Academic Course Description

BHARATH UNIVERSITY

Faculty of Engineering and Technology

Department of Mechanical Engineering

BME009 DESIGN FOR MANUFACTURING
Seventh Semester, 2015-16, (Odd Semester)

Course (catalog) description

At the end of this course the student should be able to understand the design principles of casting, welding, forming, machining and assembly, by considering various manufacturing constraints.

Compulsory/Elective course : Core Elective

Credit & contact hours : 3 & 45

Course Coordinator : Dr. A. Buckshumiyan

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Dr. A. Buckshumiyan	Final Year Mech	JR001		Backshumiyana.mech@ bharathuniv.ac.in	10.50 to 11.40
Mr. R. Karthikeyan	Final Year Mech,	JR002		Karthikeyan.mech@bharathuniv.ac.in	10.50 to 11.40

Relationship to other courses:

Pre –requisites **:** Machine Design, Manufacturing Technology

Assumed knowledge : By understanding the concept of basic mechanics and manufacturing technology.

Following courses : Nil

Syllabus Contents

Unit I General Design **9**

General design principle for manufacturing - Process capability- Surface finish – tolerances – features of tolerance – cumulative effect of tolerance – Geometric tolerances

Unit II Fits and Assemblies **9**

Fits- Selective assembly- Deciding the number of groups, control of axial play- Grouped datum systems- Types- Automated assemblies- laminated shims assemblies

Unit III Tolerance **10**

True position theory- Virtual size concept- True position tolerancing- fixed fasteners- Floating fasteners- zero true position tolerances- Functional gauging- paper layout gauging.

Unit IV Redesigning **5**

Form design of castings- Redesigning- Parting line consideration- Minimizing core requirements- economic design of castings- Form design of weldments- Welding symbols- redesigning cast members using weldments- Economic weldments.

Unit V Design for Assembly **10**

Design for assembly- Design for inspection- Design for machining- Redimensioning based on manufacturing datums- Design of reduce value addition – Parts cut to length – Machined round holes- Blind & Through holes – Design consideration for various machining operations.

Total : 45 Hours

Text Book(s) and /or required materials

TEXTBOOK:

1. **1. M.F. Spotts – "Dimensioning & Tolerancing for Quantity Production" – Prentice Hall**

REFERENCES:

1. **Harry Peck – "Designing for Manufacture" – Pitman Publications, 1973.**
2. **James G.Bnalla- "Hand book of Product Design for Manufacturing".**
3. **www.bookchums.com › Books › Free eBooks**

Computer usage: **No**

Professional component

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

Broad area : Manufacturing

Test Schedule

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

Mapping of Instructional Objectives with Program Outcome

	Correlates to program outcome		
	H	**M**	**L**
1. Students will learn the principles of manufacturing			
2. Students will learn manufacturing design	a,b	i	
3. Learn design principles of welding	b,k	f,j	
4. Learn design principles of forming	a,l		
5. Learn design principles of casting	b	f	
6. Learn design principles of machining and assembly	l		

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

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I General Design			
1.	Introduction of Design for Manufacturing	No	[T1] chapter -1,2, [R1]
2.	General design principle	No	
3.	Process capability	No	
4.	Surface finish	No	
5.	tolerances	No	
6.	Features of tolerance	No	
7.	Cumulative effect	No	
8.	Geometric tolerances	No	
9.	Problems	Yes	
UNIT II Fits and Assemblies			
10.	Fits	No	[T1] chapter - 3, [R1, R3]
11.	Selective assembly	No	
12.	Deciding the number of groups	No	
13.	Control of axial play	No	
14.	Grouped datum systems	No	
15.	Types of assemblies	No	
16.	Automated assemblies	No	
17.	Laminated assemblies	No	
18.	Shims assemblies	No	
UNIT III Tolerancing			
19.	True position theory	No	[T1] chapter - 5, [R2]
20.	Virtual size concept	No	
21.	True position tolerancing	No	
22.	Fixed fasteners	No	
23.	Floating fasteners	No	
24.	Zero true position tolerances	No	
25.	Functional gauging	No	
26.	Paper layout gauging	No	
27.	Problems	Yes	
UNIT IV Redesigning			
28.	Design of castings	No	[T1] chapter - 6, [R2,R3]
29.	Redesigning parting line consideration	No	
30.	Minimizing core requirements	No	
31.	Economic design of castings	No	
32.	Design of weldments	No	
33.	Welding symbols	No	
34.	Redesigning cast members using weldments	No	
35.	Economic weldments	No	
36.	Problems	Yes	
UNIT V Design for Assembly			
37.	Design for Assembly	No	[T1] chapter – 7,8,

38.	Design for inspection	No	[R1]
39.	Design for machining	No	
40.	Redimensioning based on manufacturing datums	No	
41.	Design of reduce value addition	No	
42.	Parts cut to length	No	
43.	Machined round holes	No	
44.	Blind& through holes	No	
45.	Design consideration for various machining operations	No	

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 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.

BME009 DESIGN FOR MANUFACTURING

Course Teacher	Signature
Dr. A. Buckshumiyan	

Course Coordinator **HOD/MECH**
Dr. A. Buckshumiyan