

Ex/ED/3.1/28/2018

BACHELOR OF ARTS EXAMINATION, 2018

(2nd Year, 1st Semester)

MATHEMATICS - II

Full Marks : 50

Time : Two Hours

The figures in the margin indicate full marks.

Use separate Answer-script for each group.

Group - A

Answer any *five* questions.

5×5=25

1. Solve by Cramer's rule

$$ax + by + cz = 1, \quad cx + ay + bz = 0, \quad bx + cy + az = 0.$$

2. Find the inverse of the matrix where

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

[*Turn over*]

[2]

3. Find the eigen values and eigen vectors of

$$A = \begin{bmatrix} 1 & -6 & -4 \\ 0 & 4 & 2 \\ 0 & -6 & -3 \end{bmatrix}$$

4. Determine the metrics A and B where

$$A = \begin{bmatrix} 1 & -6 & -4 \\ 3 & 4 & 2 \\ 8 & -6 & -3 \end{bmatrix},$$

$$B = \begin{bmatrix} 2 & -5 & -2 \\ 1 & 9 & -2 \\ 7 & -7 & -5 \end{bmatrix}.$$

5. Show that

$$\int_1^2 (3x+1) dx,$$

is Riemann integrable.

6. Show that $f(x)$ is not Riemann integrable where

$$\begin{aligned} f(x) &= x, \text{ when } x \text{ is rational} \\ &= -x, \text{ when } x \text{ is irrational.} \end{aligned}$$

[Turn over]

[3]

Group - B

Answer any *five* questions.

5×5=25

1. Solve the first order differential equation

$$(y^2 + 2x^2y)dx + (2x^3 - xy)dy = 0.$$

2. Solve the following differential equation :

$$y = p^2x + p, \quad p \equiv \frac{dy}{dx}.$$

3. Find the particular integral of the following :

$$(D^2 - 1)y = x e^x \sin x, \quad D \equiv \frac{d}{dx}.$$

4. Solve :

$$x^3 \frac{d^3y}{dx^3} + 2x^2 \frac{d^2y}{dx^2} + 2y = 10 \left(x + \frac{1}{x} \right).$$

5. Solve the following difference equations :

$$u_{x+2} + u_{x+1} - 56u_x = 2^x (x^2 - 3).$$

[*Turn over*]

[4]

6. Solve :

$$u_{x+2} - 2 \cos \alpha u_{x+1} + u_x = \cos x \alpha .$$

7. Find the general solution of the following set of difference equations :

$$u_{x+1} + u_x - 4v_x = 2^x ,$$

$$v_{x+1} - 3u_x = x^2 .$$
