

Internal Assessment
M.A./ M.Sc. Semester-II Examination,2019(DDE)
Subject: Mathematics (Old Pattern)

Use separate answer-sheet for each paper (**Answer of each paper should be limited to one A4 size page**)
Notations and symbols have their usual meanings

Time: 2 Hours

Full Marks: 20

Paper : MCG 201
Unit-I (Complex Analysis-II)

Answer any **one** question. Only **first** answer will be evaluated.

1×3 = 3

1. Prove that the function $\frac{z}{(1-z)^2}$ is simple within the unit circle.
2. Show that the transformation $\omega = \frac{1+z^2}{1-z^2}$ maps the interior of the positive quadrant of the unit circle in the z -plane conformally on the interior of the positive quadrant of the ω -plane.

Unit- II (Real Analysis-II)

Answer any **one** question. Only **first** answer will be evaluated.

1×2 = 2

1. Evaluate $L-\int_0^1 f dx$, where $f: [0,1] \rightarrow \mathbb{R}$ is given by
$$f(x) = \begin{cases} x & \text{if } x \text{ is rational} \\ x^2 & \text{if } x \text{ is irrational} \end{cases}$$
2. Let f be a measurable function on a measurable set E . If f is Lebesgue integrable on E , then prove that f is real valued almost everywhere on E .

Paper : MCG 202
Unit- I (Partial Differential Equations)

Answer any **one** question. Only **first** answer will be evaluated.

1×3 = 3

1. Find the equation of the Monge cone for the Partial Differential Equation $p^2 + q^2 = 1$.
2. Verify that the equation $z(z + y^2)dx + z(z + x^2)dy - xy(x + y)dz = 0$ is integrable.

Unit- II (Differential Geometry)

Answer any **one** question. Only **first** answer will be evaluated.

1×2=2

1. Define curvilinear coordinate system in E^3 . Obtain a necessary and sufficient condition for a curvilinear coordinate system to be orthogonal. (1+1)
2. Prove that the intrinsic derivative of an invariant coincides with its total derivative.

Paper : MCG 203
Unit- I (Operations Research-II)

Answer any **one** question. Only **first** answer will be evaluated.

1×3=3

1. Mention the principal assumptions made while dealing with sequencing problem.
2. In view of network technique, explain the term: total float, free float, independent float.

Unit- II (Principle of Mechanics-II)

Answer any **one** question. Only **first** answer will be evaluated.

1×2=2

1. State the postulates of special theory of relativity .
2. (a) Under what conditions do the special Lorentz transformation reduce to Galilean transformation .
(b) Write down the expression of coriolis force . (1+1)

Paper : MCG 204

Unit- I (Computer Programming)

Answer any **one** question. Only **first** answer will be evaluated.

1×3=3

1. What are the differences between function subprogram and subroutine subprogram .
2. Write a C-program for finding the real roots of a quadratic equation $ax^2 + bx + c = 0$.

Unit- II (Continuum Mechanics-I)

Answer any **one** question. Only **first** answer will be evaluated.

1×2=2

1. (a) State the principle of balance of angular momentum .
(b) What do you mean by a rigid body motion . (1+1)
2. (a) Write down the equation of continuity in Eulerian form .
(b) State Reynold's transport theorem for a material volume property . (1+1)