Roll No.______________

Total No of pg : 2

BTAM-102

May-2014

BTAM-102 :ENGINEERING MATHEMATICS - II

B.Tech.

Time Allowed: 3 Hours **Maximum Marks : 60**

Note : *1. Section A is compulsory.*
2. Attempt a total of 5 Questions from Section B and C, Selecting at least 2 from each section.

SECTION - A

1. (i) Solve the differential equation
$y(2xy + e^x)\,dx = e^x\,dy$

(ii) State the necessary and sufficient conditions for the equation $M(x, y)dx + N(x, y)\,dy = 0$ to be an exact differential equation.

(iii) Find the particular integral of the differential equation $(D-2)^2\,y = \text{Sin } 2x$.

(iv) Solve the differential equation $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$.

(v) Find the rank of the matrix $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$.

(vi) Difine a linear transformation from a vector space V & a vector space W.

(vii) State the integral test for the convergence of a series of positive terms.

(viii) State De Moire's theorem for a positive integer.

(ix) Find the real and imaginary parts of $e^{3xy + 4iy2}$

(x) What do you understand by the eigen values and their corresponding eigen-vectors.?

SECTION - B

Note : Each question in this section carries 8 marks.

2. Solve the differential equation
$x - y\,(1+ x - y^2)\,\frac{dy}{dx} = 1.$

3 Solve the differential equation.

$(1 + x)2\frac{dy}{dx} + (1 + x)\frac{dy}{dx} + y = 2\ \text{Sin}\ (\log\ (1 + x))$.

4. Solve the following sinmultaneous differential equations :

$\frac{dy}{dt} + 4x - y = 0, \qquad \frac{dx}{dt} - 5x - y = 0.$

5. A particle of mass on executes simple harmonic motion in the line joining the points A and B on a smooth table and is connected with these points by elastic stings whose tensions in equilibrium one each T. If l, l^1 be the extensions of the strings beyond their natural lengths, find the time of an oscillation.

SECTION - C

Note : Each question in this section caries 8 marks.

6. Verify Cayley Haviltion theorem for the matrix

$A= \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$ Hance find A^{-1}

7. Test for consistency and solve the system of linear equations $5x + 3y + 7z = 4$, $3x + 26y + 2z = 9$, $7x + 2y + 10z = 5$.

8. a) Define an alternating series state Leibnity's rule to test the convergence of an alternating series.

b) Give an example of a series which is conergent but not absolutely convergent. Justify your statement.

9. a) Separate $\text{Sin}^{-1}(\text{Cos}\varphi + i\text{Sin}\varphi)$ into real and imaginary parts, where φ is a positive acute angle.

b) Expand $\text{Cos}^8\varphi$ in a series of cosines of multiples of φ.

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