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GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Second Semester – Regular) Examinations, September – 2021

BBSBS 2010 - Engineering Mathematics II

(Common to all branches)

Time: 2 hrs

Maximum: 50 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. A partial differential equation requires
 (i) Exactly one independent variable (ii) Two or more independent variables
 (iii) More than one dependent variable (iv) Equal number of dependent and independent variables
 CO1 PO1
- b. Find the value of $\int_0^2 \int_0^4 (x^2 + y^2) dy dx$
 (i) 160/3 (ii) 106/3
 (iii) 610/3 (iv) None of these
 CO4 PO2
- c. The magnitude of the vector $\mathbf{I} + 2\mathbf{J} - 3\mathbf{K}$ is _____
 (i) 0 (ii) 12
 (iii) $\sqrt{13}$ (iv) $\sqrt{14}$
 CO3 PO1
- d. $r(u,v) = [a \cos v \cos u, au \cos v \sin u, b \sin v]$ represent the Parametric form of -----

 (i) ellipsoid (ii) paraboloid
 (iii) sphere (iv) None of these
 CO3 PO1
- e. If $\mathbf{V}$ is said to be irrotational vector if _____.
 (i) $\text{Div}(\mathbf{v}) = 0$ (ii) $\text{Div}(\mathbf{v}) \neq 0$
 (iii) $\text{Curl}(\mathbf{v}) = 0$ (iv) $\text{Curl}(\mathbf{v}) \neq 0$
 CO4 PO1
- f. $\oint_C \mathbf{F} \cdot d\mathbf{r} = \iint_R (\nabla \times \mathbf{F}) \cdot d\mathbf{s}$ represents _____.
 (i) Green's Theorem (ii) Gauss Divergence Theorem
 (iii) Stoke's Theorem (iv) none of these
 CO1 PO1
- g. Eliminating arbitrary function f from the $f(x^2 - y^2)$ we get
 (i) $4xp + yq = 0$ (ii) $yp + xq = 0$
 (iii) $p - qx = 0$ (iv) $Py - q = 0$
 CO2 PO2
- h. The Laplace transform of $3a^t$ is _____
 (i) $1/(s-3)$ (ii) $1/(s-a)$
 (iii) $3/(s-a)$ (iv) None of these
 CO2 PO2
- i. The inverse Laplace transform of $\frac{e^{-s}}{s^2-1}$ is _____
 (i) $U(t-1) \sin t$ (ii) $U(t-1) \cos t$
 (iii) $U(t-1) \sin ht$ (iv) None of these
 CO2 PO2
- j. Find the value of $L(1 * t)$ is _____
 (i) $e^t - 1$ (ii) e^t
 (iii) $e^t + 1$ (iv) None of these
 CO2 PO2

PART – B: (Short Answer Questions)**(2 x 5 = 10 Marks)**Q.2. Answer **ALL** questions

[CO#] [PO#]

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|---|-----|-----|
| a. Form a partial differential equation by Elimination of arbitrary functions $z = f(x) + e^y g(x)$ | CO1 | PO2 |
| b. Solve $2p + 3q = 1$ | CO1 | PO2 |
| c. Find the Laplace transformation of $e^{3t} \sin 2t$ | CO2 | PO2 |
| d. Find the grad f of a function $f = x^2 + y^2 - 25$ at (3,4) . | CO3 | PO2 |
| e. Write the unit normal vector to the right circular cylinder. | CO3 | PO1 |

PART – C: (Long Answer Questions)**(6 x 5 = 30 Marks)**Answer **ANY FIVE** questions

Marks [CO#] [PO#]

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|---|-----|-----|-----|
| 3. Solve the problem by Lagrange's Method $(y+z)p + (z+x)q = x+y$ | (6) | CO1 | PO2 |
| 4. Solve $qz - p^2y - q^2y = 0$ by using Charpit's Method. | (6) | CO1 | PO2 |
| 5. Solve the differential equation using Laplace Transformation,
$y'' + 2y' - 3y = \sin t$, $y(0) = 0$, $y'(0) = 0$. | (6) | CO2 | PO2 |
| 6. Solve the following integral equations $y(t) = tet - 2e^t \int_0^t e^{-c} y(r) dr$. | (6) | CO2 | PO2 |
| 7. Prove that $\text{div}(\vec{fV}) = f\text{div}\vec{V} + \vec{V} \cdot \nabla f$ | (6) | CO3 | PO2 |
| 8. Find the tangent and unit tangent vector of the curve $r(t) = \cosh t \vec{i} + 2\sinh t \vec{j}$ at the point (1/3, 4/3, 0) | (6) | CO3 | PO2 |
| 9. Using Gauss divergence theorem, evaluate the integral $\iint_S F \cdot n dA$ of
$F = [x^3, y^3, z^3]$ and S is the sphere $x^2 + y^2 + z^2 = 9$ | (6) | CO4 | PO2 |
| 10. Determine whether the line integral $\int_{(1,0,1)}^{(0, \frac{\pi}{2}, 1)} 2xyz^2 dx + (x^2 z^2 + z \cos yz) dy + (2x^3 yz + y \cos yz) dz$ is independent of path integration, if so evaluate it. | (6) | CO4 | PO2 |

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