

M.A./M.Sc. Semester II Examination, 2019 (under DDE)

Subject: Mathematics

Paper: MCG 204

Time: 2 Hours

Full Marks: 45

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

[Notation and symbols have their usual meaning]

Write the answer to Questions of each Group in separate books.

Group - A (Computer Programming)

(Marks: 27)

Answer any **three** questions. Only **first three** answers will be evaluated.

9×3 = 27

- 1 (a) Discuss COMMON statement in F-77. [4]
(b) Write the syntaxes of 'function' and 'subroutine' subprograms in F-77. Give examples of each. [5]
- 2 (a) Discuss different types of variables used in C. [4]
(b) Write a F-77 subroutine subprogram to multiply a matrix A of order $L \times M$ with a matrix B of order $M \times N$. [5]
- 3 What is looping structure in programming language? Discuss any two looping structures in C. [3+6]
- 4 (a) Explain scanf() and printf() functions with examples. [4]
(b) Write a C-program to compute all the Fibonacci numbers less than 50. [5]
- 5 (a) Write a F-77/C program for calculating the mean and variance for N-given data $x_1, x_2, \dots, x_N$. [5]
(b) Write short notes on any two of the following: [4]
(i) switch statement, (ii) recursive function,
(iii) break statement, (iv) DIMENSION statement.

Group - B (Continuum Mechanics)

(Marks: 18)

Answer any **two** questions. Only **first two** answers will be evaluated.

9×2 = 18

- 1 Show that in case of infinitesimal deformation, the distinction between the Eulerian and Lagrangian strain components disappear. [9]
- 2 State the first fundamental principle of Continuum Mechanics. Hence show that this principle leads to the equation of continuity. [1+8]

3

Given the following stress distribution

[9]

$$(T_{ij}) = \begin{bmatrix} a & -b & 0 \\ -b & 0 & -a \\ 0 & -a & T \end{bmatrix},$$

find T such that stress distribution is in equilibrium with body force $\vec{F} = (0, 0, -g)$.