M.A./ M.Sc. Semester-I Examination,2019(CDOE,BU) SUBJECT: MATHEMATICS(OLD)

Answer of MCG101 (Group A & B) together should be limited to one A4 size page, Answer of MCG102 (Group A & B) together should be limited to one A4 size page, Answer of MCG103 (Group A & B) together should be limited to one A4 size page, Answer of MCG104 (Group A & B) together should be limited to one A4 size page, Answer of MCG105 (Group A & B) together should be limited to one A4 size page,

Notation and symbols have their usual meaning.

TIME: 2 HOURS

Full Marks: 25

Paper :mcG101

(Group-A) (Functional Analysis-I)

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

- **1.** Show that in an inner product space *X*, every Cauchy sequence is bounded.
- 2. If T is an isomorphism of a linear space X onto another linear space W, then show that T has an inverse T^{-1} , which is an isomorphism of W onto X.

(Group-B) (Real Analysis-I)

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

- 1. What do you mean by a function of bounded variation .
- **2. Evaluate the integral if exists** $\int_0^1 x d(e^x)$ **.**

Paper:MCG102

(Group-A) (Linear Algebra)

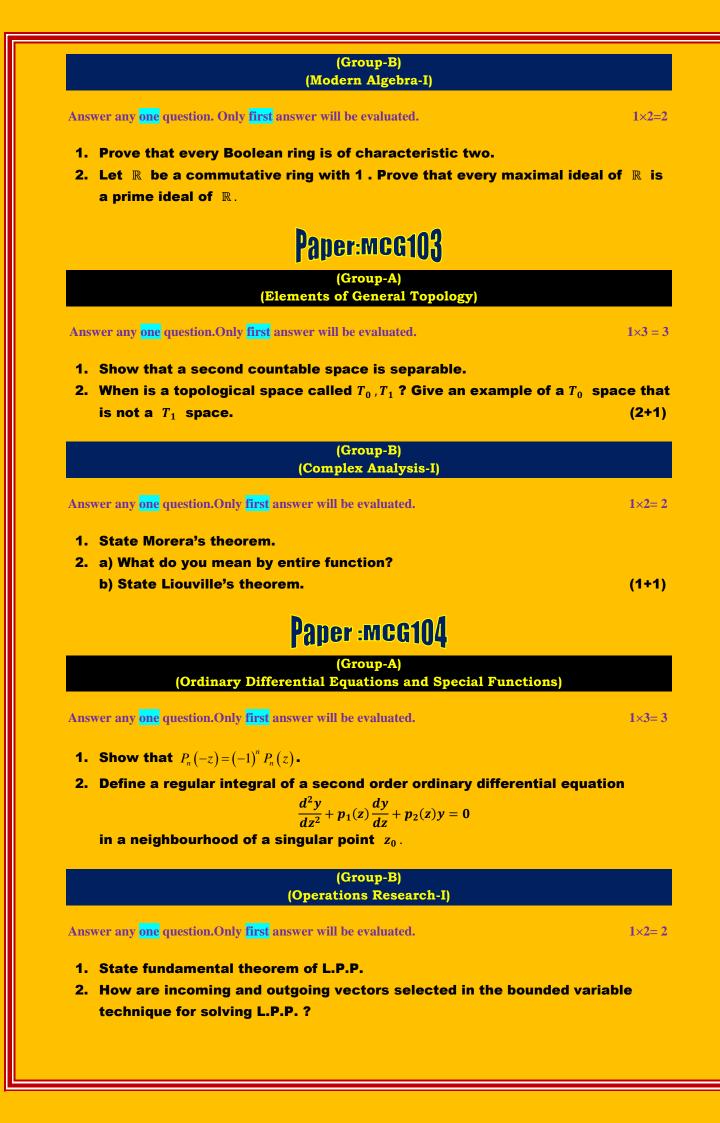
Answer any one question. Only first answer will be evaluated.

- **1.** Prove that an orthonormal set of vectors in a Euclidean space is linearly independent.
- 2. Determine the linear mapping $T: \mathbb{R}^3 \to \mathbb{R}^2$ which maps the basis vectors (1,0,0), (0,1,0), (0,0,1) of \mathbb{R}^3 to the vectors (1,1), (2,3), (3,2) respectively. Findalso *KerT*. (2+1)

 $1 \times 3 = 3$

 $1 \times 3 = 3$

 $1 \times 2 = 2$



Paper :mcG105

(Group-A) (Principle of Mechanics-I)

Answer any <mark>one</mark> question.Only <mark>first</mark> answer will be evaluated.	1×3= 3
 What do you mean by cyclic coordinates? Show that, the generalized momentum conjugate to a cyclic coordinate is a constant of motion. Define Canonical transformation. Give an example of a phase-space 	(1+2)
transformation which is not canonical .	(2+1)
(Group-B) (Numerical Analysis)	
Answer any <mark>one</mark> question.Only <mark>first</mark> answer will be evaluated.	1×2= 2
1. Define the Tchebychev's polynomial of degree <i>n</i> over the interval [-1,	,1] .
What are its extreme values ?	(1+1)
2 Obtain an expression for the error in Gaussian quadrature formula	