Total No. of Questions – [05] Total No. of Printed Pages :02

G.R. No.	

Paper code - U119-109 (BE-FS)

DEC. 2019/END SEMESTER EXAM (Backlog)

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 where ever required**

Q.1) **a)** Find the center and radius of the circle $x^2+y^2+z^2+2x-2y-4z-19=0,\ x+2y+2z+7=0$. **[6 marks]**

b) Find the equation of the right circular cylinder of radius 2 whose axis whose axis lies along the straight line $\frac{x-1}{2}=\frac{y+3}{-1}=\frac{z-2}{5}$. **[6 marks]**

c) Find the equation of the right circular cone with vertex at $(1,2,-3)$, semi vertical angle $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ and the line $\frac{x-1}{2}=\frac{y-2}{2}=\frac{z+1}{-1}$ as axis. **[4 marks]**

OR

Q.2) **a)** Find the equation of the right circular cone which passes through the point $(1,1,2)$ has its axis the line $6x=-3y=4z$ and vertex at origin. **[6 marks]**

b) Find the equation of the right circular cylinder of radius 3 whose axis whose axis lies along the straight line $\frac{x-1}{2}=\frac{y-3}{2}=\frac{z-5}{-1}$. **[6 marks]**

c) Show that the plane $2x-2y+z+12=0$ touches the sphere $x^2+y^2+z^2-2x-4y+2z-3=0$ and find the point of contact. **[4 marks]**

Q.3) **a)** Change the order of integration and evaluate $\int_0^{\infty}\int_x^{\infty}\frac{e^{-y}}{y}dxdy$ **[6 marks]**

b) Evaluate $\iiint x^2yzdxdydz$ throughout the volume bounded by the plane $x=0,y=0,z=0,\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$. **[4 marks]**

c) Find the volume bounded by the cylinders $y^2 = x, x^2 = y$ and the planes $z = 0$ and $x + y + z = 2$. **[4 marks]**

OR

Q.4) a) Find the total area of the curve $r = a(1 + \cos\theta)$. **[6 marks]**

b) Evaluate $\iint_R \frac{x^2 y^2}{x^2 + y^2} dxdy$, where R is annulus between $x^2 + y^2 = 4$ and $x^2 + y^2 = 9$. **[4 marks]**

c) Evaluate $\iiint \frac{z^2 dxdydz}{x^2 + y^2 + z^2}$ over the volume of the sphere $x^2 + y^2 + z^2 = 2$. **[4 marks]**

Q.5) Multiple choice questions **(10 × 2 = 20 marks)**

1) The solution of Differential Equation $x\,dx + y\,dy = 0$ is

(a) $e^{-x^2} - 2y = c$ (b) $x^2 + y^2 = c$ (c) $x^2 - y^2 = c$ (d) None of these

2) The value of $\left|\frac{1}{2}\right.$ is

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

3) The value of erf(x) + erfc(x) is

(a) 1 (b) 2 (c) – 1 (d) 0

4) The value of integral $\int_0^\infty e^{-x} x^4\,dx$ is

(a) 120 (b) 24 (c) 6 (d) 720

5) The curve r = a sin 4θ is symmetrical about

(a) θ = a (b) $\theta = \frac{\pi}{2}$ (c) About pole (d) None of these

6) The value of $\int_0^{\pi/2} \cos x dx$

(a) 1 (b) $\frac{\pi}{2}$ (c) 0 (d) None of these

7) For the function $f(x) = x^2$ in the interval $-l \le x \le l$, the value of b_n is

(a) 0 (b) $\frac{4l^2(-1)^n}{n^2\pi^2}$ (c) $\frac{(-1)^n 4l^2}{n\pi}$ (d) $\frac{(-1)^n l^2}{n}$

8) The value of erf(∞) is

(a) 0 (b) 1 (c) -1 (d) None of these

9) The integrating factor for the DE $\frac{dy}{dx} + y = x$ is

(a) e^x (b) log $(x^2 + 1)$ (c) x (d) $1 + x^2$

10) If $f(x) = \int_0^x G(t)\,dt$ then $\frac{df}{dx}$ is

(a) G (x) (b) G'(x) (c) x^2 G (x) (d) None of these