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Total no of pages : 2
Total No. of Questions : 09

B.Tech (Sem.1st)

ENGINEERING MATHEMATICS-I

Subject Code :AM-101

Paper ID : [A0111]

Time: 3 Hrs.

Max. Marks :60

Note:- (1) Section-A is compulsory to attempts, Consisting of ten short answer type question carrying two marks each.

(2) Attempt five question (carrying eight marks each) by electing at least two questions each from Section-B and Section-C

SECTION-A

- Q1. (a) Sketch the graph of $y = [x] - 4x$.
- (b) Find the area between $y = \sec^2 x$ and $y = \sin x$ from 0 to $\frac{\pi}{4}$
- (c) If $u = x^2 - 2y$, $u = x + y$, prove that $\frac{\partial(u,v)}{\partial(x,y)} = 2x + 2$
- (d) Find the percentage error in the area of a rectangle when an error of +1 percent is made in measuring its length and breadth.
- (e) find the equation of the cone with vertex at the origin and which passes through the curve $ax^2 + by^2 + cz^2 = 1, lx + my + nz = p$
- (f) Write the definitions of Cylinder and Cone.
- (g) Evaluate $\int_0^{\frac{\pi}{2}} \int_a^a (1 + \cos \theta) r dr d\theta$
- (h) Calculate $\iint_R \frac{\sin x}{x} dA$, where R is the triangle in the xy - plane bounded by the x -axis, the line $y = x$ and the line $x=1$
- (i) Discuss the convergence or divergence of the series $\sum \frac{n}{(\ln n)^{\frac{3}{2}}}$
- (j) Find the general value of $\log (-3)$

SECTION-B (Each 8 marks)

- Q2. Graph the functions (a) $y = x^4 - 4x^3 + 10$ (b) $y = [x^2 - 2x]$
- Q3. The region bounded by the parabola $y = x^2$ and the line $y = 2x$ in the first quadrant is revolved about the y axis to generate a solid. Find the volume of the solid.
- Q4. (a) If $u = f(y - z, z - x, x - y)$, prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$
- (b) Find $\frac{dy}{dx}$, when $(\cos x)^y = (\sin y)^x$
- Q5. Find the maximum and minimum distances of the point (3,4,12,) from the sphere $x^2 + y^2 + z^2 = 1$

SECTION-C (Each 8 marks)

- Q6. Find the equation to the right circular cylinder whose guiding circle is $x^2 + y^2 + z^2 = 9$, $x - y + z = 3$
- Q7. Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{1}{\sqrt{1-x^2-y^2-z^2}} dz dy dx$
by changing to spherical polar co-ordinates
- Q8. Find the radius and interval of convergence for the following power series:

$$\sum_{n=0}^{\infty} \frac{(x - \sqrt{2})^{2n+1}}{2n}$$
For what values of x, does the series converges (a) absolutely, (b) conditionally?
- Q9. Sum the series $1 + x \cos \alpha + x^2 \cos 2\alpha + x^3 \cos 3\alpha + \dots$ to n terms where x is less than unity. Also find the sum to infinity.
