2018 FYBMS (28)

Q.P. Code :03953

[Time: 2 ½ Hours] [Marks:75]

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory and carry equal marks.
2. Use of simple calculator is allowed.
3. Figures to the right indicate full marks of each sub question.

Q.1 A Attempt **any eight** of the following: 08

1) The simple interest on Rs4500 for 2 years at 6% per annum is ----------.
   a) 504
   b) 5400
   c) 540
   d) None of these
2) The future value of an amount is always ------ its present valve.
   a) Greater than
   b) Less than
   c) Equal to
   d) None of these
3) For the function $f(x) = x - x^2$, the value of $f(-1)$ is ----------.
   a) 5
   b) 0
   c) -2
   d) 1
4) The value of 5! Is ------
   a) 120
   b) 100
   c) 140
   d) None of these
5) A row matrix is of order ----------.
   a) $1 \times n$
   b) $n \times 1$
   c) $n \times n$
   d) None of these
6) The value of determinant $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ is ----------.
   a) $ad - bc$
   b) $bc - ad$
   c) $ac - bd$
   d) None of these
7) The input – output analysis was developed by----------.
   a) Leontief
   b) Bernoulli
   c) Newton
   d) None of these
8) The derivative of $7e^x + x$ with respect to x is ----------.
   a) 7
   b) e^x
   c) $7e^x$
   d) None of these

9) The forward differences of y are denoted by the operator
   a) Δ
   b) δ
   c) $\propto$
   d) Σ

10) If the payments are made at the end of period, the annuity is called----------.
   a) Annuity due
   b) Immediate annuity
   c) Uniform annuity
   d) None of these

B State whether the statements are true or false (attempt **any seven** of the following) 07

1. EMI stands for Equal Monthly Instalments.
2. When demand equals supply, an equilibrium point is reached.
3. A matrix of order n x n having all non- diagonal elements zero is called diagonal matrix.
4. If any two rows of a determinant are same, the value of determinant is zero.
5. In the input – output analysis, final demands of the consumers are not known.
6. For a constant function y, the value of $\frac{dy}{dx}$ is one.
7. The backward differences of y are denoted by the operator∇.
8. Compound interest on Rs2000 for 2 years at rate of 5% p.a. compounded annually is Rs200.
9. An annuity in which no. of payments are not equal is called uniform annuity.
10. The product of first n natural numbers is called factorial n.

Q.2 A. Pranit wants to keep Rs50,000 in a fixed deposit. Janata bank give 8% p. a compounded half yearly for a period of 4 years. Global Bank offer 7% p. a. compounded quarterly for a period of 3.5 years. Which is a better option and Why? 08

B. There are 8 professors and 12 students out of whom a committee, of 2 professors and 3 students is to be formed. Find the number of ways in which the committee can be formed such that 07
   1. A particular professor is included
   2. A particular student is excluded.

OR

P. Mr. Kishor plans to save for his son's education for which he wishes to accumulate Rs100000 at the end of 4 years. How much should he invest at the end of each year from now, if he can get Interest compounded at 7% p. a ? 08

Q. A company sells X pens each day at RS25 per pen. The cost of manufacturing is Rs15 per pen and the distributor charges are Rs2 per pen. Besides, the daily overhead comes to Rs840. Determine the profit function. What is the profit if 10 pens are manufactured and sold in a day? What is the break-even point? 07

Q.3 A. Solve the following simultaneous equations using Cramer's Rule. 08

$$7x + 3y + z = 11$$
$$2x - y + 3z = 4$$
$$x + y + z = 3$$

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

OR

P. Find the inverse of the following matrix 08

$$A=\begin{bmatrix}2 & 3 & 1\\ 3 & 4 & 1\\ 3 & 7 & 2\end{bmatrix}$$

Q. For the following input output model, find outputs if final demands are increased by 30 each. Also calculate labour requirement for this output. 07

Industry	Consumption by		Final demand	Total output
	X	Y		
X	70	80	60	210
Y	50	90	40	180
Input (Labour)	90	10		

Q.4 A. Differentiate the following functions with respect to x. 08

1. $y = (3x^2 + 4x)\,(4x + 3)$
2. $\frac{2x^2+5x+2}{5x-1}$

B. A shop keeper observes the following data for demand and total revenue for a certain commodity. 07

Demand (in kg)	10	20	30
Total revenue	900	1600	2100

Estimate the total revenue when demand is 40kg using newton's forward difference interpolation formula.

OR

P. A manufacturer can sell x items at a price of Rs (330 – x) each. Total cost of producing x items is Rs $(x^2 + 10x + 12)$ find x for which the profit is maximum. 08

Q. the total cost of producing certain number of items in a factory is as follows:- 07

No. of items	25	35	45
Total cost (Rs)	475	525	560

Estimate the total cost of producing 40 items using Newton's Backward difference interpolation formula.

Q.5 A) 1. A loan of Rs 50000 is to be returned in 3 equal monthly instalments, the rate of interest being 24% p.a. find the EMI using reducing balance method. Also find EMI using flat interest rate method. 08

2. The demand function is given by $p = 40 + D - D^2 + D^3$ where p = price and D= Demand. Find the total revenue, average revenue and the marginal revenue when the demand is 5. 07

OR

B) Attempt **any three** of the following (short note) 15

1. Types of annuity
2. Difference between compound interest and simple interest.
3. Types of matrices with examples.
4. Fundamental theorem.
5. Different types of functions.