QPC: RA19BTECH083 AR 19 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (First Semester) Examinations, April – 2021

BBSBS1010 – ENGINEERING MATHEMATICS I

(Common to all branches)

Time: 3 hrs Maximum: 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer ***ALL*** questions [CO#] [PO#]

a. The Stationary point at which the function $f(x,y)$ has neither maximum nor minimum is called as……. CO1 PO1

(i) Point of Maximum (ii) Point of Minimum

(iii) Saddle Point (iv) None of these

b. If $f(x,y)$ is a Homogeneous function of degree n then $x\frac{\partial f}{\partial x}+y\frac{\partial f}{dy}=$ CO1 PO1

(i) nf (ii) $n(n-1)f$

(iii) 0 (iv) None of these

c. The solutions y_1 , y_2 are said to be independent if their Wronskian is CO2 PO1

(i) Equal to Zero (ii) Not equal to Zero

(iii) Equal to 1 (iv) None of these

d. The integrating factor of $y'+2y=x$ is _____. CO2 PO1

(i) e^{2x} (ii) e^{-2x}

(iii) e^{-4x} (iv) e^{4x}

e. The fundamental period of sin2x is _____. CO3 PO1

(i) π (ii) 3π

(iii) 2π (iv) 4 π

f. The sum of Eigen values of the matrix $\begin{pmatrix}7 & 1\\ 0 & 2\end{pmatrix}$ is_____. CO4 PO1

(i) 0 (ii) 7

(iii) 2 (iv) 9

g. The absolute value of Eigen value of an orthogonal matrix is _____ CO4 PO1

(i) 0 (ii) 2

(iii) infinity (iv) 1

h. A square matrix A satisfying the property $A^T=A$ then A is called as CO4 PO1

(i) orthogonal (ii) Skew Symmetric

(iii) Symmetric (iv) unitary

i. The product of Eigen values of matrix is equal to CO4 PO1

(i) sum of main diagonal elements (ii) always Zero

(iii) determinant of the matrix (iv) none of these

j. If $u=\tan^{-1}\left(\frac{y}{x}\right)$, then $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=$ __ CO1 PO2

(i) 1 (ii) $2u$

(iii) 3u (iv) 0

PART – B: (Short Answer Questions) **(2 x 10 = 20 Marks)**

Q.2. Answer ***ALL*** questions	[CO#]	[PO#]
a. Write the Taylor's series of f(x, y) in powers of (x-a) and (y-b) up to 3rd degree terms.	CO1	PO1
b. Discuss the condition for maxima and minima of $f(x,y)$ at a point (a, b)	CO1	PO2
c. Under what condition the equation (Ax + By) dx + (Cx + Dy) dy = 0 is exact.	CO2	PO2
d. Solve $y' + y = e^{-x}tanx$	CO2	PO2
e. Define periodic function with example.	CO3	PO2
f. Check for even and odd function for $f(x) = x + x^2$	CO3	PO2
g. Define algebraic and geometric multiplicity of an Eigen value.	CO4	PO1
h. Find the symmetric coefficient matrix of the quadratic form Q= 4 x^2-8 x y + 5 y^2	CO4	PO2
i. Define rank of matrix.	CO4	PO1
j. Solve $(x^2 D^2 + 3x D + 1)y = 0$	CO2	PO2

PART – C: (Long Answer Questions) **(10 x 4 = 40 Marks)**

Answer ***ALL*** questions	Marks	[CO#]	[PO#]
3. a. If $u = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right), x \neq y$ then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$	7	CO1	PO2
b. Find the total derivative of u = $e^x y$	3	CO1	PO2
(OR)			
c. Expand $f(x,y) = x^2 + xy + y^2$ in powers of $(x-2)$ and $(y-3)$.	5	CO1	PO2
d. Discuss the maxima or minima of $U = x^3 + y^3 - 3axy$	5	CO1	PO2
4. a. Solve $y'' - 4y' + 4y = \frac{e^{2x}}{x}$ by using method of variation of parameter.	8	CO2	PO2
b. Define integrating Factor	2	CO2	PO2
(OR)			
c. Solve $3y'' + 10y' + 3y = 9x + 5\cos x$ by method of undetermined coefficients	10	CO2	PO2
5. a. Find the Fourier series of $f(x) = x^2$ $in\ 0 < x < 2\pi$	10	CO3	PO2
(OR)			
b Find the Fourier series of $f(x) = 3x^2$ $in -1 < x < 1$.	10	CO3	PO2
6. a. Diagnolize the matrix $\begin{bmatrix} 2 & 1 \\ 2 & 1 \end{bmatrix}$	10	CO4	PO2
(OR)			
b. Find out which type of conic section is represented by Quadratic function $-11x^2 + 84xy + 24y^2 = 156$	5	CO4	PO2
c Solve the system of linear equations by Gauss Elimination method $-3x + 2y + z = 3$, $2x + y + z = 0$, $6x + 2y + 4z = 6$	5	CO4	PO2

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