Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Mechanical Engineering

BME 002- SPECIAL CASTING PROCESSES

Fifth Semester, 2015-16 (odd Semester)

Course (catalog) description

To Understand the concepts of molding and casting

Compulsory/Elective course : Elective

Credit & contact hours : 3 & 45

Course Coordinator : Mr. V.P.Durai Raj

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Mr. R. J. Golden Renjith Nimal	3rd Year Mech, Sec 'C', 'D'	JR 001, JR 002	9994351938	goldenrenjith.mech@bharathuniv.ac.in	9.00 to 9.50 am
Mr. R. Hariharan	3rd Year Mech, Sec 'A', 'E'	SK 004, JR 101	9884910167	hariharan.mech@bharathuniv.ac.in	10.50 to 11.40 am
Mrs. G. Sucharitha	3rd Year Mech, Sec 'B'	JR 003	9840590726	sucharitha.mech@bharathuniv.ac.in	1.30 to 2.40 pm

Relationship to other courses:

Pre –requisites : **Manufacturing Technology**

Assumed knowledge : By understanding the concepts of molding and casting

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Following courses : Nil

Syllabus Contents

UNIT I INTRODUCTION 12

Sand casting-Conventional mould-Core making-Need for special casting process-Applications

UNIT II SHELL MOULDING 8

Process-Machines-Pattern-Sand, resin and other materials – Process parameters – Characteristics of shell mould casting-'D' Process – Applications

UNIT III INVESTMENT CASTING 9

Process- Pattern and mold materials – Black mold and ceramic shell mold - Mere Cast and Shaw process – Applications.

UNIT IV CETRIFUGAL AND DIE CASTING 9

Types of centrifugal process – calculation of rotating speed of mold – Equipment – Applications.

UNIT V CONTINUOUS CASTING, CO_2 MOULD PROCESS AND FULL MOULD PROCESSES 12

Reciprocating continuous mould process – Direct chill process – Use of steel, Aluminum, brass material in continuous casting. CO_2 Mould / Core hardening process – Principle of full Mould process – Applications , Special processes like Squeeze casting and eletroslag casting processes.

REFERENCES:

1. P.L. Jain, Foundry Technology, 1992.
2. R.A.Higgins, Engineering Metallurgy – Vol. II, 1998.
3. phindia.com/.../**casting**-technology-and-**cast**-alloys-chakrabarti-a-k--isbn.

Computer usage: Nil

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Engineering

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 2nd week	Session 1 to 14	2 Periods
2	Cycle Test-2	September 2nd week	Session 15 to 28	2 Periods
3	Model Test	October 3rd week	Session 1 to 45	3 Hrs
4	University Examination	November	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To Understand the concepts of molding and casting	Correlates to program outcome		
	H	**M**	**L**
understand and perform basic casting processes .		h	k
Understand shell moulding process	c, h, i	g	k, l
Study about Investment casting	c, d	e, g	j, k
Understand centrifugal casting	l	e, g, i	k
Study about Continous casting	l	e	
Study about Full mould process	g	f, h	l

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
Unit 1	**INTRODUCTION**		
1.	Introduction	No	[R2] chapter -1
2.	Sand casting	No	
3.	Conventional mould	No	
4.	Core making	No	
5.	Need for special casting process	No	
6.	Need for special casting process	No	
7.	Applications	No	
UNIT II	**SHELL MOULDING**		
8.	Process	No	[R3] chapter - 3
9.	Machines	No	
10.	Resin and other materials	No	
11.	Pattern-Sand	No	
12.	Process parameters	No	
13.	'D' Process	No	
14.	Characteristics of shell mould casting	No	
15.	Applications	No	
UNIT III	**INVESTMENT CASTING**		
16.	Introduction	No	[R1] chapter - 5, [R2] chapter - 4
17.	Process	No	
18.	Pattern	No	
19.	mould materials	No	
20.	Black mould	No	
21.	Ceramic shell mould	No	
22.	Mere Cast	No	
23.	Shaw process	No	
24.	Applications	No	
UNIT IV	**CETRIFUGAL AND DIE CASTING**		
25.	Centrifugal	No	[R2] chapter - 6
26.	Types of centrifugal process	No	
27.	Calculation of rotating speed of mold	Yes	
28.	Equipment	No	
29.	Applications	No	
30.	Die casting	No	
UNIT V	**CONTINUOUS CASTING, CO_2 MOULD PROCESS AND FULL MOULD PROCESSES**		
31.	Reciprocating continuous mould process	No	[R1] chapter - 8 [R2] chapter - 6
32.	Direct chill process	Yes	
33.	Use of steel, Aluminum, brass material in continuous casting	Yes	
34.	CO_2 Mould / Core hardening process	Yes	
35.	Principle of full Mould process	No	
36.	Applications	Yes	
37.	Special processes like Squeeze casting	No	
38.	Electroslag casting processes	Yes	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment / Seminar / Online Test / Quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by Mr. R. J. Golden Renjith Nimal Dated :

Addendum

ABET Outcomes expected of graduates of B.Tech / MECH / program by the time that they graduate:

a) The ability to apply knowledge of mathematics, science, and engineering fundamentals.

b) The ability to identify, formulate and solve engineering problems.

c) The ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

d) The ability to design and conduct experiments, as well as to analyze and interpret data

e) The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

f) The ability to apply reasoning informed by the knowledge of contemporary issues.

g) The ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

h) The ability to understand professional and ethical responsibility and apply them in engineering practices.

i) The ability to function on multidisciplinary teams.

j) The ability to communicate effectively with the engineering community and with society at large.

k) The ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.

l) The ability to recognize the need for, and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION:
Mechanical Engineering graduatesare enthusiastic to provide strong foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems in the field of Mechanical Engineering.

PEO2: CORE COMPETENCE:
Mechanical Engineering graduates have competence to enhance the skills and experience in defining problems in the field of Mechanical Engineering and Technology design and implement, analyzing the experimental evaluations, and finally making appropriate decisions.

PEO3: PROFESSIONALISM:
Mechanical Engineering graduates made competence to enhance their skills and embrace new thrust areas through self-directed professional development and post-graduate training or education.

PEO4: PROFICIENCY:
Mechanical Engineering graduates became skilled to afford training for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS:
Mechanical Engineering graduates are morally merged to apply the ethical and social aspects of modern Engineering and Technology innovations to the design, development, and usage of new products, machines, gadgets, devices, etc.

Course Teacher	Signature
Mr. R. J. Golden Renjith Nimal	
Mr. R. Hariharan Mrs. G. Sucharitha	

Course Coordinator **HOD/MECH**
Mr. V.P.Durai Raj