F4BMS

(1)

Q.P. Code :31980

[Time: $2\frac{1}{2}$Hours] **[Marks:75]**

Please check whether you have got the right question paper.

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

Q.1 A) Choose the correct alternative (any eight) **08**

1. In _____years, Rs,8000 will amount to Rs.8840 at 3.5% p.a. simple Interest
   (a) 2
   (b) 3
   (c) 5
   (d) 6

2. An annuity in which the number of payments are infinite is called_____
   (a) Infinity
   (b) Infinite
   (c) Limited annuity
   (d) Perpetuity

3. f(x) = 5x -9 is_____
   (a) an exponential function
   (b) not a function
   (c) A linear function
   (d) A quadratic function

4. ${}^{n}p_{r}$ = _____
   (a) $\frac{ncr}{r!}$
   (b) $(r!)^{n}$
   (c) $(r! \times nc_{r})$
   (d) None of these.

5. A Square matrix whose non-diagonal elements are all zero and the diagonal elements are all equal is called _____
   (a) Scalar
   (b) Square
   (c) Diagonal
   (d) none of these

6. If 2 rows or 2 columns of a determinant are equal then the value of the determinant is _____
   (a) Zero
   (b) Unity
   (c) Double
   (d) none of these

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7. Derivative of a function y with respect to x _____
   (a) can be bought through a stock broker
   (b) is a remainder
   (c) is a measure of rate of change
   (d) none of these

8. The total cost is $C=3000+2x+x^2$, when x=5, the marginal cost is_____
   (a) 6
   (b) 20
   (c) 12
   (d) 300

9. If f(x) is a polynomial of degree $'n'$ then $\Delta^n f(x) =$_____
   (a) Zero
   (b) One
   (c) Non-zero constant
   (d) Variable

10. At equilibrium point, supply =_____
   (a) Profit
   (b) Demand
   (c) Loss
   (d) None of these

B) State True or False (any 7) **07**

1) e^x is not an exponential function.
2) Order of a matrix is never zero
3) An annuity in which the number of payments is fixed is called fixed annuity.
4) If 2 rows or columns of a determinant are interchanged then the value of determinants remains same.
5) Two matrices can be multiplied only if their order are same.
6) Second order derivative is derivative of derivative.
7) ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$
8) When transpose of a matrix is same it is called symmetric matrix.
9) If η>1 the demand is said to be elastic.
10) At breakeven point revenue is same as total cost.

Q.2 A i) Find the maturity amount of a 2 years fixed deposit of Rs.1,00,000 at 10% p.a. if the interest is compounded semi-annually. **03**

ii) Given **04**

$f(x) = x - 2 \; for \; 1 < x \leq 2$

$= 2x - 1 \; for \; 2 < x < 4$

$= 25 \; for \; 4 \leq x \leq 5$

Find f(2),f(4) and f(5). Also find x when f(x) = 5

B A Loan of Rs.80,000 is to be returned in 3 equal monthly installments at the rate of 12% p.a. Compounded monthly. Find the EMI using the reducing balance method. Find the interest and principal repayment for each month. **08**

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OR

P i. In how many ways can the letters of the word 'DONKEY' be arranged, if the vowels are never together. 03

ii. In how many ways can the letters of the word 'STUPID' be arranged if the arrangements start and ends with vowels. 04

Q A watch company is to produce a cheaper variety of wrist watches. It involves initially a fixed cost of Rs.2 Lakhs and a variable cost of Rs.105 for each wrist watch. If each wrist watch can be sold at Rs. 500, find the total cost function, the total revenue function and the profit function. How many wrist watches must be produced and sold so that the company does not incur any loss. 08

Q.3 A i) If $A = \begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$, find the matrix , $A^2 + 3A - 5I$ 04

ii) $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ Show that $A^2 = A$ 04

Q.3 B Solve following equations using cramer's rule 07

$3x + 3y - z = 11$

$2x - y + 2z = 9$

$4x + 3y + 2z = 25$

OR

P The input –output matrix for two industry case is given below 08

Industry	Consumption by Industry		Final Demand	Total Output
	1	2		
1	100	200	100	400
2	200	300	200	700
Input	100	200		

Find total outputs if demands are $\begin{bmatrix} 300 \\ 500 \end{bmatrix}$

and Labour requirement for this output. Also find the total input requirement.

Q. Solve the equations using matrix Inversion method 07

$3x + 2y + 4z = 2, \quad x - 2y - z = 6$

$x + 2y - 6z = -2$

Q.4 A Find dy/dx if, 08

i) $y = (x+2)^2 log x$

ii) $y = (x^2 - 3x + 5)/e^x + 1$

B Find maxima and minima for the function given below 07

$f(x) = x^3 - 2x^2 + x + 10$

OR

P The demand for a commodity when its price is x is given by; 07
$y = \frac{2x+5}{3x-4}$. Find the elasticity of demand when the price is 5 units.

Q By preparing the forward difference table find the 6^{th} and 7^{th} terms of the sequence 08
i) 6, 11, 18, 27, 38
ii) 8, 3, 0, -1, 0

Q.5 A A machine is bought at Rs.80,000 has effective life of 4 years. A sinking fund is created for replacing the machine by a new model at the end of its lifetime, when its scrap value is Rs.5000. The price of the new model is estimated to be 25% higher than the present price. Find out what amount should be set aside at the end of each year out of the profits for the sinking fund if it accumulates at 5% per annum compounded annually. 08

B A factory produces 3 goods P, Q and R. A unit of P requires 2 hours on machine I, 3 hours on machine II and 1 hour on machine III the same figures for Q are 1,2 and 4 and for R are 2,1 and 2 a day. Find out how many unit of P,Q and R can be produced if the machine time is fully utilized. 07

OR

C Attempt any 3 15

i) Write a note on Quadratic function and linear function.
ii) Distinguish between permutation and combination.
iii) Write a note on elasticity of demand.
iv) Write a note on types of matrices.
v) Write a note on annuity and types of annuity.

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