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

G.R. No.	

Paper Code - U127-101 (ESE)

MAY 2018/ENDSEMESTEREXAM

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

COURSE NAME: Engineering Mathematics II

COURSE CODE: ES12171

(2017 PATTERN)

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

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2, 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 whereever required**

Q.1) a) Find the equation of sphere which passes through the points (1,0,0); (0,1,0); (0,0,1) and having radius as small as possible. 6

b) Obtain the equation of the right circular cone, which passes through the point (1,3,4) with vertex is at (2,2,1)and axis parallel to the line $\frac{x+1}{2}=\frac{y-1}{-2}=\frac{z-2}{3}$. 6

c) Find the equation of right circular cylinder of radius 5 and axis $\frac{x-2}{3}=\frac{y-3}{1}=\frac{z+1}{1}$ 4

OR

Q.2) a) Find the equation of sphere which is tangential to the plane 2x-2y-z+16=0 at (-3,4,2) and passing through the point (-2,0,3) 6

b) Axis of a right circular cone whose vertex is origin ,makes constant angle with the coordinate axes and the cone passes through the line from origin with direction cosines proportional to 1,-2,2 .find the equation of right circular cone 6

c) Find the equation of right circular cylinder whose axis is the line 2(x-1)=y+2=z and radius is 3. 4

Q.3) a) Express the following integral as single integral and hence evaluate 6

$$\int_0^1\int_0^y (x^2+y^2)dxdy+\int_1^2\int_0^{(2-y)} (x^2+y^2)dxdy$$

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

c) Find the area of the upper half of the cardiode $r=a(1+\cos\theta)$ 4

OR

Q.4) a) Evaluate $\int_0^1 \int_{y^2}^{y} \frac{ydxdy}{(1-x)\sqrt{x-y^2}}$ 6

b) Find the volume enclosed between the cone $z=\sqrt{x^2+y^2}$ and the paraboloid $x^2+y^2=z$ 4

c) Find the area common to the circles $x^2+y^2=9$ and $x^2+y^2=6x$ 4

Q.5) Attempt following questions:[20 marks]

1 Find order and degree of the differential equation $\frac{\left[y-x\frac{dy}{dx}\right]}{\left(\frac{dy}{dx}\right)^2}=\frac{dy}{dx}$. 1

2 The solution of D.E. $\frac{d^2y}{dx^2}-k\frac{dy}{dx}+6y=0$ is $y = ae^{2x} + be^{3x}$ the find K. 2

3 Find I.F. of differential equation $(1+y^2)dx=(\tan^{-1}y-x)dy$. 2

4 Find differential equation of orthogonal trajectory of $x^2 + cy^2 = 1$. 2

5 The rate of disintegration of radioactive element at any time t is proportional to its mass at that time, then find the time during which the original mass of 1.5 gm will disintegrate into its mass of 0.5 gm. 2

6 What is the differential equation of R-L circuit where E(t) is applied emf ? 1

7 Write the Fourier series for a periodic function f(x) of period 2L in the interval (c, c+2L). 1

8 Evaluate $\int_0^a \sqrt{a^2-x^2}\,dx$ 2

9 Find the value of $\sqrt{\frac{1}{3}}\sqrt{\frac{2}{3}}$. 2

10 Find the tangent to the curve $y(1+x^2) = x$ at origin. 1

11 Find angle between radius vector and tangent to the curve $r=\frac{2a}{1+\cos\theta}$. 2

12 Find the length of the curve $8x = y^4 + 2y^{-2}$ from y=1 to y = 2. 2

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