

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2022  
(First Semester)

Branch – COMPUTER SCIENCE

MATHEMATICS-I

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

- The inverse of the matrix  $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$  is \_\_\_\_\_.  
a)  $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$       b)  $\begin{pmatrix} 1 & 0 \\ 0 & 1/2 \end{pmatrix}$       c)  $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$       d)  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
- The P.I of  $(D^2-6D+9)y=e^{3x}$  is \_\_\_\_\_.  
a)  $\frac{x^2}{2}e^{3x}$       b)  $\frac{x}{2}e^{3x}$       c)  $\frac{x^3}{2}e^{2x}$       d)  $\frac{x^3}{2}e^{3x}$
- In Gauss Jordan method the augmented matrix is reduced to \_\_\_\_\_ matrix.  
a) Upper diagonal    b) Lower diagonal    c) diagonal    d) unit
- In Newton's forward interpolation method the formula to find  $dy/dx$  is \_\_\_\_\_.  
a)  $\frac{1}{h} \left[ \Delta y_0 - \frac{1}{3} \Delta^2 y_0 + \frac{1}{4} \Delta^3 y_0 - \dots \right]$       b)  $\frac{1}{h} \left[ \Delta y_0 - \frac{1}{10} \Delta^2 y_0 + \frac{1}{12} \Delta^3 y_0 - \dots \right]$   
c)  $\frac{1}{h} \left[ \Delta y_0 - \Delta^2 y_0 + \Delta^3 y_0 - \dots \right]$       d)  $\frac{1}{h} \left[ \Delta y_0 - \frac{1}{2} \Delta^2 y_0 + \frac{1}{3} \Delta^3 y_0 - \dots \right]$
- The error in Simpson's 1/3 rule is \_\_\_\_\_.  
a)  $h^4$       b)  $h^3$       c)  $h^2$       d)  $h$

SECTION - B (15 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 3 = 15)

- a) Find the rank of the matrix  $\begin{bmatrix} 3 & -1 & 2 \\ -6 & 2 & -4 \\ -3 & 1 & -2 \end{bmatrix}$ .  
(or)  
b) Find the inverse of the matrix  $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ .
- a) Solve:  $p^2 + q^2 = npq$   
(or)  
b) Solve:  $p - x^2 = q + y^2$
- a) Solve by Gauss elimination method  
 $x + y + z = 9$ ;  $2x - 3y + 4z = 13$ ;  $3x + 4y + 5z = 40$ .  
(or)  
b) Solve by Gauss Jordan method  
 $5x - 2y + 3z = 18$ ;  $x + 7y - 3z = -22$ ;  $2x - y + 6z = 22$ .
- a) Using Newton's forward interpolation formula find the value of  $y$  for  $x=28$  from the following data:

X	20	23	26	29
Y	0.3420	0.3907	0.4384	0.4848

(or)

Cont...

b) Estimate the missing value:

x	2	3	4	5	6
f(x)	45.0	49.2	54.1	-	67.4

10. a) Find  $dy/dx$  at  $x=0.5$ , given

x	0	1	2	3	4
y(x)	1	1	15	40	85

(or)

b) Evaluate  $\int_0^{10} \frac{dx}{1+x^2}$  using Trapezoidal rule and Simpson's 1/3 rule.

### SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 6 = 30)

11. a) Test for consistency of the equations and solve

$$x - 3y - 8z = -10; 3x + y - 4z = 0; 2x + 5y + 6z = 13.$$

(or)

b) Find the eigen values and eigen vectors of the matrix,  $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ .

12. a) Solve:  $(D^2 + D - 2)y = \sin 2x$ .

(or)

b) Solve:  $(x^2 - yz)p + (y^2 - zx)q = (z^2 - xy)$

13. a) Solve by Gauss-Seidal method

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

(or)

b) Solve by Gauss Jacobi method.

$$28x + 4y - z = 32; x + 3y + 10z = 24; 2x + 17y + 4z = 35.$$

14. a) The population of the town is as follows :

Year	1941	1951	1961	1971	1981	1991
population	20	24	29	36	46	51

Estimate the population increase during the period at 1946 and 1976.

(or)

b) Find a polynomial of degree four which takes the values

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

15. a) The population of the town is as follows :

Year	1931	1941	1951	1961	1971
population	40.62	60.80	79.95	103.56	132.65

Estimate the rate of growth of population during the period at  $x=1961$ .

(or)

b) Evaluate  $\int_0^1 \frac{1}{1+x} dx$  by Trapezoidal Rule, Simpson's 1/3 rule and 3/8 rule, dividing the range into 6 equal parts,

Z-Z-Z END