Total No. of Questions – [5] Total No. of Printed Pages:2

G.R. No.	

Paper code - U128-109 (BE-FF)

MAY 2019 / END-SEM

F. Y. B.TECH. (COMMON) (SEMESTER - II)

COURSE NAME: Engineering Mathematics-II

COURSE CODE: ~~ES12181~~ ES12171

(PATTERN 2017)

Time: [**2 Hours**] [Max. Marks: **50**]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4 and Q.5**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1.a) Find the equation of the sphere passing through four points $(1,2,3), (0,-2,4), (4,-4,2)$ & $(3,1,4)$. [6 marks]

b) Find the equation of the right circular cone with vertex at $(1,-1,2)$, axis the line $\frac{x-1}{2}=\frac{y+1}{1}=\frac{z-2}{-2}$ and semi vertical angle 45^0. [6 marks]

c) Find the equation of right circular cylinder of radius 3 whose axis passes through $(1, 2, 3)$ and has direction cosines proportional to 1,1,1 [4 marks]

OR

Q.2) a) Prove that plane $x + y + z = 1$ touches the sphere $3(x^2 + y^2 + z^2) - 30x + 12y - 18z + 89 = 0$. Find point of contact. [6marks]

b) Find the equation of the right circular cone with vertex at origin, whose axis is the line $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and semi vertical angle 30^0. [6 marks]

c) Find the equation of the right circular cylinder of radius 4 and whose axis lies along the straight line $\frac{x-2}{2}=\frac{y-1}{-4}=\frac{z+2}{3}$. [4 marks]

Q.3) a) Evaluate $\iint_R (x^2+y^2)dxdy$ over the area of the triangle whose vertices are $(0,1), (1,1), (1,2)$. [6 marks]

b) Evaluate $\int_0^{\frac{\pi}{2}} \int_{\frac{\pi}{2}}^{\pi} \cos(x + y)\, dxdy$ [4 marks]

c) Find the volume common to the cylinders $x^2 + y^2 = a^2$ and $x^2 + z^2 = a^2$ [4 marks]

OR

Q.4) a) Evaluate $\iint_R x^2y^2\,dxdy$, where R is positive quadrant of $x^2+y^2=1$ [6 marks]

b) Evaluate $\int_0^1 \int_{y^2}^{1} \int_0^{1-x} xdzdxdy$ [4 marks]

c) Find the total area of the curve $r = a(1-\cos\theta)$. [4 marks]

Q. 5) Solve

1) The differential equation $1+\frac{dy}{dx}-\left(\frac{d^2y}{dx^2}\right)^{\frac{3}{2}}=0$ is of :

a. Order 1 and degree 2
b. Order 2 and degree 3
c. Order 3 and degree 4
d. Order 3 and degree 3 [2marks]

2) The differential equation of orthogonal trajectories of family of curves $xy = c$ is.

a. $x\frac{dx}{dy}+y=0.$
b. $-x\frac{dx}{dy}+y=0.$
c. $-x\frac{dx}{dy}-y=0.$
d. $x\frac{dy}{dx}+y=0.$ [2marks]

3) The orthogonal trajectories of the family of rectangular hyperbola xy = 1 is [2marks]

(a) $x^2-y^2=1$ (b) $x^2+y^2=1$ (c) $y=mx$ (d) $x=y^2$

4) For the function f (x) = cos x in the interval (-π, π) the value of b_n is [2marks]

(a) $\frac{1}{\pi}$ (b) 2π (c) 0 (d) $\frac{2}{\pi}$

5)The value of Γ(1/2) is

(a) $\sqrt{\frac{\pi}{2}}$ (b) $\sqrt{\pi}$ (c) $\frac{1}{2}!$ (d) $\frac{\sqrt{\pi}}{2}$ [2marks]

6) The value of erf(0) dx is [2marks]

(a) 2 (b) − 2 (c) $\sqrt{3}$ (d) − 4

7) erf(-∞) is [2marks]

(a) 0 (b) ∞ (c) + 1 (d) − 1

8) The horizontal asymptote for the curve $x^2y^2 = a^2(x^2+y^2)$ is [2marks]

(a) $y=\pm a$ (b) $x=0$ (c) $y=0$ (d) $x=\pm a$

9) The curve r = a (1 +cosθ) is symmetric about [2marks]

(a) Initial line (b) Pole (c) Y axis (d) None of these

10) The tangent to the curve $x^2y^2 = a^2(x^2-y^2)$ at origin is

(a) $y=\pm x$ (b) $x=0$ (c) $y=0$ (d) $x=\pm a$