

GANPAT UNIVERSITY**B. Tech. Semester: V (Mechatronics Engineering)****Regular Examination Nov – Dec 2015****2MC 501: Casting and Machining Processes****Time: 3 Hours****Total Marks: 70**

- Instruction:**
- 1 Attempt all questions.
 - 2 Figure to the **right** indicate full marks.
 - 3 Assume suitable data if **necessary**.
 - 4 Draw neat **sketch** whenever essential.

Section - I

- Que. – 1**
- (a) How gases are formed in casting and how can these be eliminated? **4**
 - (b) Define permeability and permeability number. Describe the method for determining the permeability number of any moulding sand. **4**
 - (c) Derive the expression for the time taken to fill mould cavity in bottom gating system. **4**

OR

- Que. – 1**
- (a) Explain briefly “CO₂ moulding process”. What are the characteristics of sand casting? **4**
 - (b) A certain mould has a sprue whose length is 20 cm and the cross sectional area at the base of sprue is 2.5 cm². The sprue feeds a horizontal runner leading into a mould cavity whose volume is 1560 cm³. Determine **4**
 - (i) Velocity of the molten metal at the base of the sprue.
 - (ii) Volume rate of flow
 - (iii) Time to fill the mould
 - (c) What is Gating ratio? Explain the unpressurized and pressurized gating system with neat sketch. **4**

- Que. – 2**
- (a) Explain briefly the following: **5**
 - (i) Solidification of pure metals
 - (ii) Dendritic solidification
 - (b) Design top and bottom risers for Aluminium casting cube of 15 cm if the shape of riser is cylindrical and volume shrinkage is 6.5 %. **6**

OR

- Que. – 2**
- (a) Two solid workpieces (i) Sphere with radius R, (ii) a cylinder with diameter equal to its height, have to be sand cast. Both workpieces have the same volume. Show that the cylindrical workpieces will solidify faster than the spherical workpieces. **4**
 - (b) What is Aspiration effect? Derive the expression for the Aspiration effect. **4**
 - (c) Write a short note on “Defects in sand casting”. **3**

- Que. – 3** Write short notes on the following: (Any three) **12**
- (a) Centrifugal casting

- (b) Cupola Furnace
- (c) Nucleation and Growth.
- (d) Gating system

Section – II

- Que. – 4 (a) Estimate the time required for one complete cut on a work piece of length 600mm and diameter 60mm by cutting tool which operates at 30m/min. Take feed to be 0.30mm/rev. 4
- (b) Explain whit worth quick return motion mechanism used in shaper machine with neat sketch. 4
- (c) Explain the Work holding devices in milling machine. 4
- OR
- Que. – 4 (a) Using neat sketch, describe the various operation that can be carried on shaper machines. 4
- (b) List out the type of operation performed on planner and explain it. 4
- (c) Write advantages, limitation and application of broaching. 4
- Que. – 5 (a) List out the different operation perform on radial drilling machine. Explain any six operations with neat sketches. 6
- (b) Write a short note on : “ Radial drilling machine” 5
- OR
- Que. – 5 (a) Explain all the parts of centre lathe using neat sketch. 6
- (b) Write a short note on : “ Apron Mechanism” 5
- Que. – 6 Write a short note on :(Any three) 12
- (a) Lapping
 - (b) Up milling and down milling
 - (c) Centreless grinding process
 - (d) Horizontal broaching machines and vertical broaching machines

END OF PAPER