Shri Mata Vaishno Devi University
Department of Mechanical Engineering B.Tech, 3rd Semester
Minor-I Examination, Sep 2017

Manufacturing Processes
Code: MEL 2113

Max. Marks: 20
Time: 01 Hour

Attempt all questions.

1(a) In a company, you are asked to make a pen stand for students. Choose material and write all important factors which are considered for the selection of material for making a pen stand.

(b) With suitable examples, classify various manufacturing processes normally used for production of engineering components in the industries. (2,3)

2. Different between the followings:
(a) Solidification between pure metal and alloys (b) Pressurized and Non pressurized ratio
(c) Refractoriness and Permeability (d) True centrifugal and Centrifuging casting (1x4)

3. With a neat diagram, explain the Die casting operation for making a Aluminum casing of back light for bike. Write the advantages and limitations of the die casting process. (5)

4. Write the final dimension for a pattern required for making a steel block of 100 x100x100 (LxWxH in mm) considering shrinkage allowance of 20 mm/m and machining allowance 3 mm per surface. Compute the solidification time for this casting taking 1.5 value of Chvorinov constant. (3)

5. Write the possible causes and remedies for casting defects: blow holes, misrun, hot tears or swell. (3)

Shri Mata Vaishno Devi University
Department of Mechanical Engineering B.Tech, 3rd Semester
Minor-II Examination, Oct 2017

Manufacturing Processes **Max. Marks: 20**
Code: MEL 2113 **Time: 01 Hour**

1. Define the following: (i) Reverse extrusion (ii) Explosive forming (iii) Wire drawing (iv) Bend allowance. (1x4)
2. Differentiate between the followings:
   (a) Spinning and Deep Drawing
   (b) Impact and Hydrostatic Extrusion
   (c) Drop forging and Press Forging
   (d) Hot working and Cold Working Processes (1x4)
3. Explain briefly the rolling principle along with various defects likely to occur in the rolling of mild steel ingots. (4)
4. Differentiate between punching and blanking operation. A hole of 20 mm x 50 mm is to cut in a thick sheet of 4 mm. The shear strength of the material is 90 MPa. Estimate the shear force required for making a hole. Also find the size of die and punch for punching and blanking operations. Assume constant 'C' is 0.0032. (4)
5. Write various forging operations used to make the industrial products. Write various design considerations made for the design of die for forging process. (4)

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Mechanical Engineering
B. Tech. (Mechanical Engg.) Minor I Examination, Sept 2018

Entry No: 17bme021 **Total Number of Pages: [1]**
Date: **Total Number of Questions: [2]**

Course Title: Manufacturing Processes
Course Code: MEL 2133

Time Allowed: 1.5 Hours **Max Marks: [20]**

Instructions / NOTE

i. Attempt All Questions.
ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
iii. Assume an appropriate data / information, wherever necessary / missing

	Section A		
Q1.	**(a)** What is the purpose of a **riser** in sand casting?	[2]	CO1
	(b) What are the **design parameters** for a riser, and what are the **design constraints** that you need to satisfy given your answer in (a)?	[2]	CO1
	(c) Calculate the **permability number** of sand if it takes **1min 25 sec** to pass **2000 cm^3** of air at a pressure of **5 g/cm^2** through the standard sample	[2]	CO1
	(d) What should be kept in mind while choosing the **positioning** of the **ingates**	[2]	CO1
	(e) Explain normal **desired characteristics** of core	[2]	CO1
Q2.	**(a)** Explain the **modulus method for riser design** and judge the importance of it in modern foundry	[3]	CO1
	(b) A **cube** shaped casting solidifies in **5 min**. Calculate the **solidification time** in min for a cube of the same material, which is **8 times** heavier than the original casting.	[2]	CO1
	(c) A **200 mm** long down sprue has an area of cross-section of **650 mm^2** where the pouring basin meets the down sprue (i.e. at the beginning of the down sprue). A constant head of molten metal is maintained by the pouring basin. The molten metal flow rate is **6.5×10^5 mm^3/s**. Considering the end of the down sprue to be open to atmosphere and an acceleration due to gravity of **10^4 mm/s^2**, design the **area of the down sprue** in mm^2 at its end (avoiding aspiration effect).	[2]	CO1
	(d) Illustrate at least **6 different types of core** which is utilized in modern foundry (just illustrate by sketching)	[3]	CO1

