) Find the elasticity of demand for demand function  $p = 80 - D^2$  when  $D = 2$ . 05

(E) The demand function and the supply function for a commodity are given by  $D = 400 - p^2$  and  $S = 100 + 2p^2$  respectively. Find the rate of change in demand with respect to price at the equilibrium price. 05

2. Attempt **any four** from (A), (B), (C), (D) and (E):

(A) Find the compound interest and the accumulated amount after 4 years of a principal sum of ₹ 20,000 at 8% p.a. 05

(B) Mr. Khanna needs ₹ 40,00,000 for his new business after 3 years. He wishes to put aside some money now in a bank giving 9% compound interest p.a., so that after 3 years he would get the required amount. How much should he put aside now? 05

(C) What sum should be set aside at the end of each year for 4 years, at 10% p.a. compound interest, to replace a machinery which is expected to cost ₹ 50,00,000 at that time? 05

(D) Find the present value of an immediate annuity of ₹ 10,000 per year for 3 years with interest compounded at 6% p.a. 05

(E) A loan of ₹ 30,000 is to be returned in 4 monthly instalments at the rate of 12% p.a. compounded monthly. Find the EMI using the reducing balance method. 05

### SECTION II

3. Attempt **any four** from (A), (B), (C), (D) and (E):

(A) If the Rank correlation coefficient is  $\frac{2}{3}$  and  $\sum d^2 = 55$ , then find the number of pairs of observations (Assume that no rank is repeated.) 05

(B) Given that means of two variable  $X$  &  $Y$  are 6 and 8 and their variance are 25 and 169 and coefficient of correlation is 0.53 find likely value of  $y$  when  $x = 102$  05

Turn Over

- (C) Calculate Product moment correlation coefficient from the following data.
- 05**

x	6	2	10	4	8
y	9	11	5	8	7

- (D) The regression equation of y on x is
- $10y - 9x = -40$
- and regression equation x on y is
- $10x - 4y = 80$
- . Find
- 05**

- i)  $\bar{x}$  and  $\bar{y}$   
 ii) Correlation coefficient ( $r$ )

x	1	2	3	4	5
y	2	5	3	8	7

- (E) Define 'Regression' why there are two regression lines? Under what condition can there will be only one regression line?
- 05**

4. Attempt
- any four**
- from (A), (B), (C), (D) and (E):

- (A) Compute the seasonal indices for the following data using simple average method.
- 05**

Year	Quarter			
	I	II	III	IV
2005	55	53	57	51
2006	56	55	60	53
2007	57	56	61	54

- (B) Construct Index Number by weighted aggregative method.
- 05**

Commodity	Price		Weight
	2000	2014	
A	200	285	12
B	1600	2000	4
C	800	800	8
D	520	540	6

- (C) Find three yearly moving average from the following data.
- 05**

Year	2002	2003	2004	2005	2006	2007	2008
Productions	19	24	25	21	24	26	25

- (D) Find fishers Index number from the following data.
- 05**

Commodity	Current year		Base year	
	Price	Quantity	Price	Quantity
A	3	30	2	20
B	5	20	4	15
C	6	50	3	40

- (E) What is seasonal variation? Explain briefly with examples.
- 05**



5. Attempt **any four** from (A), (B), (C), (D) and (E):

- (A) A student calculates mean as 5 and variance as 9 for a Binomial distribution. **05**  
Is his calculation correct? Justify.
- (B) If  $x$  has a Poisson distribution with parameter  $m$  such that  $P[x = 3] = P[x = 4]$ . **05**  
Find  $P[x \geq 3]$ ,  
 $[e^{-4} = 0.0183]$
- (C) If Random Variable  $X \sim N(4, 25)$  then find  $P[x \leq 4]$ . **05**
- (D) The company having 5000 workers whose wage distributed normally with average wage ₹ 800 with S.D. of wage ₹ 200 find the no of workers getting wages above 1000.  
[Area between  $Z = 0$  and  $Z = 1$  is 0.3413]. **05**
- (E) Write the p.m.f of Binomial distribution and its properties. **05**
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