

(i) Printed Pages : 3

Roll No.

(ii) Questions : 8 Sub. Code :

1	7	5	4	1
---	---	---	---	---

Exam. Code :

0	0	0	6
---	---	---	---

B.A. / B.Sc. (General) 6th Semester

(2056)

MATHEMATICS

Paper-I : Analysis-II

Time Allowed : 3 Hours]

[Maximum Marks : 30

Note :- Attempt **five** questions in all, selecting at least **two** questions from each unit.

UNIT-I

1. (a) Show that $f(x, y) = 2$ defined on $A = \{(x, y) \mid 1 \leq x \leq 2; 3 \leq y \leq 4\}$ is integrable over A.

(b) Evaluate $\iint_A (xy) \, dx \, dy$; where A is the domain bounded by the x-axis, ordinate $x = 2$, and the arc of parabola " $x^2 = 4ay$ ". 3+3=6

2. (a) Find the area enclosed by the cardioid $r = a(1 - \cos \theta)$.

(b) Find the volume of the tetrahedron bounded by planes $x = y = z = 0; 2x + 3y + 4z = 1$. 3+3=6

3. (a) Evaluate $\int_0^a \int_{\sqrt{ax}}^a \frac{-y^2 dy dx}{\sqrt{y^2 - a^4 x^2}}$.

(b) Evaluate $\int_C \vec{F} \cdot d\vec{r}$; where $\vec{F} = x^2 \hat{i} + y^3 \hat{j}$ and curve C is the parabola $y = x^2$ in the xy plane from (0, 0) to (1, 1).

4+2=6

4. Verify Gauss divergence theorem for $\vec{F} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$ taken over the rectangular parallelepiped $0 \leq x \leq a$; $0 \leq y \leq b$; $0 \leq z \leq c$. 6

UNIT-II

5. Use Mn-test to test the sequence $\{f_n(x)\}$; where $f_n(x) = \frac{nx}{1+n^3x^2}$ for uniform convergence on $[0, 1]$. 6

6. (a) Prove that the sum function of a uniformly convergent series of continuous functions is continuous itself.

(b) Use Dirichlet's test to show that the series $\sum_{n=1}^{\infty} \frac{\cos nx}{n}$ converges uniformly in $(0, 2\pi)$. 3+3=6

7. (a) Find the interval of convergence of the power series

$$\sum_{n=1}^{\infty} \left(\frac{3}{4}\right)^n \frac{x^n}{n}.$$

- (b) Show that the series for which the sum of the first "n" terms

$$f_n(x) = \frac{1}{1+nx}$$
 can be integrated term by term on $[0, 1]$

though it is not uniformly convergent on $[0, 1]$. $2+4=6$

8. (a) Find the Fourier series of $f(x) = x$ in $[-\pi, \pi]$.

- (b) Find the half range cosine series for $f(x) = x^2$ in $[0, \pi]$.

$3+3=6$