FYBMS/SEM II/REG/BM/

Time: 2½ hrs. **Marks:75**

Note:
1. All questions are compulsory with internal options.
2. The figures to the right indicate full marks.
3. Draw a neat diagram wherever necessary.

Q. 1 (A) Fill in the blanks with the correct answer from the alternatives given below. (Attempt any 8) **(08)**

(1) The simple interest on Rs 1000 @ 6% p.a. for 5 years is Rs _____.

(a) 200 (b) 250

(c) 300 (d) 350

(2) The compound interest for Rs 50,000 for 1 year @ 12% p.a. will be maximum if the compound interest is calculated _____.

(a) Yearly (b) Half yearly

(c) Quarterly (d) Monthly

(3) Mr. Shah borrowed Rs 20,000 from Mr. Patel. After 8 months, he returned the amount, with the simple interest. If the rate was 12% p.a., find the interest he had paid.

(a) Rs 1200 (b) Rs 1400

(c) Rs 1600 (d) Rs 1800

(4) The value of the determinant $\begin{vmatrix} 2 & 4 & 6 \\ 2 & 4 & 6 \\ 1 & 5 & 2 \end{vmatrix}$ is _____.

(a) 0 (b) 1

(c) -1 (d) 10

(5) If rows and columns of a determinant are interchanged, its value _____.

(a) Increases (b) Decreases

(c) Remains unchanged (d) Changes in sign

(6) A matrix of order m*1 is called a _____.

(a) Row matrix (b) Column matrix

(c) Unit matrix (d) Diagonal matrix

(7) The rate of change of total revenue with respect to demand D is called _____.

(a) Total revenue function (b) Demand function

(c) Marginal revenue (d) Elasticity of demand

(8) The derivative of log10 with respect to x is _____

(a) 1/log10 (b) 0

(c) 1/x (d) 1/10

(9) The differences of first forward differences are known as _____.

(a) Second forward differences (b) Third forward differences

(c) Fourth forward differences (d) Argument

(10) The forward differences of y are denoted by the operator _____.

(a) Δ (b) A

(c) B (d) μ

(B) State whether the following statements are True or False. (Attempt any 7) **(07)**

(1) The interest calculated on principal amount only, whatever may be the period is called simple interest.

(2) To calculate the compound interest, we should know the amount A and principal P.

(3) EMI stands for equal monetary investments.

(4) A square matrix with all non- diagonal elements zero and diagonal elements equal is called a triangular matrix.

(5) If A, B and C are three matrices of same order, m*n and (A+B) +C = A+(B+C) then matrix addition is said to be associative.

(6) The order of a determinant can be m*n.

(7) The derivative of a derivative is called second order derivative.

(8) If C is a total cost function of x, its derivative is called average cost.

(9) The backward differences of y are denoted by the operator E.

(10) The values of f(x) obtained from Newton's forward / backward difference formula are same.

Q.2 (a) Ajit and Akshay kept exactly identical amounts in two different banks, giving simple interest at 9% and 10% respectively. Ajit got interest of Rs 4050 after 2.5 years while Akshay kept his money in the other bank for 4.5 years. Calculate the simple interest he will receive. **(08)**

(b) In how many years a sum of Rs 35,000 will amount to Rs 52,500 at 10% simple interest? **(07)**

OR

Q.2 **(p)** Usha kept Rs 1,00,000 as a fixed deposit for 5 years in a bank at 8% p.a., compound interest and her friend Nisha kept Rs 80,000 in bank for 8 years with 10% p.a., compounded annually. Who will receive more compound interest and by how much? **(08)**

(q) Find the final amount of Rs 10,000 at 9% p.a. in 3 years compounded half-yearly. **(07)**

Q.3 **(a)** Evaluate the following determinants: **(08)**

(i) $\begin{vmatrix} 2 & -1 & 1 \\ 1 & 0 & 2 \\ -1 & 1 & -1 \end{vmatrix}$ (ii) $\begin{vmatrix} 3 & -1 & 2 \\ 1 & 0 & 5 \\ 2 & -1 & 1 \end{vmatrix}$

(b) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 0 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 & -1 \\ 2 & 0 & 3 \\ 3 & -1 & 0 \end{bmatrix}$, find the product matrix AB. Is it possible to find BA? If no, why? **(07)**

OR

Q.3 **(p)** Solve the following equations in three unknowns using Cramer's rule: **(08)**

$2x + y + z = 8$, $3x - y + 2z = 11$ and $x - y + z = 4$

(q) Differentiate w.r.t x the following functions: **(07)**

(i) $X^3 - \log x + e^x + 4^x + 25$
(ii) $4x^7 - 5\log x + 5e^x$

Q.4 **(a)** Examine for maxima and minima the function $f(x) = 2x^3 - 6x^2 - 48x + 11$ **(08)**

(b) The total cost function is given by $C = 2x^2 + 4x + 25$. Find the average cost, the marginal cost and the marginal average cost when $x = 10$. **(07)**

OR

Q.4 **(p)** If $f(x) = x^3 - 2x^2 + 3x + 1$, find the values of f(x) for $x = 0,1,2,3,4,5$. Prepare the difference table and verify that the third order differences are constant. **(08)**

(q) The following table represents exports of fruits in lakhs of Rs to Dubai for 4 different years. Find the estimated exports in the year 2009. **(07)**

Year	2006	2008	2010	2012
Exports	57	59	63	68

Q.5 **(a)** Estimate f (3.5) using newton's backward interpolation formula: **(08)**

X	0	1	2	3	4
F(x)	0	1	8	27	64

(b) The demand function is given by $p = 30 + 6D - D^2$ where p is price and D is demand. Find the **(07)**

total revenue, average revenue and marginal revenue when the demand is 4 units.

OR

Q.5 (p) Write short notes on (Attempt any 3) **(15)**

(1) Properties of determinants

(2) Compound interest

(3) Marginal cost

(4) Properties of matrix addition

(5) Properties of matrix multiplication

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