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Total Number of Pages : 02

B.TECH

AR-17

B.TECH 1ST SEMESTER EXAMINATIONS(BACK), DECEMBER 2019
BBSBS1010- ENGINEERING MATHEMATICS-I

Time: 3 Hours

Max Marks : 100

The figures in the right hand margin indicate marks.

PART-A**(10X1 = 10 MARKS)****Answer all questions.**

- The number of arbitrary constants in the general solution of second order differential equation is _____.
- What is the Order and degree of the differential equation $\sqrt[3]{\frac{d^2y}{dx^2}} + y = \sin \sqrt{x}$
- The integrating factor of $y' + 4y = 20$ is _____.
- What is wronskian of two independent solution y_1, y_2 is _____.
- The fundamental period of $\sin 2x$ is _____.
- The function $f(x) = x^2$ is an _____ function in the range $(-c, c)$.
- The fourier series of $f(x)$ in the period $2L$ is _____.
- The fundamental period of $\sin 2x$ is _____.
- The value of $\cos n\pi$. Is _____.
- The function $\sin(n\pi x/L)$ is an _____ Function in the interval $(-L, L)$.

PART-B**(15 x 2 = 30 MARKS)****Answer any fifteen questions from the following.**

- Under what condition the equation $(Ax+By)dx + (Cx+Dy) dy=0$ is exact.
- Solve $x^2y'' - 3xy' + 4y = 0$
- Verify whether the function $Y_1 = \ln X, Y_2 = \ln x^4$ are linearly dependent or not.
- Solve $(2x + e^y) dx + x e^y dy = 0$
- Solve $Y' + Y = e^{-x} \tan x$
- Solve $(y'' - y' - 2y) = 0$.
- Write the series of $\sin x$ in powers of x .
- Verify $f_{xy} = f_{yx}$ where $f = e^{2x} \cos 3y$
- Find the basis of the solution of $y'' + y' + y = 0$
- Find the total derivative of $u = y \cos x$
- Define even and odd function.
- Define linear dependence and independence of vectors.
- Define half range cosine series.
- Define Euler-cauchy formula.
- Define periodic function.
- Define Taylor's theorem.
- Check for LD or LI $\begin{bmatrix} 2 & 3 \end{bmatrix}, \begin{bmatrix} 3 & 6 \end{bmatrix}, \begin{bmatrix} -1 & 4 \end{bmatrix}$.
- Define symmetric and skew-symmetric matrix
- Find the symmetric coefficient matrix of the quadratic form $Q = 4x^2 - 8xy + 5y^2$
- Expand e^x in powers of x .

**PART-C****(6 x 5 = 30 MARKS)****Section-i****Answer any Six questions**

1. Solve $y' + y = \sin 3x$.
2. Solve $x^2 y'' - 4x y' + 6y = 0$
3. Solve $7x - 4y - 2z = -6$, $16x + 2y + z = 3$, $14x - 8y - 4z = -12$
4. Solve $\cos(x+y) \frac{dy}{dx} = 1$
5. Prove that the absolute value of determinant of an unitary matrix is 1.
6. Solve $xy \frac{dy}{dx} = 1 + xy + x + y$
7. Find the rank of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$
8. Solve the system of linear equation by Gauss Elimination method
 - a. $-3x + 2y + z = 3$, $2x + y + z = 0$, $6x + 2y + 4z = 6$

Section-ii**Answer any Two questions****2x 15 = 30 MARKS)**

- 1.(a) If u is homogeneous function of degree n , prove that

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = n(n-1)u$$

- (b) If $u = \sin^{-1} \left(\frac{x^2 + y^2}{x+y} \right)$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$.

- 2 a) Find the Fourier series of $f(x) = \begin{cases} k, & -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 0, & \frac{\pi}{2} < x < \frac{3\pi}{2} \end{cases}$

- b) Find the Half range sine Series of $f(x) = x^2$, in $0 < x < \pi$

3. a) Solve the Initial value problem $4y'' - 4y' - 3y = 0$, $y(-2) = 1$, $y'(-2) = 0$

- b) Solve $y'' + y = \sec x$ by using variation of parameter.

4. a) Find the eigen value and eigen vector of the matrix $\begin{pmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix}$

- b) Find out which type of conic section is represented by Quadratic form

$$-11x^2 + 84xy + 24y^2 = 156$$

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