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Total Number of Pages : 02

B.Tech.
BS1101

1st Semester Back Examination 2018-19
MATHEMATICS - I

BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH, MARINE, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, TEXTILE

Time : 3 Hours

Max Marks : 70

Q.CODE : E808

Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions : (2 x 10)

- Define polar formula of curvature.
- Define an asymptote of the curve and when an asymptote does not exist?
- What do you mean by integrating factor? How it helps to solve differential equations?
- Define Euler's formula for homogeneous function of degree n .
- Define particular integral of differential equations of higher order with constant coefficient.
- What is the basis of Eigen vector when does it exist?
- What is the rank of a matrix? Write its basic importance?
- Find the Legendre polynomial $P_1(x)$ and $P_2(x)$.
- How can you say a real square matrix is orthogonal?
- Explain the condition for which a system of linear equation will possess more than one solution.

Q2 a) Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \\ 4 & 6 & 8 \end{bmatrix}$. (5)

b) Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ (5)

Q3 a) Solve the equation $(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 4y = 0$, by power series method. (5)

b) Reduce the equation $\sin y \frac{dy}{dx} = \cos x (2 \cos y - \sin 2x)$ to a linear equation and hence solve it. (5)

Q4 a) Solve the differential equation: $xy \frac{dy}{dx} = 1 + x + y + xy$. (5)

b) Solve the differential equation: $y'' - 4y' + 4y = e^x \cos x$, where $y' = \frac{dy}{dx}$. (5)

Q5 a) Solve the following differential equation (5)

$(2x + 3)^2 y'' - (2x + 3)y' - 12y = 6x$, where $y' = \frac{dy}{dx}$.

b) Obtain the rectilinear asymptotes of the curve $r(e^\theta - 1) = a(e^\theta + 1)$ (5)

Q6 a) Prove that the center of curvature at points of a cycloid lie on an equal cycloid. **(5)**

210 210 **b)** Solve: $(D^2 + 6D + 8)y = x + e^{2x} + \sin 2x$ 210 210 **(5)** 210

Q7 a) Solve: $(y(1 + \frac{1}{x}) + \cos y) dx + (x + \log x - x \sin y) dy = 0$ **(5)**

b) Solve the following system of linear equation by Gauss elimination method : **(5)**
 $2x + 3y - z = 0, 5x - 3y + z = 7, 8x + 9y - 3z = 2.$

Q8 Write short answer on any TWO : (5 x 2)

a) Rank of Matrix

210 210 **b)** Legendre equation and Legendre polynomial 210 210 210

c) Linear independent and linear dependent.

d) Linear differential equations and its solutions.