QUANTITY PRODUCTION METHOD
(MECH 4241)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Gear cutting by hobbing can be classified as
(a) rolling process (b) forming process
(c) broaching (d) generation process.

(ii) Quantity production of small shaft like component is best done using
(a) single or multi-spindle automat (b) milling machine
(c) general purpose lathe (d) machining centre.

(iii) For quantity production of bolts, threading can be done by
(a) rolling (b) broaching
(c) grinding (d) forging.

(iv) Eccentric pin of a Crank shaft can be machined by
(a) turning (b) milling
(c) turn Broaching (d) all of above.

(v) Final operation in the track of a Ball Bearing is
(a) grinding (b) super finishing
(c) turning (d) rolling.

(vi) Which one of the following material cannot be machined by EDM?
(a) Mild steel (b) Alumina
(c) Copper (d) Aluminium.

(vii) When inspection of all products become impossible in mass production, following process is used
(a) group technology (b) quality function deployment
(c) statistical quality control (d) total Productivity management

(viii) Flexible manufacturing lines are characterized by presence of
(a) machines with jigs and fixture that can be quickly reset
(b) CNC machines
(c) robots
(d) all of the above.

(ix) 3-2-1 location principle is used for
(a) design of machine tools (b) process planning
(c) quality control (d) design of fixture.

(x) Tool inserts are usually made by
(a) casting (b) explosive forming
(c) bulging (d) powder metallurgy.

Group- B

2. (a) Mention the factors that influence the choice of a "Manufacturing System". [(CO1)(Remember)/LOCQ]
(b) Discuss the characteristics, merits and demerits of Just-In-Time production. [(CO1)(Understand)/LOCQ]
6 + 6 = 12

3. Briefly describe the following Bulk Deformation Processes with a suitable sketch. Name a suitable product made by each of these following processes:
(i) Closed Die Forging [(CO1)(Remember/LOCQ)]
(ii) Extrusion [(CO1)(Remember/LOCQ)]
(iii) Wire drawing. [(CO1)(Remember/LOCQ)]
(4 + 4 + 4) = 12

Group - C

4. (a) Describe with a neat sketch the production sequence of a crank shaft. [(CO3)(Understand)/IOCQ]
(b) Explain with sketches the steps for production of 'Inner Race' of a Ball Bearing from a pipe as raw material. [(CO3)(Analyze/IOCQ)]
6 + 6 = 12

5. (a) Describe with neat sketch the steps of quantity production of 'Hexagonal Bolts' from raw material. [(CO3)(Remember/LOCQ)]
(b) Explain the process of production of spur gears by "Gear Shaping". While doing so, explain the cutting process with sketch of the following:
(i) the shape of the cutting tool
(ii) relative position of cutter and gear blank
(iii) motions of the cutter and the job. [(CO3)(Evaluate/HOCQ)]
6 + 6 = 12

Group – D

6. (a) What is the purpose of "Process Planning"? List the information that should appear in a process planning sheet. [(CO4)(Analyse/IOCQ)]
   (b) Explain the concept of "Group Technology". Name two classifications used in Group Technology and their respective attributes. [(CO4)(Evaluate/HOCQ)]
   6 + 6 = 12

7. (a) What is a Jig and what is a fixture? Explain with suitable sketches. [(CO5)(Remember/LOCQ)]
   (b) With regard to Fixture Design, define and explain what is (i) Location Surface (ii) Support Surface and (iii) Clamping Surface. [(CO5)(Analyse/IOCQ)]
   6 + 6 = 12

Group - E

8. (a) Identify and briefly describe the three basic components of a numerical control system. [(CO5)(Remember/LOCQ)]
   (b) Briefly explain the functions of four major components of an Industrial Robot. [(CO5)(Understand)/HOCQ)]
   6 + 6 = 12

9. (a) Mention the advantages of Powder Metallurgy over Conventional Metal Fabrication Techniques. [(CO6)(Analyze)/IOCQ]
   (b) Discuss in brief the steps of production of Ceramic Products. [CO6)(Remember)/LOCQ]
   6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	50	31.25	18.75

Course Outcome (CO):

After completion of the course, the students will be able to:

CO1 Plan and implement various manufacturing systems and processes

CO2 Apply mass manufacturing knowledge for manufacturing common engineering items.

CO3 Apply different production process knowledge for manufacture of complex engineering items.

CO4 Improve productivity and quality through application of planning, group technology and quality control.

CO5 Improve productivity through application of automation, robots and CNC machines in production.

CO6 Implement various non-conventional and emerging production techniques

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question