GIET Main Campus (Autonomous)
Gunupur-765 022

Reg.No.: | | | | | | | | | | | |

B.TECH. DEGREE EXAMINATION-NOV-DEC-2018
End Semester Examination
BBSBS1010-Engineering Mathematics-I
(Regulations 2018)
(Common to all Branches of Engineering)

Time : 3 Hours **Maximum : 100 Marks** **Question Code:10812**
Answer ALL Questions

PART A - (10 X 2 = 20 Marks)

1. (a) The Stationary point at which the function f(x, y) has neither maximum nor minimum is called as—— [CO1][PO1]
   a) Stationary point
   b) saddle point
   c) maximum
   d) none of these

   (b) The value of zxy is....., where z = 3x sin 2x [CO1][PO2]
   a) 2
   b) 1
   c) -1
   d) 0

   (c) What is the order of differential equation $y'^2 + y = 0$. [CO1][PO1]
   a) Second
   b) first
   c) third
   d) none of these

   (d) The solutions y_1, y_2 are said to be independent if their Wornskian is not equal to ——— [CO1][PO1]
   a) 0
   b) 1
   c) -1
   d) none of these

   (e) The value of sin nπ =—— [CO3][PO1]
   a) 0
   b) 1
   c) -1
   d) none of these

   (f) The fundamental period of sin2x is —— [CO3][PO1]
   a) π

b) 1
c) 2π
d) none of these

(g) The function $f(x) = x^3$ is an ———function in the range (0, 3). [CO3][PO1]
) odd
b) even
c) neither odd nor even
d) not defined

(h) The absolute value of an orthogonal matrix is —— [CO4][PO1]
a) 0
b) 1
c) ∞
d) none of these

(i) The determinant of a singular matrix is [CO4][PO1]
a) Eigne set
b) eigen vector
c) Spectrum
d) none of these

(j) The determinant of a singular matrix is—— [CO4][PO1]
a) 1
b) -1
c) 0
d) none of these

PART B - (10 X 2 = 20 Marks)

2. (a) Define Euler's theorem for homogeneous functions. [CO1][PO1]
(b) Verify $f_{yx} = f_{xy}$ where $f = sin(2x^2 + y^2)$ [CO1][PO2]

(c) Define Wronskian and find the Wronskian of $y_1 = sinx$ and $y_2 = cosx$ [CO2][PO1]

(d) Find the particular solution of y" + 2 y = sin 3x [CO2][PO2]

(e) Define periodic function. [CO3][PO1]

(f) Define even and odd function. [CO3][PO1]

(g) Define half range sine series. [CO3][PO1]

(h) Prove that the diagonal elements of a skew-symmetric matrix are zero. [CO4][PO2]

(i) Define symmetric and skew-symmetric matrix. [CO4][PO1]

(j) Find the symmetric coefficient matrix of quadratic form for $Q = x_1^2 - 2x_1x_2 + 4x_2x_3 - 9x_3^2$ [CO4][PO2]

PART C - (4 X 15 = 60 Marks)

3 a i) If $U = \log\frac{x^4+y^4}{x+y}$ then show that $x\frac{\partial U}{\partial x} + y\frac{\partial U}{\partial y} = 3$ [CO1][PO2] [8]

ii) Expand $f(x,y) = x^2 + xy + y^2$ in powers of (x-2) and (y-3). [CO1][PO2] [7]

(OR)

b i) Discuss the maxima or minima value of $U = x^3 + y^3 - 3axy$ [CO1][PO2] [8]

ii) If $U = x^2 \tan^{-1}\frac{y}{x} - y^2 \tan^{-1}\frac{x}{y}$; $xy \neq 0$ then prove that $\frac{\partial^2 U}{\partial x \partial y} = \frac{x^2 - y^2}{x^2 + y^2}$ [CO1][PO2] [7]

4 a i) Solve $\frac{dy}{dx} - (1 + \frac{3}{x})\, y = x + 2$ [CO2/PO2][8MARKS]

ii) Solve $x^2 y'' - 4x y' + 6y = 0$ {CO2/PO2] [7MARKS]

(OR)

b i) Solve the differential equation $y'' + y = Cosecx$ by using variation of parameter [CO2][PO2] [8]

ii) Using Operator method Solve the differential equation y" + 9y= cos3x [CO2][PO2] [7]

5 a i) Find the Fourier series of $f(x) = \begin{cases} 0, & \text{if } -\pi < x < 0 \\ x, & \text{if } 0 < x < \pi \end{cases}$ [CO3][PO2] [7]

ii) Find the Fourier series of $f(x) = x^2$, $0 < x < 2\pi$. [CO3][PO2] [8]

(OR)

b i) Find the Fourier series of $f(x) = \begin{cases} x, & -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 0, & \frac{\pi}{2} < x < \frac{3\pi}{2} \end{cases}$ [CO3][PO2] [8]

ii) Find the Half range sine Series of f(x) $=x^2$, in $0 < x < \pi$ [CO3][PO2] [7]

6 a i) Find the rank of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$ [CO4][PO2] [7]

ii) Find the Eigen value and Eigen vector of [CO4][PO2] [8]

$$\begin{pmatrix} -19 & 7 \\ -42 & 16 \end{pmatrix}$$

(OR)

b i) Find out which type of conic section is represented by Quadratic function [CO4/PO2] [7]
$11x^2 + 84xy + 24y^2 = 156$

ii) Diagnolize the matrix $\begin{bmatrix} 2 & 1 \\ 2 & 1 \end{bmatrix}$ [CO4/PO2] [8]