

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD
(Department of Mathematics and Statistics)

WARNING

1. PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM AWARD OF DEGREE/CERTIFICATE, IF FOUND AT ANY STAGE.
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Course: Mathematics for Computing-II (3403)

Level: BS (CS)

Semester: Spring, 2013

Maximum Marks: 100

Pass Marks: 50

ASSIGNMENT No. 1

(Unit: 1–3)

Note: Attempt all questions, all questions carry equal marks.

Q.1 a) Evaluate $\int_{-1}^{\infty} \frac{x}{1+x^2} dx$

b) Evaluate $\int_0^4 \frac{dx}{(x-2)^{2/3}}$

c) Make the given substitution and evaluate the given integral:

$$\int_0^{\infty} \frac{e^{-x}}{\sqrt{1-e^{-2x}}} dx ; u = e^{-x}$$

Q.2 a) Find the value of a: $\int_0^{\infty} \frac{1}{x^2+a^2} dx = 1; a > 0.$

b) Find the Limit: $\lim_{x \rightarrow 0} \frac{e^x - 1}{\sin x}$

c) Find the Limit: $\lim_{x \rightarrow 0} \frac{xe^x}{1-e^x}$

Q.3 a) Find the Limit: $\lim_{x \rightarrow \infty} \frac{e^{5x}}{x^2}$

b) Determine whether the sequence: $\left\{ \left(1 - \frac{2}{n}\right)^2 \right\}_{n=1}^{\infty}$ converges or diverges if converges then find the limit.

c) Use any method to check the convergence or divergence of the sequence:

$$\left\{ \frac{n}{n^2 + 10} \right\}_{n=1}^{\infty}$$

Q.4 a) Apply ratio test to check the convergence or divergence of the series: $\sum_{k=1}^{\infty} \frac{4^k}{k^2}$.

b) Sketch the following conics and label the foci:

i) $9(x-1)^2 + 16(y-3)^2 = 144$ ii) $\frac{(x+3)^2}{16} + \frac{(y-5)^2}{4} = 1$

Q.5 Let $x'y'$ - coordinate system is obtained by rotating an xy - coordinate system through an angle of 60° :

a) Find the $x'y'$ - coordinates of the point whose xy - coordinate is $(-2,6)$?

b) Find an equation of the curve $\sqrt{3}xy + y^2 = 6$ in $x'y'$ - coordinates?

c) Sketch the curve in part (b)?

ASSIGNMENT No. 2

(Unit: 1-3)

Maximum Marks: 100

Pass Marks: 50

Note: Attempt all questions, all questions carry equal marks.

Q.1 a) Express the equation $(x^2 + y^2)^2 = 16(x^2 - y^2)$ in polar coordinates.

b) Sketch the following curves and identify their names:

i) $r = 3(1 - \sin \theta)$ ii) $r = 4 \cos \theta + 4 \sin \theta$

Q.2 a) Find the area of the region inside the circle $r = 5 \sin \theta$ and outside the limaçon $r = 2 + \sin \theta$.

b) Find the arc length of the curves given as follows:

i) $x = \cos^3 t; y = \sin^3 t$ where: $0 \leq t \leq \frac{\pi}{2}$

ii) $x = 2 \cos t; y = \sin t$ where: $0 \leq t \leq 2\pi$

Q.3 a) Find the standard equation of the sphere satisfying the following given conditions:

i) Sphere with Center $(1, 0, -1)$ and Diameter = 8

ii) Sphere with Center $(-1, 3, 2)$ and passing through origin: $(0, 0, 0)$.

b) Describe the surface whose equation is: $2x^2 + 2y^2 + 2z^2 - 2x - 3y + 5z = 2$.

Q.4 a) Determine whether \mathbf{r} given as: $\mathbf{r}(t) = t^3\hat{i} + (3t^2 - 2t)\hat{j} + t^2\hat{k}$ is a smooth function of the parameter t ?

b) Find the unit tangent vector \mathbf{T} and the unit normal vector \mathbf{N} to $\mathbf{r}(t) = t\hat{i} + \frac{1}{2}t^2\hat{j} + \frac{1}{3}t^3\hat{k}$ at $t=0$.

c) Find an equation of the plane passing through the points: $(-2, 1, 1)$, $(0, 2, 3)$ and $(1, 0, -1)$.

Q.5 a) Find the parametric equations that correspond to the given vector equations:

- i) $\mathbf{r}(t) = 3t^2\hat{i} + 2\hat{j}$
ii) $\mathbf{r}(t) = te^{-t}\hat{i} - 5t^2\hat{k}$.
- b) Find f_{xx} , f_{yy} , f_{xy} and f_{yx} for $f(x, y) = \ln(5x^2 - xy + y)$.
- c) Find the gradient of $f(x, y) = (x^2 + xy)^3$; at the point $P(-1, -1)$.