

# COMBINED COMPETITIVE EXAMINATION (MAIN)

## MECHANICAL ENGINEERING

### Paper—I

Time : 3 hours

Full Marks : 200

**Note :** (1) The figures in the right-hand margin indicate full marks for the questions.

(2) Attempt **five** questions in all.

(3) Question No. 1 is compulsory.

1. Answer any ten of the following : 4×10=40

- (a) What is cam? What type of motions can be generated through the cam-follower mechanism?
- (b) Define open and closed loop controls along with some examples.
- (c) What is ductility and how is it measured?
- (d) Write the appropriate relations among the elastic constants used to determine the deformations produced in materials under the action of stress systems.
- (e) State the distortion energy theory used for checking the failure condition of a material under loading.
- (f) What are the mechanical properties that can be improved in a material by alloying it with some other materials?
- (g) Draw (112) and (101) planes in unit cubic cells in the case of face-centred cubic structure of materials.
- (h) Explain the importance of non-conventional machining processes.
- (i) What are the important factors to be considered in analysing the economics of machining?
- (j) Describe the main phases of production planning and control.