Course Outcomes

CO1. Able to understand casting process including designing of riser, and gatting system

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	Q1, Q2	20	31

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Mechanical Engineering
B. Tech. (Mechanical Engg.), Sem-III
Minor II Examination, Oct 2018

Entry No: 1 7 b m e 0 2 1
Date:

Total Number of Pages: [1]
Total Number of Questions: [2]

Course Title: Manufacturing Processes
Course Code: MEL 2133

Time Allowed: 1.5 Hours **Max Marks: [20]**

Instructions / NOTE
i. Attempt All Questions.
ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
iii. Assume an appropriate data / information, wherever necessary / missing

	Section A		
Q1.	**(a)** Illustrate following **casting defects**: Misru, Cold shut, Blow hole, Hot tear, Run out, Metal penetration, and also suggest the remedies of these defects.	**[3]**	**CO1**
	(b) Explain **Shell moulding** casting process in terms of following: (i) draw the schematic diagram of shell moulding procedure; (ii) what are the materials and equipment required for it; (iii) process variables; (iv) advantages; (v) disadvantages; (vi) applications;	**[3]**	**CO1**
Q2.	**(a)** How we decide position of **parting line in forging**, explain with different schematic diagrams.	**[2]**	**CO2**
	(b) How we decide **corner and fillet radius** in a forging component, explain with diagram.	**[1]**	**CO2**
	(c) Analyze the function of **flash and gutter design.**	**[1]**	**CO2**
	(d) Analyse the **external and Internal draft angle** during hammer die and press die forging operation for different materials (Provide data in tabular form)	**[2]**	**CO2**
	(e) Explain the **stages in drop forging** of a lever with neat sketches.	**[2]**	**CO2**
	(f) Distinguish between **open and close die forging**.	**[1]**	**CO2**
	(g) Illustrate at least 4 different types of **forging defects** and suggest the remedies of these defects.	**[2]**	**CO2**
	(h) Prove that $\sigma_x = \frac{2}{3}\sigma_0 \ln\frac{1}{1-r}$ in strip drawing of a wide **sheet operation**, where all the notations have standard meaning.	**[3]**	**CO2**

Course Outcomes
CO1. Able to understand casting process including designing of riser, and gatting system
CO2: Able to understand the different forming process and their applications

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	Q1	06	32
CO1	Q2	14	

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Mechanical Engineering
B. Tech. (Mechanical Engg.), Sem-III
Major Examination, Nov 2018

Entry No: 17bme021
Date:

Total Number of Pages: [2]
Total Number of Questions: [5]

Course Title: Manufacturing Processes
Course Code: MEL 2133

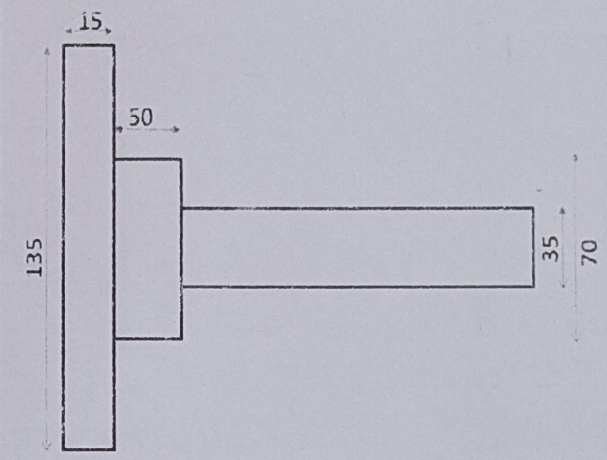
Time Allowed: 3 Hours

Max Marks: [50]

Instructions / NOTE

i. Attempt All Questions.
ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
iii. Assume an appropriate data / information, wherever necessary / missing

