

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018  
(First Semester)

Branch –SOFTWARE SYSTEMS  
(Five year integrated)

MATHEMATICS-I

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 1 = 10)

1 For the matrix  $A = \begin{bmatrix} 2 & -2 & 3 \\ -2 & -1 & 6 \\ 1 & 2 & 0 \end{bmatrix}$ , one of the eigen value is 3. The other two

eigen values are

- (i) 2, -5 (ii) 3, -5  
(iii) 2, 5 (iv) 3, 5

2 Identify the rank of a 3 x 3 null matrix.

- (i) 3 (ii) 2  
(iii) 1 (iv) 0

3 The general solution of  $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 4y = 0$  is

- (i)  $y = Ae^x + Be^{4x}$  (ii)  $y = Ae^{-x} + Be^{-4x}$   
(iii)  $y = Ae^x + Be^{-4x}$  (iv)  $y = Ae^{-x} + Be^{4x}$

4 The complete solution of  $z = px + qy + 2\sqrt{pq}$  is

- (i)  $z = ax + by + 2ab$  (ii)  $z = ax + a^2y + 2a$   
(iii)  $z = ax + by + 2\sqrt{ab}$  (iv)  $z = ax + by + \sqrt{2ab}$

5 In Gauss Elimination method the coefficient matrix is transformed to \_\_\_\_\_ form.

- (i) upper triangular (ii) lower triangular  
(iii) unit matrix (iv) symmetric

6 \_\_\_\_\_ method converges only if the coefficient matrix is diagonally dominant.

- (i) Gauss Elimination (ii) Gauss - Seidal  
(iii) Gauss - Jordan (iv) Newton's

7 Newton's forward interpolation formula used only for \_\_\_\_\_ intervals.

- (i) equal (ii) closed  
(iii) open (iv) unequal

8 Newton's Backward interpolation formula used to interpolate the values of y nearer to the \_\_\_\_\_ of a set tabular values.

- (i) begining (ii) end  
(iii) middle (iv) outside

9 In Trapezoidal rule, y(x) is a \_\_\_\_\_ function of x.

- (i) linear (ii) quadratic  
(iii) odd (iv) even

**SECTION - B (25 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 5 = 25)

11 a Find the rank of the matrix  $\begin{bmatrix} 3 & 1 & -5 & 1 \\ 1 & -2 & 1 & -5 \\ 1 & 5 & -7 & 2 \end{bmatrix}$ .

OR

b Show that the equations  $x + 2y = 3$ ;  $y - z = 2$ ;  $x + y + z = 1$  are consistent.

12 a Solve  $(D^2 - 5D + 6)y = e^{4x}$ .

OR

b Solve the equation  $p + q = x + y$ .

13 a Solve the system by Gauss – Elimination method :

$$2x + 3y - z = 5; \quad 4x + 4y - 3z = 3 \text{ and } 2x - 3y + 2z = 2$$

OR

b Apply Gauss – Jordan method to find the solution of the following system :

$$10x + y + z = 12; \quad 2x + 10y + z = 13; \quad x + y = 5z = 7$$

14 a Using Newton's forward interpolation find a polynomial of degree three which takes the values :

x	:	2	4	6	8	10
y	:	0	0	1	0	0

OR

b Find the missing value of the table given below. What assumptions have you made to find it?

Year	:	1917	1918	1919	1920	1921
Export (in tons)	:	443	384	--	397	467

15 a Find the second derivative of  $x^{1/3}$  at  $x = 50$  given the table below :

x	:	50	51	52	53	54	55	56
$y = x^{1/3}$	:	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

OR

b A curve passes through the points (1, 2), (1.5, 2.4), (2.0, 2.7), (2.5, 2.8), (3, 3), (3.5, 2.6) and (4.0, 2.1). Using Simpson's one-third rule, obtain the area bounded by the curve, the x axis and  $x = 1$  and  $x = 4$ .

**SECTION -C (40 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

16 a Determine the values of a and b for which the equations  $x + y + 3 = 3$ ;  $x + 2y + 2z = 6$ ;  $x + ay + 3z = b$ , have (i) no solution (ii) a unique solution (iii) infinite number of solutions.

OR

b Find the eigen values and eigen vectors of  $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ .

17 a Solve  $(D^2 + 16)y = 2e^{-3x} + \cos 4x$ .

OR

b Solve  $(v^2 + z^2)p - xyq = -xz$ .



- a Solve the following system by Gauus – Jacobi method :
- $$10x - 5y - 2z = 3; \quad 4x - 10y + 3z = -3 \text{ and } x + 6y + 10z = -3$$

OR

- b Solve the following system of equations by Gauss- Seidal method correct to three decimal places :

$$x + y + 54z = 110; \quad 27x + 6y - z = 85; \quad 6x + 15y + 2z = 72$$

- 19 a Determine the value of y at x = 21 and x = 28 from he following data :

x	:	20	23	26	29
y	:	0.3420	0.3907	0.4384	0.4848

OR

- b The population of a town is as follows ::

Year	:	1941	1951	1961	1971	1981	1991
Population in Lakhs	:	20	24	29	36	46	51

Estimate the population increase during the period 1946 to 1976.

- 20 a The population of a certain town is given below. Find the rate of growth of the population in 1931 and 1941.

Year	:	1931	1941	1951	1961	1971
Population in thousands	:	40.62	60.80	79.95	103.56	132.65

OR

- b Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  using Trapezoidal rue with h = 0.2. Hence obtain an approximate value of  $\pi$ . Can you use Simpson's rule.

Z-Z-Z

END