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G.R. No.	
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Paper Code - U128-109 (BE-FS)

May 2019/ End-Sem Exam

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

COURSE NAME: Engineering Mathematics II

COURSE CODE: ES12171

(PATTERN 2017)

Time: **2 Hour**

[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 $(1,0,0)$, $(0,1,0)$ and $(0,0,1)$ and having least possible radius. [6 marks]
- b) Obtain the equation of a right circular cone which passes through the point $(2, 1, 3)$ with vertex at $(1, 1, 2)$ and axis parallel to the line $\frac{x-2}{2} = \frac{y-1}{-4} = \frac{z+2}{3}$. [6 marks]
- c) Find the equation of right circular cylinder of radius 2 whose axis passes through $(1, 2, 3)$ and has direction cosines proportional to 2, -3, and 6. [4 marks]

OR

Q.2)

- a) Find the centre and radius of the circle $x^2 + y^2 + z^2 - 2x + 4y + 2z - 6 = 0$, $x + 2y + 2z - 4 = 0$ and also find the orthogonal projection of the area of the circle in yz -plane. [6 marks]
- b) Find the equation of the right circular cone which passes through the point $(1, 1, 2)$ and has its axis the line $6x = -3y = 4z$ and vertex at origin. [6 marks]
- c) Find the equation of the right circular cylinder of radius 2 and whose axis lies along the straight line $\frac{x-1}{2} = \frac{y+3}{-1} = \frac{z-2}{5}$. [4marks]

Q.3)

- a) $\iint_R \frac{x^2 y^2}{x^2 + y^2} dx dy$, where R is annulus between $x^2 + y^2 = 4$ and $x^2 + y^2 = 9$. [6 marks]
- b) Change the order of integration for $\int_0^{4a} \int_{\frac{4a}{y}}^y f(x, y) dx dy$ [4 marks]
- c) Find the area inside the circle $r = a \sin \theta$ and outside the curve $r = a(1 - \cos \theta)$. [4 marks]

OR

Q.4)

a) $\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{dx dy}{(1+e^y)\sqrt{1-x^2-y^2}}$

[6 marks]

b) Find the volume of the region enclosed by the cone $z = \sqrt{x^2 + y^2}$ and paraboloid $z = x^2 + y^2$.

[4 marks]

c) Find the total area of the curve $r = a(1 + \cos \theta)$.

[4 marks]

Q. 5) Solve

1) The value of λ for which the differential equation

$(xy^2 + \lambda x^2 y) dx + (x + y) x^2 dy = 0$ is exact

(a) 2

(b) -3

(c) 6

(d) 3

[2marks]

2) The solution of the DE $\frac{dy}{dx} + y = e^{-x}$ is

[2marks]

(a) $y = (x + c) e^x$

(b) $ye^x + x = c$

(c) $ye^x = x + c$

(d) None of these

3) The orthogonal trajectories of the family of rectangular hyperbola $xy = c$ is

[2marks]

(a) $x^2 - y^2 = A$

(b) $x^2 + y^2 = A^2$

(c) $y = mx$

(d) $x = y^2 A$

4) A resistance of 50Ω , an inductance of 2 henries are connected in series with battery of 10 volts, then integrating factor of D.E. is

[2marks]

(a) e^{-25t}

(b) e^{250t}

(c) e^{25t}

(d) $\frac{t}{500}$

5) For the function $f(x) = \sin x$ in the interval $(0, 2\pi)$ the value of a_0 is

[2marks]

(a) $\frac{1}{\pi}$

(b) 2π

(c) 0

(d) $\frac{2}{\pi}$

6) The value of $\int_0^1 \frac{1}{2} dx$ is

[2marks]

(a) $\sqrt{\frac{\pi}{2}}$

(b) $\sqrt{\pi}$

(c) $\frac{1}{2}!$

(d) $\frac{\sqrt{\pi}}{2}$

7) The value of $\int_0^1 \frac{\log x}{\sqrt{x}} dx$ is

[2marks]

(a) 2

(b) -2

(c) $\sqrt{3}$

(d) -4

8) $\text{Er } f(\infty)$ is

[2marks]

(a) 0

(b) ∞

(c) +1

(d) -1

9) The vertical asymptote for the curve $x^2 y^2 = a^2 (x^2 + y^2)$ is

[2marks]

(a) $y = \pm a$

(b) $x = 0$

(c) $y = 0$

(d) $x = \pm a$

10) The curve $r = a(1 + \sin \theta)$ is symmetric about

[2marks]

(a) Initial line

(b) Pole

(c) Y axis

(d) None of these