Ref. No. : Ex/ME/T/226/2017

BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING EXAMINATION, 2017

(2nd Year, 2nd Semester)

MANUFACTURING PROCESS

Time: 3hrs. Full Marks: 100

Answer *five (05)* questions taking at least *two (02)* from each Part

Use pencil for drawings.

The figures in the margin indicate full marks.

Use separate Answer-Script for each Part

PART I

1. (a) Answer the following:

(i) CO_2- molding is specially used for.....(ii) Hot blast cupola uses..... (iii) Arc furnace may be either .....lining or .....lining. (iv) 'Antioch' is a process of .....followed by .....(v) Radioactive materials can be casted by ..... casting process (vi) sprue pins are used for .....and .....[6×1.5 = 9]

(b) Draw neat diagrams of: (i) cover core (ii) casting defect 'honey combing' (iii) external and internal chills (iv) splash core and skim bob. [4 × 2= 8]

(c) Discuss on 'pressurized' and 'non-pressurized' gating systems. [3]

2. (a) 'Molten metal stored in riser should be solidified last'- discuss clearly.
A sphere, a cube and a cylinder with a height equal to its diameter have the same volume. Which one should be used as a riser? Justify your answer considering solidification times of each. [10]

(b) Drawing a neat diagram and mentioning the important advantages and limitations discuss about shell molding process. [10]

3. (a) How the property 'permeability' of molding sand is measured in the laboratory? Discuss with a lucid diagram in this regard. [12]

(b) Drawing figures, where necessary, discuss about different pattern making allowances. Mention about some important pattern making materials. [8]

4. (a) Define the terms 'core', 'core prints' and 'chaplets'. Discuss with adequate figures. [6]
(b) What are the desirable properties of a good core making sand? [4]
(c) Following sand testing data have been given:

[Turn over

Sieve no.:	6	12	20	30	40	50	70	100	140	200	270	Pan
Wt. retained (gm):	--	--	--	2.0	4.7	7.3	14.8	16.2	3.4	1.1	0.2	0.1
Multiplier:	3	5	10	20	30	40	50	70	100	140	200	300

Find out the grain fineness number. Also draw the histogram of percentage retained in each sieve. [10]

5. (a) Drawing a neat diagram discuss about different portions of an anvil, mentioning their functions as well as materials. [10]

   (b) What is meant by 'draft in rolling'? Drawing an adequate diagram prove the relationship amongst the draft, roll radius and projected length. [10]

6. (a) Drawing necessary graph discuss about the relation between die angle and force during forward extrusion. Discuss about each of the forces in details. [6]

   (b) Deduce the expression of coefficient of spread as given by Tomlinson and Stringer. [6]

   (c) What is 'deep drawing operation' and 'hot draw bench'? How the total force requirement in deep drawing can be calculated? Discuss with adequate formula and explaining the legends involved therein. [8]

7. (a) How arc is established in between the electrodes during arc welding? Discuss in the light of electron theory of arc column. [6]

   (b) What is meant by DCSP and DCRP? Discuss clearly drawing adequate figures and stating the application area. [4]

   (c) Drawing explanatory figures discuss about butt welding. [5]

   (d) How acetylene gas is preserved in gas cylinder and why? [5]

8. (a) Write explanatory notes on: (i) MIG or TIG welding (ii) barrelling during upsetting (iii) fuel in open hearth furnace. [3×5=15]

   (b) What is 'rapid prototyping' and 'reverse engineering'? Explain the concept of generative or additive manufacturing process. [5]

PART II

9. (a) What is expendable pattern ? Discuss the casting process in detail where expendable pattern is used

3 + 7 = 10

(b) Give at least five reasons as sand is used primarily as molding material. Explain the term Permeability , Green Compressive Strength , Green Hardness , Compatibility of molding sand 5 + 5 = 10

10. (a) Draw a neat sketch of a Feeding System of a casting of simple shape. What is pressurized and non-pressurized gating system ? How it affects on the soundness of a casting? 4 + 4 + 4 = 12

(b) What is Riser or Feeder in casting ? What is the use of it ? What is the best shape of riser ? How it affects on the overall yield of the casting? 2 + 2 + 2 + 2 = 8

11. (a) Draw a neat sketch of a Cold Blast Cupola or Induction Furnace with proper labeling and discuss its operation in brief. 10

(b) Explain the causes of following casting defects (give figures where applicable).

(i) Cold Shut (ii) Mismatching (iii) Shrinkage (iv) Pin hole porosity (v) Sand Penetration 10

12. (a) What is draught in rolling? Explain the effect of die angles with extrusion

pressure in extrusion process with suitable explanations. 2 + 8 = 10

(b) What type of rolling mill would be suggested for cold rolling of mild steel? Draw the schematic diagram of suitable rolling stands for the purpose. 10

13. (a) Broadly classify different types of welding processes . Explain different types of flames in gas welding with suitable sketches. 10

(b) What is TIG welding process? Mention its advantages and disadvantages over MIG welding process. 4 + 6 = 10

14. Write short notes on :
(a) Deep Drawing (b) Press Tool (c) Spinning (d) Drop Forging 20

15. What are the differences between : (Any four) 20

(a) Destructive& Non Destructive Testing of castings(b) Lost foam process & Investment Casting Process (c) Hot & Cold working (d) Pressure Die casting & Gravity Die Casting (e) Brazing & Soldering (f) Direct & Indirect Extrusion