Total No. of Questions :8]

P4028

SEAT No.:	
[Total	No of Pages · 3

[5351] - 108 F.Y.

ENGINEERING

Engineering Mathematics - II (2015 Pattern) (Semester - II)

Time: 2 Hours] [Max. Marks:50

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figure to the right indicates full marks.
- 4) "Assume suitable data, if necessary and clearly state."
- 5) Use of electronic pocket calculator is allowed.
- **Q1)** a) Solve the following.
 - i) Solve the following differential equation $(4+e^{2x})\frac{dy}{dx} = ye^{2x}$. [4]

ii) Solve,
$$x(x-y)\frac{dy}{dx} = y(x+y)$$
. [4]

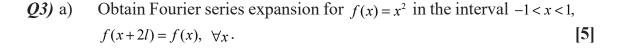
b) A steam pipe 40cm in diameter contains steam at 150°C and is protected with a covering 10cm, thick for which k=0.0012, If the temperature of the outer surface of the covering is 30°C, find the temperature at a distance 25cm from the center of the pipe under steady-state condition. [4]

OR

Q2) a) Solve
$$\cos x \frac{dy}{dx} + y = \sin x$$
.

- b) i) A body at temperature 100°C is placed in a room whose temperature is 25°C and cools to 80°C in 10 minutes. Find the time when the temperature will be 60°C. [4]
 - ii) a resistance of 150 ohms and an inductance of 0.3 H are connected in series with a battery of 25 volts. Find the current in the circuit if i=0 at t=0.

[4]



b) Evaluate
$$\int_0^\infty x^7 e^{-2x^2} dx$$
. [3]

c) Solve any one.

i) Trace the curve
$$r = a \cos 2\theta$$
 [4]

ii) Trace the curve
$$xy^2 = a^2(a-x)$$
 OR

Q4) a) If
$$u_n = \int_0^{\pi/4} \tan^n \theta d\theta$$
 then show that $n(U_{n+1} + U_{n-1}) = 1$.

b) If
$$f(x) = \int_{a}^{x} (x-t)^{2} G(t)$$
 at, then. [5]
show that $\frac{d^{3} f}{dx^{3}} - 2G(x) = 0$.

- c) Find the primeter of the cordioide $r = a(1 + \cos \theta)$ from $\theta = 0$ to $\theta = \frac{\pi}{3}$. [4]
- **Q5)** a) Find the equation of the sphere for which the circle $x^2 + y^2 + z^2 + 7y 2z + 2 = 0$, 2x + 3y + 4z = 8 is a great circle. [5]
 - b) Find the equation of right circular cone whose vertex is (1,1,1), axis the line $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-1}{3}$ and semi vertical angle $\frac{\pi}{4}$. [4]
 - Find the equation of a right circular cylinder having its radius as 03 units and equation of whose axis is $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-2}{3}$. [4]

OR

- **Q6)** a) Find the sphere through the circle $x^2 + y^2 + z^2 = 4$, z = 0 meeting the plane x + 2y + 2z = 0 in a circle of radius 3. [5]
 - b) Find the equation of the right circular of the cone with vertex (-1,0,0), semi vertical angle 60° and axis is x axis. [4]
 - c) Find the equation of a right circular cylinder having its radius as 04 units and equation of whose axis is $\frac{x+1}{1} = \frac{y+1}{-1} = \frac{z+1}{1}$. [4]

Q7) Attempt any two of following

- a) Change the order of integration $\int_{0}^{a} \frac{\int_{0}^{y+a}}{a^{2} y^{2}} f(x, y) dx dy ?$ [7]
- b) Find the volume of tetrahedron bounded by the co-ordinate planes and the plane $\frac{x}{2} + \frac{y}{3} + \frac{z}{4} = 1$? [6]
- c) Find moment of inertia of the portion of the parabola $y^2 = 4ax$, bounded by x axis and latus rectum, about x axis, if density at each point varies as the cube of the abscissa?

OR

Q8) Attempt any two of following

- a) Evaluate $\iint_{R} x^2 y^2 dx dy$ over the positive quadrant of $x^2 + y^2 = 1$? [7]
- b) Evaluate $\iiint \frac{dxdydz}{\sqrt{1-x^2-y^2-z^2}}$ taken throughout the volume of the sphere $x^2+y^2+z^2=1$ in positive octant? [6]
- ABCD is a square plate of side a and 0 is the mid point of AB. If the surface density various as the square of distance from 0, show that the center of gravity of the plate is at a distance ^{7a}/₁₀ form 0? [6]

