

II B. Tech II Semester Regular Examinations, April/May – 2016
PRODUCTION TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
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PART -A

1. a) What are the required properties of good molding sand? (4M)
- b) Explain solidification of pure metals in casting. (3M)
- c) List the advantages and disadvantages of gas welding. (4M)
- d) Define soldering and name the types of soldering operations. (4M)
- e) Give the causes and remedies of rolling defects. (4M)
- f) What is spring back effect? How to prevent it? (3M)

PART -B

2. a) Define gating ratio and differentiate between pressurized and un-pressurized gating systems. (8M)
- b) List out and explain various pattern allowances with sketches. (8M)
3. a) Explain cupola furnace with neat sketch and give the reactions takes place at different stages of the furnace. (10M)
- b) What will be the solidification time for a 1200 mm diameter and 33 mm thick casting of aluminum if the mould constant is 2.2 sec/mm^2 ? (6M)
4. a) Explain the characteristics of welding joints. (7M)
- b) The arc length characteristic of a D.C arc is given by $V=24+4L$, where V is the voltage in volts and L is arc length in mm. The static volt-ampere characteristic of the power source is approximated by a straight line with a no load voltage of 80 V and a short circuit current of 600 A. (9M)
5. a) Explain the design guidelines of welded joints. (8M)
- b) What is brazing? Explain the types of brazing with applications. (8M)
6. a) What is strain hardening? Explain its mechanism. (6M)
- b) What s extrusion? Discuss the types of extrusion with sketch. Also list the advantages, limitations and application of each type of extrusion process. (10M)
7. a) What are thermoplastic materials? How do they differ from thermosetting plastics? (8M)
- b) Explain Stretch forming and hydro forming operation with neat sketch mentioning their applications. (8M)



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PART -A

1. a) Discuss briefly the materials which are added to molding sand to improve its properties. (4M)
- b) Explain solidification of alloys in casting. (4M)
- c) Compare between A.C and D.C arc welding. (4M)
- d) Give the causes and remedies of any two welding defects. (3M)
- e) Name the methods to produce metal powders and list compaction techniques. (4M)
- f) Explain coining and embossing operations. (3M)

PART -B

2. a) What is casting? Give the advantages, limitations and applications of casting? (8M)
- b) Find the dimensions of pattern to cast cubical steel casting of 50 cm size considering all the allowances. Take draft as 2^0 and machining allowance of 2mm. (8M)
3. a) Explain the principle of operation for reverberatory furnace with neat sketch. Also give the applications of this furnace. (8M)
- b) With cylindrical riser, prove that for a longer solidification time, diameter of riser is equal to height of riser. (8M)
4. a) Explain the principle, advantages and applications of gas cutting. (8M)
- b) Explain the principle, advantages and applications of Gas metal arc welding. (8M)
5. a) Define soldering. Enumerate the fluxes commonly used in soldering. (8M)
- b) What do you know about friction stir welding (FSW) process? Explain in detail about the working principle with neat sketch. Also name the applications of FSW. (8M)
6. a) Discuss wire drawing and tube drawing processes with neat sketch. (8M)
- b) What is the importance of forging operation? Explain the causes and preventive methods for forging defects. (8M)
7. a) Define plastic. How are they classified? Give their applications. (8M)
- b) What is bending operation? How to find bending allowance? Explain the types of bending operations with sketch. (8M)



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PART -A

1. a) Discuss briefly the influence of molding sand on sand properties. (4M)
- b) Give the causes and remedies for the following casting defects: (4M)
 - i. Blow hole
 - ii. Misrun
- c) What is neutral flame? Give the reactions and applications of it. (4M)
- d) What is brazing? Give the applications of brazing. (4M)
- e) Give the causes and remedies of forging defects. (3M)
- f) Explain the following operations (3M)
 - i. Nibbling
 - ii. Perforating
 - and iii. Trimming

PART -B

2. a) Grey Cast Iron block of size 200X100X10 cubic cm is to be cast in a sand mould. Shrinkage allowance for pattern making is 2 %. Find the ratio of volume of the pattern to the volume of the casting. Also for the same problem, find the ratio if the block is steel. Give your comment on the problem. (9M)
- b) List out and explain various pattern materials with applications. (7M)
3. a) Briefly explain investment casting with neat sketch. Also give its limitations and applications. (8M)
- b) Compare the solidification times for castings of three different shapes of same volume: Cube, cylindrical (with h=d) and spherical. (8M)
4. a) List the advantages and limitations of D.C and A.C power sources in arc welding. (8M)
- b) How to designate an electrode? Explain in detail. (8M)
5. a) List out and explain the causes and remedies for welding defects. (8M)
- b) Explain the principle, limitations and applications of explosive welding. (8M)
6. a) Explain the step by step procedure to be followed for powder metallurgy technique. Give the advantages, limitations and applications of powder metallurgy technique. (10M)
- b) Enumerate the differences between hot working and cold working processes. (6M)
7. a) Define plastic. Explain the characteristics of plastic materials. (8M)
- b) Explain metal spinning and shear spinning operations with suitable sketches. Also mention their applications. (8M)



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**PART -A**

1. a) List some of specific properties which moulds should possess to produce sound castings. (4M)
- b) Give the causes and remedies for the following casting defects: (4M)
  - i) Hot tear
  - ii) Cold shut
- c) What is carburizing flame? Give the reactions and applications of it. (4M)
- d) Why a flux is used in brazing and soldering? Explain. (3M)
- e) Briefly explain strain hardening. (4M)
- f) Explain the following operations (3M)
  - i) Notching
  - ii) Slitting and
  - iii) Shaving

**PART -B**

2. a) Design the down sprue avoiding aspiration to deliver liquid Cast Iron of density  $7800 \text{ kg/m}^3$  at a rate of 10 kg/sec against no head at the base of the sprue. The height of the sprue is 10 cm and that of pouring basin is 6 cm. Neglect frictional and orifice effects. (8M)
- b) Briefly explain the types of gating systems with neat sketch. (8M)
3. a) Briefly explain various die casting process with neat sketch. Also give their limitations and applications. (8M)
- b) Compare the solidification times for two optimum side risers of same volume when one was a cylindrical shape and other is a square parallelepiped. (8M)
4. a) Determine the melting efficiency in the case of arc welding of steel with a potential of 22V and current of 230 A. The cross-sectional area of the joint is  $22 \text{ mm}^2$  and the travel speed is 5 mm/s. Heat required to melt steel may be taken as  $12 \text{ J/mm}^3$  and the heat transfer efficiency as 85%. (8M)
- b) Explain the principle, advantages and applications of submerged arc welding. (8M)
5. a) Explain the importance of pre and post heating of weld. What is the effect of this heating on grain structure? Explain. (8M)
- b) Discuss solid state welding processes in detail with sketch. (8M)
6. a) Explain the types of powder preparation methods with neat sketch. What is the type of grain shape obtained through various methods of powder preparation? (8M)
- b) Explain the process of rolling with sketch. Derive the expression for arc of contact in rolling. (8M)
7. a) List out and explain any two processing methods of plastic materials with suitable sketch. (9M)
- b) Explain deep drawing operation with neat sketch. Give the expression for drawing force and blank holding force. (7M)