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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations March-2021

MATHEMATICS-II

(Common to All)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a Solve $\frac{dy}{dx} + y = x$. 2M
- b Write the formula for Bessel's function $J_n(x)$. 2M
- c Evaluate $\int_0^\pi \int_0^{\sin \theta} r dr d\theta$. 2M
- d Write Cauchy's Riemann equations in polar form. 2M
- e State Cauchy's theorem. 2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

- 2 a Solve $x \frac{dy}{dx} + y = \log x$. 5M
- b Solve $x \frac{dy}{dx} + y = x^3 y^6$. 5M

OR

- 3 a Solve $y = 2px + y^2 p^3$. 5M
- b Solve $(px - y)(py + x) = a^2 p$. 5M

UNIT-II

- 4 a Solve by method of variation of parameters $(D^2 - 2D)y = e^x \sin x$. 5M
- b Solve $x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^4$. 5M

OR

- 5 Prove that $J_{5/2}(x) = \frac{3}{x} \left[\sqrt{\frac{2}{\pi x}} \left(\frac{\sin x}{x} - \cos x \right) \right] - \sqrt{\frac{2}{\pi x}} \sin x$. 10 M

UNIT-III

- 6 a Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. 5M
- b Evaluate $\int_0^\pi \int_0^{a(1+\cos \theta)} r dr d\theta$. 5M

OR

- 7 a Calculate the volume of the solid bounded by the planes $x = 0, y = 0, x + y + z = a$ and $z = 0$. 5M
- b Evaluate the triple integral $\iiint xy^2 z dx dy dz$ taken through the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$. 5M

UNIT-IV

- 8 a Show that $u = \frac{1}{2} \log(x^2 + y^2)$ is Harmonic. 5M
- b If $w = f(z)$ is analytic function then prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |\operatorname{Re} al f(z)|^2 = 2|f'(z)|^2$. 5M

OR

- 9 a Find the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$. 5M
- b Show that the function $w = \frac{4}{z}$ transforms the straight line $x = c$ in the z -plane, into a circle in the w -plane. 5M

UNIT-V

- 10 a Find the Laurent series expansion of the function $f(z) = \frac{z^2 - 6z - 1}{(z-1)(z-3)(z+2)}$ in the region $3 < |z+2| < 5$. 5M
- b Find the Laurent series of the function $f(z) = \frac{z}{(z+1)(z+2)}$ about $z = -2$. 5M

OR

- 11 Show that $\int_0^{2\pi} \frac{d\theta}{1+a^2-2a\cos\theta} = \frac{2\pi}{1-a^2}$, $0 < a < 1$. 10 M

END