

**MECHANICAL ENGINEERING DEPARTMENT**

**B.E. MECHANICAL ENGG. 2<sup>nd</sup> Year, 2<sup>nd</sup> Semester Exam 2023**

**Time: 3 Hours**

**Full Marks: 100**

**SUB.- MANUFACTURING PROCESS**

Answer all the parts of a question together (that is, in one place only)  
Draw suitable diagram wherever required (preferably by pencil)

*The figures in the margin indicate full marks.  
Answer any 05 (five) questions of the following.*

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1. (a) What is meant by permeability of moulding sand? How this property is tested in the laboratory? [2+4]  
(b) Calculate the permeability number of sand if it takes 1 min 35 sec to pass 2000 cm<sup>3</sup> of air at a pressure of 6 g/cm<sup>2</sup> through the standard sample. 4  
(c) Define core & core print in casting with figures. 4  
(d) What are the functions of riser? 3  
(e) Why sprue pins are made tapered? 3
2. (a) Why allowances are given on a pattern? Explain different types of allowances to be given on pattern. [2+6]  
(b) Explain four (04) major patterns in details with figures. 8  
(c) Name some important pattern materials stating their advantages and limitations. 4
3. (a) A cube and a sphere have equal volumes. Which one will be the ideal riser and why? Justify your answer considering the solidification times of each geometrical shape. 6  
(b) Drawing a figure discuss about 'stop off'. 2  
(c) Write brief note on color coding of pattern. 3  
(d) Drawing an explanatory diagram discuss how chaplets are used. 2  
(e) Drawing explanatory figure discuss about an electric induction furnace. Mention its advantages and limitations. 4  
(f) State major advantages and limitations of precision or investment casting process. 3
4. (a) Explain briefly the following welding processes with diagram (any two): [6+6]  
(i) SAW (ii) TIG (iii) Atomic Hydrogen welding  
(b) What are the functions of a coating material in an electrode? Mention some important coating materials. 4  
(c) Explain clearly the process of soldering and brazing?

OR

[ Turn over

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- How acetylene gas is preserved in cylinder? Why copper is not to be used with acetylene? 4
5. (a) Discuss about flash butt and upset butt welding. 5  
 (b) How electric arc column is established in between electrodes during arc welding? Discuss as per electron theory. 5  
 (c) Write a brief note on flame cutting. 4  
 (d) Discuss about a welding process which may be pressure as well as fusion type both and which receives heat from some chemical reaction. 6
6. (a) (i) Drawing a neat and labeled diagram discuss about deep drawing operation (ii) What is conventional redrawing, reverse redrawing and ironing? Discuss with adequate figures (iii) Draw the figures of common defects in drawing operation (iv) What is 'hot draw bench'? [3+6+2+1]  
 (b) A cup of outside diameter 170 mm is to be produced from a 1.5748 mm thick EDDQ steel. The height of the cup should be 95 mm. Assume both the ultimate tensile stress and compressive stresses of the material as 43 kgf/mm<sup>2</sup>. A constant of 0.6 may be assumed to take care of friction and bending. Die clearance is approximately 10% of the work material thickness. What is the blank diameter and total press force required for the operation? 8
7. (a) Drawing adequate diagram discuss about 'machine forging'. 3  
 (b) Write a brief note on 'forging fibers'. 2  
 (c) What is 'pancaking' and forge ability? [2+1]  
 (d) Drawing a neat and labeled diagram discuss about 'Anvil'. Mention clearly about the materials and functions of the different portions of an anvil. 4  
 (e) Show that the strip velocity at exit is much higher than that of at entry during a flat rolling operation. Determine the maximum possible reduction in thickness for cold rolling of a 300 mm thick slab when coefficient of friction is 0.08 and the roll diameter is 600 mm. What will be the reduction for hot rolling operation when coefficient of friction is 0.5? [4+4]
8. Write short notes on (any 04):  
 (a) Backward extrusion (b) Properties of moulding sand (c) Major casting defects (d) Differences between hot and cold working of metals (e) Roll piercing (f) metal spinning 4x5