

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: B.E.
BRANCH: MECHANICAL/ PRODUCTION**

**SEMESTER :V
SESSION : MO/19**

SUBJECT: PE5001 MANUFACTURING PROCESS-II

TIME:

FULL MARKS: 60

INSTRUCTIONS:

1. The question paper contains 7 questions each of 12 marks and total 84 marks.
 2. Candidates may attempt any 5 questions maximum of 60 marks.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a) Distinguish between liquid shrinkage and solid shrinkage as related to casting. Explain how these are taken care in designing sand castings. [2]

Q.1(b) Briefly explain the application of chaplets and chills in casting. [4]

Q.1(c) The zircon sand obtained from Quilon (Kerala) has produced the following results on sieve analysis [6]

Sieve Number	70	100	140	200	270	pan
Retained (%)	0.04	1.01	45.21	48.02	5.38	0.36

Plot the cumulative grading curve, calculate the grain fineness number and explain its uses

Q.2(a) Why aluminum casting preferred to be done by cold-chamber die-casting than hot-chamber die casting? [2]

Q.2(b) Step by step explain the process of shell molding using suitable diagram. [4]

Q.2(c) A mould has down sprue whose length is 20 cm and the cross sectional area at the base of the down sprue is 1 cm². The down sprue feeds a horizontal runner leading into the mold cavity of volume 1000 cm³. Determine the time required to fill mold cavity. [6]

Q.3(a) How pin hole porosity is different from blow holes in casting? [2]

Q.3(b) Explain the methods of cleaning the casting? [4]

Q.3(c) On a particular day, an iron foundry prepared the charge for cupola as 20% pig iron 1, 25% pig iron 2 and 55% scrap iron. Find the final composition of the product melt, given the following compositions for the charge elements. Assume carbon pick-up 15%, Sulphur pick-up 0.05%, silicon loss 10% and manganese loss as 20% in the cupola. [6]

Charge Materials	Carbon %	Silicon %	Manganese %	Sulphur %
Pig iron 1	3.20	1.70	0.80	0.03
Pig iron 2	3.50	2.40	0.60	0.01
Scrap iron	3.25	2.30	0.65	0.08

Q.4(a) What is flux? Why it is essential to use it in some welding situations? [2]

Q.4(b) How the problem of arc blow is address in DC arc welding? [4]

Q.4(c) Describe the type of flames obtained in oxy-acetylene gas welding and mention the material which use this flames for welding. [6]

Q.5(a) Under what condition it is recommended to use DCEN and DCEP in TIG welding [2]

Q.5(b) Explain the process of butt joining 75mm thick plate through arc welding in single pass. [4]

Q.5(c) Explain with sketches, how metal transfer takes place in GMAW [6]

Q.6(a) Explain how braze welding is different from brazing? [2]

Q.6(b) Make a brief note on projection welding. [4]

Q.6(c) How to weld (i) Thicker metal with thinner metal (ii) Metal with different electrical resistivities (iii) Metal with different thermal conductivities, using resistance welding method. [6]

Q.7(a) Discuss the mechanism of metal removal in ECM. [2]

Q.7(b) With Suitable sketch, explain the welding method of thick metal plates used for fabrication of Nuclear plant. [4]

Q.7(c) Draw a typical relaxation circuit used for the EDM power supply and derive the expression for the material removal rate. [6]