[Time: 3 Hours]   **[Marks: 100]**

Please check whether you have got the right question paper.

N.B:
1. All questions are Compulsory.
2. In each question, attempt any four sub-questions out of the given five sub-questions.
3. Each questions carries 20 marks. Each sub-questions carries 5 marks.
4. Use of a simple calculator is allowed.
5. Use of a scientific calculator, digital diary or a phone is NOT allowed.
6. 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 $R = 100\,D - D^2$. Find the Total   05
   Revenue, the Average Revenue and the Marginal Revenue when $D = 10$.

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

   (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 $D = 400 -$ 05
   p^2 and $S = 100 + 2\,p^2$ respectively. Find the rate of change in demand with respect to
   price at the equilibrium price.

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   05
   sum of ₹ 20,000 at 8% p.a.

   (B) Mr. Khanna needs ₹ 40,00,000 for his new business after 3 years. He wishes to put   05
   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?

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

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

   (E) A loan of ₹ 30,000 is to be returned in4 monthly instalments at the rate of 12% p.a.   05
   compounded monthly. Find the EMI using the reducing balance method.

SECTION II

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

   (A)   05
   If the Rank correlation coefficient is $\dfrac{2}{3}$ and $\Sigma\, d^2 = 55$, then find the number of pairs of

   observations (Assume that no rank is repeated.)

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

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   05
10x − 4y = 80. Find

  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   05
there will be only one regression line?

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

  $Find \quad P[x \geq 3]$,

  $\left[e^{-4} = 0.0183 \right]$

(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   05
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].