	Section A		
Q1.	**(a)** The zircon sand obtained from Quilon (Kerala) has produced the following results on sieve analysis: Calculate the grain fineness number and based on this number how you can judge the quality of sand. Sieve No. | 70 | 100 | 140 | 200 | 270 | Pan Retained % | 0.04 | 1.01 | 45.21 | 43.02 | 5.38 | 0.36	[3]	CO1
	(b) Explain 4 different types of additives which is used during moulding.	[1]	
	(c) Develop comparative studies among top gate, bottom gate, parting gate, and step gate system (also draw diagram).	[2]	
	(d) Describe CAINE'S method for riser design.	[1]	
	(e) Explain **precision investment** casting process in terms of following: (i) draw the schematic diagram of shell moulding procedure, (ii) what are the materials and equipment required for it; (iii) process variables; (iv) advantages; (v) disadvantages; (vi) applications.	[3]	
Q2.	**(a)** How we can produce sound casting i.e without any casting defects like Misru, Cold shut, Blow hole, Hot tear, Run out, Metal penetration.	[3]	CO1
	(b) Explain at least 8 different types of patterns (also draw diagram).	[2]	
	(c) While cooling, a cubical casting of side 40 mm undergoes 3%, 4% and 5% volume shrinkage during the liquid state, phase transition and solid state, respectively. Calculate the % of volume of the metal compensated from the riser.	[2]	
	(d) Match the items in Column I and Column II. Col I | Col II P. Metallic Chills | 1. Support for the core Q. Metallic Chaplets | 2. Reservoir of the molten metal R. Riser | 3. Control cooling of critical sections S. Exothermic Padding | 4. Progressive solidification	[1]	
	(e) A cubic casting of 50 mm side undergoes volumetric solidification shrinkage and volumetric solid contraction of 4% and 6% respectively. No riser is used. Assumed uniform cooling in all directions. Compute the side of the cube after solidification and contraction.	[2]	
	Section B		
Q3.	**(a)** Differentiate (at least 4 points) between upsetting and fullering.	[1]	CO2
	(b) In open-die forging, a disc of diameter 200 mm and height 60 mm is compressed without any barreling effect. The final diameter of the disc is 400 mm. Compute its true strain.	[2]	
	(c) Explain step by step procedure for edging impression in forging.	[3]	
	(d) Analyze the most important three rules which we should follow to achieve defects free upset forging.	[2]	
	(e) Distinguish between open die and closed die forging processes (at least 4 points).	[1]	
	(f) Design the upsetting die required for the C24 shaft shown in below fig (all dimensions are in mm).	[3]	



Q4.	(a) Calculate the **bending force** required for C50 steel 1.5 mm sheet of width 1 m to be bent in a wiping die. The die radius used in 3 mm. Ultimate tensile strength of C50 steel is 800 MPa. Assume K=0.33. (b) Differentiate between **Embossing and Coining** (Include diagram). (c) Illustrate **drawing operation** (Include diagram) and analyze the effect of following **process variables**: corner radius on punch, draw radius on die, clearance, blank size, drawing force, bland holding force, ironing force, percentage reduction, air vent, and drawing speed on **drawing operation**. (d) Explain following sheet metal operation: (i) **Spinning**, (ii) **Bending**, (iii) **Notching**, (iv) **Nibbling**, (v) **Shaving**, (vi) **Trimming**, (vii) **Stretch forming**, and (viii) **Extrusion** (support your answer by diagrams).	[1] [1] [4] [4]	CO3
	Section C		
Q5.	(a) According to American Welding Society develop classification of welding processes. (b) Analyze the **five purposes** of coating on the electrodes during welding processes. (c) Illustrate Tungsten Inert Gas Welding **(TIG)** in terms of (i) TIG welding setup (draw sketch), (ii) Power source, (iii) Electrodes, and (iv) welding techniques. **OR** Illustrate Submerged Arc Welding **(SAW)** in terms of (i) Schematic view of SAW, (ii) Principle, (iii) Electrode burnoff rates for various electrode size and currents in AC welding (SAW), (iii) Metal deposition rate in AC SAW as affected by welding current, and (iv) metal deposition rates in SAW with metal powder addition. (d) Explain resistance **spot welding** in terms of (i) Schematic view of setup (equipment), (ii) Principle, (iii) Squeeze time, (iv) Weld time, (v) Hold time, (vi) Off time, (vii) Applications, (viii) Disadvantages. (e) Differentiate between brazing and soldering (at least five points).	[3] [1] [3] [2] [1]	CO4

Course Outcomes

CO1. Able to understand casting process including designing of riser, and gatting system
CO2: Able to understand the forging process and their applications
CO3: Able to understand different sheet metal processes and their applications
CO4: Able to understand different welding process and their applications

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	Q1, Q2	20	35
CO2	Q3	10	
CO3	Q4	10	
CO4	Q5	10	