CE/CHE/CS/EC/EE/EI/IT/ME 121 (MA02)

Hall Ticket Number:

I/IV B.Tech (Supplementary) DEGREE EXAMINATION

November, 2019 — **Common to all branches**

Second Semester — **Mathematics -II**

Time: Three Hours — **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a) Find the period of f(x) = k, a constant.

b) Find the coefficient a_0 in the Fourier series of $f(x) = \sin x$ defined in $(-\pi, \pi)$

c) Write the half range sine series for the function $f(x)$ in (0, L).

d) Find L(t^2)

e) Write inverse Laplace transform of $\frac{1}{s^2 + a^2}$

f) Define Unit step function.

g) Change the order of integration in $\int_0^a \int_0^b f(x, y)dxdy$

h) Find the area of the region bounded by $r_1 = f_1(\theta), r_2 = f_2(\theta) \,\&\, \theta_1 = \alpha, \theta_2 = \beta$

i) Evaluate $\int_0^a \int_0^b \int_0^c dxdydz$

j) Given $\overline{A} = x^2 y\, i - 2xz\, j + 2yz\, k$, find curl $\overline{A}$.

k) When a vector function is said to be solenoidal.

l) State Stoke's theorem.

UNIT I

2. a) Find the Fourier series of $f(x) = x^2$ in $-\pi < x < \pi$. (6M)

b) Find the half range cosine series of the function $f(x) = (x-1)$ in (0, 1). (6M)

(OR)

3. a) Find the Fourier Sine series of the function f(x) = sin x in (0, π). (6M)

b) Find the complex Fourier series of the periodic function $f(x) = e^x$ in $-\pi < x < \pi$ (6M)

UNIT II

4. a) Find the Laplace transform of (i) t sin 2t (ii) (1- cos t)/t (iii) e^{-2t} sin 2t cos t. (6M)

b) Using convolution theorem, find the inverse Laplace transform of $\frac{s}{(s^2 + a^2)^2}$. (6M)

(OR)

5. a) Find $L\left[\int_0^t e^{-2t}\frac{\sin 3t}{t}\,dt\right]$ (6M)

b) Using Laplace transform technique solve $(D^2+3D+2)y=e^t,\quad y(0)=1,\quad y'(0)=0$ (6M)

UNIT III

6. a) Change the order of integration and evaluate $\int_0^1\int_x^{\sqrt{x}} xy\,dydx$ (6M)

b) Find by triple integral, the volume of the sphere $x^2 + y^2 + z^2 = a^2$. (6M)

(OR)

7. a) Find the area lying between the parabola $y^2 = 4x$ and $x^2 = 4y$. (6M)

b) Evaluate $\int_0^a\int_0^x\int_0^{x+y} e^{x+y+z}\,dz\,dy\,dx$ (6M)

UNIT IV

8. a) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point (2, -1, 2). (6M)

b) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at P(1,2,3) in the direction of normal to the surface $xy^2z = 3$ at (1, -1, 1). (6M)

(OR)

9. a) Apply Gauss Divergence theorem to evaluate $\int_S \overline{F}.\overline{ds}$ where $\overline{F} = (x^2 - yz)I + (y2 - xz)J + (z^2 - xy)K$ where S is the surface bounded by $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$. (6M)

b) Apply Green's theorem to evaluate $\int_C [(xy + y^2)dx + x^2dy]$, where c is bounded by $y = x$ and $y = x^2$. (6M)