APPLIED MATHEMATICS-II

IInd Semester

Q-1 : Attempt any two questions are following. $[5 \times 2 = 10]$

(a) Evaluate : $\int \frac{dx}{\sin^2 x \cos^2 x}$

(b) Evaluate :- $\int \frac{dx}{\sqrt{25-x^2}}$

(c) Evaluate :- $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 dx$

(d) If $f(x)$ is an even function, then give the property for
$$\int_{a}^{a} f(x) \, dx$$

(e) Write the formula for $\int u(x) \cdot v(x) \, dx$

(f) Explain the two property of Definite Integral.

(g) The equation of a line is in the form of $x \cos \alpha + y \sin \alpha = p$
What are α and p

(H) find the value of $\int \frac{f'(x)}{f(x)} dx$

(I) what is the radius of of a Circle $x^2 + y^2 + 2gx + 2fy + c = 0$

(J) Directions ratio of a line are $-12, 6, -9$ find the direction
Cosine

(K) The Points are $(3, 4, -7)$ and $(7, -2, 4)$ find the distance
between two points

(L) What is direction Cosine of lines

Q2. Attempt ~~any two qu~~ any five parts of the following [5×2=10]

(a) $\int \dfrac{\cos 2x \, dx}{\sqrt{1+\sin 2x}}$, evaluate the integration

(b) Evaluate:- $\int \sin 4x \cos 6x \, dx$

(c) Evaluate:- $\int \tan x \, dx$

(d) Find the area of an ellipse $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=1$ using Integration

(e) Find the angle between lines
$\dfrac{x+3}{-2}=\dfrac{y-2}{4}=\dfrac{z-1}{3}$ and $\dfrac{x+1}{3}=\dfrac{y-3}{-2}=\dfrac{z-1}{4}$

(f) Find the equation of circle which touches both the axes and passes through the points $(1,2)$

(g) Prove the points $(-2,3,5)$, $(1,2,3)$ and $(7,0,-1)$ are Co-linear

Q.3. Attempt any two parts of the following [2×5=10]

(a) Evaluate $\int \dfrac{dx}{1+x+\sqrt{3}+x^2}$

(b) find the value of $\int_0^{\pi/4} \sqrt{1-\sin 2x} \, dx$

(c) Find the equation of circle with centre at $(2,-1)$ and touching the line
$x-y-6=0$

Q4. Attempt any two parts [2×5=10]

(a) Prove that $\int_0^{\pi/2} \log \cos x \, dx = -\dfrac{\pi}{2}\log 2$

(b) Find the length of arc of $y^2=4ax$ cut off by the latus rectum

(c) Curve are $y=x^{3/2}$ find the length between $x=0$ to $x=5$

Q.5. Attempt two Parts [2×5=10]
(a) Find the value of $\int_0^4 \dfrac{dx}{1+x^2}$ using Simpson rule where 0 to 4 are divided into four Parts

(b) Prove that $\int_0^\pi \dfrac{x \sin x}{1+\cos^2 x} \, dx = \dfrac{\pi^2}{4}$

(c) Evaluate $\int_0^1 \dfrac{1}{1+x} \, dx$ using Simpson's $\dfrac{1}{3}^{rd}$ rule upto three decimal places