Q.P. Code :31981

[Time: 2½ Hours]   [Marks:75]

Please check whether you have got the right question paper.

N.B: 1.   All questions are compulsory.
          2.   In Q1 attempt both the sub-parts A and B.
          3.   Figures to the right indicate full marks.
          4.   Use of non-programmable calculator is allowed.

Q1 (A) Attempt any Eight of the following.   08

(1) A column matrix is of order _____
   (a) 1xn
   (b) nx1
   (c) nxn
   (d) mxn

(2) The present value of an amount is always _____ its future value.
   (a) Greater than
   (b) Less than
   (c) Equal to
   (d) Not equal to

(3) For the function f(x)=43+x, the value of f(-2) is _____
   (a) 41
   (b) 43
   (c) 50
   (d) None of the above

(4) The value of 4! is _____
   (a) 25
   (b) 24
   (c) 30
   (d) None of the above

(5) In EMI calculations, the rate of interest is compounded _____
   (a) Quarterly
   (b) Yearly
   (c) Monthly
   (d) Half-yearly

(6) The derivative of 5 log x with respect to x is _____
   (a) 5/x
   (b) 5x
   (c) 5*x
   (d) None of the above

(7) Given f(0)=1, f(1)=0, f(2)=1, f(3)=10, the values of Δ^2 are _____
    (a) 2,4
    (b) 2,8
    (c) 4,8
    (d) None of the above

(8) The demand function if p=60+2D-10D^2, the rate of change in price with respect to demand is _____
    (a) 60/D+2-10D
    (b) 2-20D
    (c) 2-40D
    (d) None of the above.

(9) Simple interest is always_____than compound interest
    (a) less than
    (b) more than
    (c) equal to
    (d) less than or equal to

(10) A _____ is an arrangement of all or part of a set of objects in a definite order.
    (a) permutation
    (b) function
    (c) combination
    (d) factorial

Q1 (B) State whether the statements are True or False.   07
    (1) The simple interest of 3 years at 9% p.a. of Rs.5000 is Rs.1300.
    (2) When the demand equals the supply, an equilibrium point is reached.
    (3) The product of first n natural numbers is called factorial n.
    (4) The sum of two identity matrices is an identity matrix.
    (5) If C is a total cost function of x, it derivative is called average cost.
    (6) The backward differences of y are denoted by the operator Δ
    (7) Annuity in which payments are made at the end of period is called annuity due.
    (8) If any two rows of a determinant are same, the value of determinant is zero.
    (9) Only some industries require labour as an input.
    (10) For y=4x+12, the first order differences are constant.

Q2 A) Which of the following yields more interest? 12% p.a. compounded quarterly or 12.5% p.a.   08
Compounded semi-annually?

B) A committee of 4 is to selected from 5 boys and 6 girls. In how many ways can this be done so that   07
(i) exactly one girl is included (ii) at least one boy is in the committee?

OR

P) Find the present value of an immediate annuity of Rs.40000 p.a. for 3 years with interest   08
compounded at 8% p.a.

Q) A company produces toys. The weekly total cost given by C=1200+40x.   07
   (i)   If each toy is sold at Rs.60, find the number of units to be produced and sold for no loss.
   (ii)   If the selling price increases by 10%, find the number of units to be produced and sold to ensure no loss.
   (iii)   If it is known in advance that the weekly demand for goods will be 70, find the selling Price of a toy to ensure no loss.

Q3 A)   If $A = \begin{bmatrix} 1 & 2 & 5 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{bmatrix}$ Find the inverse of the matrix A.   08

B) For the following Input-Output model, find the total output if final demands are increased by 40 each. 07
Also calculate labour requirement for this output.

Product	Industry		Final Demand	Total output
	1	2		
1	50	60	80	190
2	30	50	80	160
Input(labour)	110	50		

OR

P) Solve the following simultaneous equations by Cramer's Rule   08
   x+2y+z=6
   2x-3y+z=1
   -x+2y-2z=5

Q) If $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & -4 & 1 \\ 3 & -5 & 0 \end{bmatrix}$ find $A^2-3A-2I$. Also find the determinant of A.   07

Q4 A) Differentiate the following functions with respect to x.   08
   $y=(x^2+2x)(1+\log x)$

   $y= \dfrac{3x^2+5X-2}{5x+3}$

B) Using Newton's forward difference interpolation formula find f(65) if,   07

x	51	61	71	81	91
f(x)	46	66	81	93	104

OR

P) A manufacturer can sell x items per month at a price p=300-2x, The cost of production is given by 08
C=2x+1000. Find the average profit and the marginal profit when the output x=10.

Q) Estimate f(1.1) using Newton's Backward difference interpolation formula   07

x	0	1	2	3	4
f(x)	3	6	11	18	27

Q5 A) A loan of Rs. 55000 to be returned in 3 equal monthly installments, the rate of interest being 12% p.a. 0.
Find the EMI using Reducing Balance Method. Also find EMI using Flat interest Rate method.

B) Find x for which the total revenue function is maximum where $R = 2x^3 - 63x^2 + 648x + 300$ **07**

OR

C) Attempt any three of the following (short notes)   **15**

     1) Types of functions
     2) Permutation and combination
     3) Types of matrices
     4) Differences between simple and compound interest
     5) Types of annuity

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