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Total Number of Pages : 2

AR-18

B.TECH

1st Semester (BACK PAPER) Examination-December 2019**BBSBS1010 ENGINEERING MATHEMATICS-I**

Time : 3 Hours

Maximum : 100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 x 2=20 Mark**Q.1. Answer ALL Questions**

- a The value of z_x is _____, where $z = y \sin 2y$
 a) 2 b) 1 c) -1 d) 0
- b _____ is the degree of $x u_x + y u_y = n u$
 a) $n-1$ b) $n+1$ c) 1 d) none of these
- c Write the general solution of the Differential equation $y''+2y'+y=0$ having equal roots is _____
 a) $(a+bx)e^{-x}$, b) bxe^{-x} c) $x(a+bx)e^{-x}$ d) none of these
- d The differential equation $y'' + 2xy' + y = 0$ is _____.
 a) Homogeneous b) Non- Homogeneous c) Exact d) none of these.
- e what is the general solution of $(D - 2)y = 0$
 a) $y = k e^{2x}$ b) $y = k x e^{2x}$ c) $y = k x^2 e^{2x}$ d) none of these
- f The value of $\cos n\pi$. Is _____.
 a) 0 , b) 1 , c) -1, d) none of these
- g The fundamental Period of $\tan x$ is _____.
 a) π , b) 1 , c) 2π , d) none of these
- h The function $f(x) = x^3$ is an _____ function in the range (0, 3).
 a) odd , b) even , c) neither odd nor even d) not defined
- i The spectral radius of the matrix is $\begin{pmatrix} 5 & 0 \\ 9 & 2 \end{pmatrix}$ is _____.
 a) 7 b) 9 c) 0 d) 2
- j The determinant of a singular matrix is _____.
 a) 1 b) -1 c) 0 d) none of these

PART – B: (Short Answer Questions) 10X2=20 Marks**Q.2. Answer ALL questions**

- a Find the total derivative of $u = y \cos x$
- b Define Taylor's theorem of two variable
- c Solve $x^2 y'' - 3x y' + 4y = 0$
- d Solve $(2x - e^y) dx + x e^y dy = 0$
- e Solve $Y' + Y = e^{-x} \tan x$
- f Define Fourier series in the period 2π .



- g Determine whether the function is even or odd. $f(x)=\log (x+\sqrt{x^2+1})$
- h Determine whether the function is even or odd. $f(x)=x\left(\frac{a^x-1}{a^{x+1}}\right)$
- i Define hermitian and skew-hermitian matrix.
- j Check for Linear Dependent or linear independent of $[3,0,2,2]$, $[-6,42,24,54]$, $[21,-21,0,-15]$

PART – C: (Long Answer Questions) 4X15=60 Marks**Answer ALL questions****Q.3**

- a Expand $f(x, y) = x^2 + xy + y^2$ in powers of $(x-2)$ and $(y-3)$. 7
- b if $U = \tan^{-1} \frac{x^3 + y^3}{x - y}$, $x \neq y$ then show that $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y} = \sin 2U$ 8

OR

- c Integrate $\int x^2 \sin 2x \cos 3x dx$ 7
- d Verify $f_{xy} = f_{yx}$ where $f = e^{2x} \cos 3y$ 8

Q.4

- a Solve $xy \frac{dy}{dx} = 1 + xy + x + y$ 7
- b Solve $y' + y = \sin 3x$. 8

OR

- c Solve $y'' + 3y' - 18y = 9 \sin x$ by using undetermined coefficient method. 7
- d Solve $3y'' + 10y' + 3y = 9x + 5 \cos x$ 8

Q.5

- a Find the Fourier series of $f(x) = x|x|$, $-\pi < x < \pi$. 7
- b Find the Fourier series $f(x) = \frac{x^2}{2}$ in $-\pi < x < \pi$ 8

OR

- c Find the Half range sine Series of $f(x) = x^2$, in $0 < x < \pi$ 7
- d Find the Fourier series of $f(x) = \begin{cases} k, & -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 0, & \frac{\pi}{2} < x < \frac{3\pi}{2} \end{cases}$ 8

Q.6

- a Find the rank of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$ 7
- b Solve the following system of equations by Gauss Elimination Method 8

$$x + y - z = 9, \quad 8y + 6z = -6, \quad -2x + 4y - 6z = 40$$

OR

- c Prove that the eigen values of a Hermitian matrix are Real. 7
- d Find out which type of conic section is represented by Quadratic function $11x^2 + 84xy + 24y^2 = 156$ 8

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