MANUFACTURING PROCESSES
(MEC2204)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) The purpose of the riser in the sand casting process is
(a) To provide a passage for molten metal to enter the mould cavity
(b) To cool the molten metal before it enters the mould cavity
(c) To compensate for shrinkage defects in the casting
(d) To direct the flow of molten metal away from the mould cavity

(ii) The taper provided on pattern for its ease and clean withdrawal from the mould is called
(a) Distortion allowance
(b) Draft allowance
(c) Shrinkage allowance
(d) Taper allowance

(iii) Use of runner, risers and cores are eliminated in
(a) Centrifuged casting
(b) Die casting
(c) Permanent mould casting
(d) Semi permanent mould casting

(iv) The purpose of using a flux in arc welding is
(a) To provide heat insulation
(b) To remove impurities from the base metal
(c) To control the flow of gas
(d) To regulate the welding current

(v) Weld spatter refers to
(a) Flux
(b) Filler material
(c) Welding defects
(d) Weld shield

(vi) The strength of the welded joint reduces due to
(a) Undercut
(b) Lack of fusion
(c) Lack of penetration
(d) All of these

(vii) The primary advantage of cold rolling over hot rolling is
(a) Higher production speed
(b) Reduced energy consumption
(c) Improved material ductility
(d) Enhanced surface finish

(viii) The important property of a material in all metal forming process is
(a) Plasticity
(b) Elasticity
(c) Ductility
(d) Brittleness

(ix) A cutting tool can never have its
(a) Rake angle – positive
(b) Rake angle – negative
(c) Clearance angle – positive
(d) Clearance angle – negative

(x) Positive rake angle on the cutting tool is provided for
(a) Reducing cutting forces
(b) Improving dimensional accuracy
(c) Strengthening cutting tool
(d) Improve surface finish

Fill in the blanks with the correct word

(xi) The material used for making the pattern in sand casting is typically _____.

(xii) The two main gases used in gas welding are _____ and _____.

(xiii) _____ is a forming process where a metal billet is forced through a die to create a desired shape.

(xiv) In machining, built-up-edge develops at the chip tool interface mainly due to_____.

(xv) Machining of mild steel yields _____ type of chip

Group - B

2. (a) State the names of different pattern allowances that are commonly used in casting. Briefly describe any one allowance with proper examples.
[(CO2)(Apply/IOCQ)]

(b) Describe the term gating system related to casting and also explain the function of each component within a gating system. *[(CO2)(Understand/LOCQ)]*

(2 + 4) + (2 + 4) = 12

3. (a) How effective are die casting and centrifugal casting methods in producing high-quality components for various industrial applications? *[(CO2)(Evaluate/HOCQ)]*

(b) Explain the underlying causes and remedial measures behind cold shut and misrun types of casting defects. *[(CO2)(Apply/IOCQ)]*

6 + 6 = 12

Group - C

4. (a) What are the advantages and limitations of TIG, MIG welding methods in terms of productivity, weld quality and applicability to different materials? *[(CO3)(Analyse/IOCQ)]*

(b) Write down the principle and application areas of the resistance welding process? *[(CO3)(Remember/LOCQ)]*

6 + 6 = 12

5. (a) Differentiate between constant current and constant voltage power source characteristics with their applications. *[(CO3) (Analyze/IOCQ)]*

(b) Name any four kinds of joints that are normally employed for welding purposes and also give their sketches. *[(CO3) (Remember/LOCQ)]*

6 + 6 = 12

Group - D

6. (a) What are the differences between cold and hot working processes? *[(CO4)(Understand/LOCQ)]*

(b) How does the forging process differ from other manufacturing techniques? *[(CO4)(Understand/LOCQ)]*

6 + 6 = 12

7. (a) In a single flat rolling operation a 400 mm wide steel strip having thickness of 10 mm is reduced to 8 mm by using rolls of diameter 600 mm. Find the contact length of the roll strip with the workpiece. *[(CO4) (Evaluate/HOCQ)]*

(b) Compare between wire drawing and extrusion with respect to their principles and applications. *[(CO4) (Analyze/IOCQ)]*

6 + 6 = 12

Group - E

8. (a) State the advantages of positive rake angle, negative rake angle and clearance angle provided for machining ductile metals. *[(CO5)(Understand/LOCQ)]*

(b) During machining of C-20 steel with a carbide cutting tool 0^0 10^0 6^0 6^0 8^0 75^0 0 (mm) configuration shape with a feed of 0.2 mm/rev. and depth of cut of 2mm at a cutting speed of 140m/min, a chip thickness of 0.36 mm has been obtained. Calculate the chip reduction coefficient and shear angle. *[(CO2)(Evaluate/HOCQ)]*

6 + 6 = 12

9. (a) Explain the mechanism of chip formation for ductile and brittle materials and the types of chip with suitable diagrams. *[(CO6)(Analyse/IOCQ)]*

(b) Define ‘chip reduction coefficient’ and ‘cutting strain’ related to chip thickness and explain why the value of chip reduction coefficient is generally greater than 1.0? *[(CO6)(Remember/LOCQ)]*

6 + (4 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	43.75	37.50	18.75