Lesson Plan For

Foundry Technology (2023-24)

Department of Metallurgical Engineering

UGIE Rourkela

Discipline: **Metallurgical engineering**

Subject: **Foundry Technology (Th-1)**

Semester :**6th**

Total period allotted: **75**

Periods per week: **5**

Name of the Teaching Faculty: **Arpita Nayak**

week	Class No		Lecture Topics
1	1	Introduction to Foundry as a Manufacturing Process	Define casting as a process of manufacturing.
	2		State principles of casting andState the basic steps involved in making a casting
	3		Mention advantages &disadvantages of metal casting
	4		Teaching and showing real exampls of casting
	5		Doubt clearing class
2	6	Pattern and Pattern Making	Define pattern and Differentiate between pattern and casting.
	7		State the reason for selection of pattern

			materials. Describe different pattern materials.
	8		Explain different types of pattern giving examples. Explain different types of pattern allowances.
	9		State the basis and merits of pattern colours giving examples. Mention the utilities of storing and preservation of patterns.
	10		Doubt clearing class
3	11	Moulding Materials.	State different sources of moulding sand. State different types of moulding sand
	12		Give different ingredients of moulding sand.
	13		State the classification of moulding sand in two different ways namely: Classification based upon grainClassification base upon grain shape.
	14		State the properties desired for moulding sand.
	15		Differentiate between facing sand and backing sand. Differentiate

			between sand preparation and sand conditioning.
4	16	Moulding Materials.	State the reasons of sand reclamation.
	17		Explain different sand reclamation techniques. Testing of moulding sand.
	18		Describe the procedure f moisture content test of molding sand. Derive an expression for AFS grain fineness number of moulding sand
	19		Describe the procedure for clay content test of moulding sand. Describe the procedure for mould hardness test.
	20		Derive an expression for permeability number of moulding sand. Describe the procedure for compression strength of moulding sand.
5	21	Binders and Additives.	State the functions of binder Explain different types of clay binders
	22		State the function of additives

			State the different types of additives.
	23		Differentiate between facing materials and coarse materials.
	24		Describe the utilities of different cushion materials giving examples
	25		Explain the functions of special additives giving examples
6	26	Core and Core Making	Define core State different functions of core
	27		State essential characteristics of core and explain different types of core with Sketches.
	28		Describe the steps involved for core making.
	29		Explain various methods of core baking.
	30		Explain different core baking machines.
7	31	Moulds and Mould Making	Define mould. State different characteristics of mould
	32		Explain with sketches different types of mould.
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	34		Explain with sketches different types of mould.
	35		Describe different moulding methods such as: a. Bench Moulding
8	36		Floor Moulding
	37		Pit Moulding
	38		Machine Moulding.
	39		Class Test
	40		Describe the different methods of ramming: 7.1.1 Hard ramming 7.1.2 Squeezing 7.1.3 Jolting 7.1.4 Sand slinging
9	41	Special Moulding Process	Name special molding processes
	42		Explain the molding method in permanent mould
	43		Describe the method of shell molding giving sketch
	44		Give the essential feature of investment mould.
	45		Describe the carbon dioxide molding process.
10	46	Melting Practices	State different types of furnaces with sketches that are used in foundry for melting of ferrous and non-ferrous metals.
	47		Describe Induction furnace of coreless high frequency type.

	48		Explain the working principle of induction furnace.
	49		Explain the construction and operation of cupola used for cast iron melting.
	50		Estimate the different quantities of raw material to get a specific grade of C.I. with the help of simple charge calculation.
11	51		State the advantages and limitation of cupola.
	52		Mention modern development of cupola. Explain different electric arc furnaces namely a. Direct Arc type
	53		Indirect Arc type
	54		Highlight recent trends in melting techniques.
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12	56	Methods of Pouring and Feeding	Explain gating system.
	57		State elements of gating system with sketch.
	58		State function of a riser. Describe different types of riser with sketches.
	59		Explain the importance of size

			and shape of riser in metal casting.
	60		Justify the location of riser in the gating system.
13	61		Define directional solidification.
	62		Describe progressive and directional solidification and use of chills.
	63		State the factors which increase the efficiency of riser such as: a. Use of insulating material b. Use of exothermic materials c. Use of chills d. Use of padding e. Use of chaplets f. Use of molding materials of different chill capacities. g. Use of topping up h. Use of electric arc feeding i. Riser head design
	64		State Chvorinov‘s rule.
	65		Mention the effects of poring temp. on the quality of casting.
14	66	Cleaning of Casting	Explain shake out. Explain fettling.
	67		Classify fettling operation in two stages namely

			a. Removal of cores b. Cleaning of canting surfaces.
	68		Compare between sand blasting and shot blasting Describe the process of chemical cleaning
	69		Explain different methods or removal of gates and risers etc. such as: a. Chipping by hammers b. Flogging c. Sheering d. Sawing e. Abrasive wheel slitting f. Machining g. Flame cutting h. Plasma cutting i. Grinding j. Gouging k. Trimming and sizing.
15	70	Special Casing Techniques	Explain the following die casting techniques and processes a. Gravity die casting b. Pressure die casting
			c. Vacuum die casting d. Cold chamber process e. Hot chamber process

			Explain the following centrifugal casting techniques a. True centrifugal casting having b. The De Lavaud process
			c. Moore casting system d. Semi centrifugal casting e. Centrifuging
			Mention the advantages of die casting
16	71		Mention the advantages of centrifugal casting
	72		Explain investment casting process
	73	Casting Defects	Mention different types of casting defects with example and their remedies a. Defects caused by patterns and molding box. b. Defects caused by improper molding and core making. c. Defects caused by improper mixing and distribution.
	74		Defects caused by improper molding core making and gating e. Defects due to improper mold drying and core baking

	75		Defects occurring while closing and Pouring in the moulds g. Defects caused by molten metal
17	76		Defects occurring during fettling. i. Defects due to faulty heat treatment
	77		Solidification Shrinkage of cast metal. k. Warpage
	78		Revision