Academic Course Description

BHARATH UNIVERSITY

Faculty of Engineering and Technology

Department of Mechanical Engineering

BME 503 FLUID POWER SYSTEMS

Fifth Semester, 2015-16 (Odd Semester)

Course (catalog) description

To know the advantages and applications of Fluid Power Engineering and Power Transmission System. To learn the Applications of Fluid Power System in automation of Machine Tools and others Equipments.

Compulsory course : Compulsory

Credit & contact hours : 3 & 45

Course Coordinator : S.Thirumavalavan

Instructors :

Relationship to other courses:

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
S.Nakkeeran	**V sem**	**JR 002**	**22290125**	nakkeeranmech@bharathuniv.ac.in	11.40 -12.30 PM
S.Thirumavalavan	**V sem**	**JR003,004**		Thirumavalavan.mechmech@bharathuniv.ac.in	10.50 - 11.40 AM

Pre –requisites **:** Fluid mechanics and machinery

Assumed knowledge : To expose the students to understand the concept of fluid mechanics and basic engineering mechanics to design and fabricate the components if fluid power system..

Following courses : nil

Syllabus Contents

UNIT 1: GENERAL INTRODUCTION AND CONTROL SYSTEM COMPONENTS 9

Introduction to Fluid Power, Advantages, Applications –Fluids – Properties of Fluids - Basic Principle of Fluid Power. Hydraulic pumps, Classification Performance, characteristics, pump selection, - Hydraulic Actuators Linear, Rotary, Selection, and Characteristics. Control system components-Hydraulic valves – Pressure, Flow, and Direction control - Applications

UNIT II :HYDRAULIC CIRCUITS 9

Fluid power symbols - Hydraulic circuits - Location of Flow control valves Regenerative, Synchronizing, Sequencing, Intensifier-Accumulator– Types, Applications

UNIT III: HYDRAULIC CIRCUIT DESIGN 8

Design of Hydraulic circuits - selection of components - Hydraulic circuit for shapers, Surface Grinding machine Vertical milling machine, Forklift ,Hydraulic press, Safety circuits -Automatic reciprocating system, Robot Arm – Hydrostatic Transmission – Power Pack.

UNIT 1V: PNEUMATIC SYSTEMS 10

Basic concepts and principles of pneumatic circuits, Relative merits and demerits over hydraulic Systems, Pneumatic conditioners – filters, regulators, lubricators, mufflers, Air dryers. Pneumatic actuators, pneumatic circuits, Hydro Pneumatics- Pneumatic logic controls, Electro hydraulic systems – Servo Systems

UNIT V: DESIGN & SELECTION 9

Design of pneumatic circuits – classic – cascade – step counter – selection criteria for pneumatic components – PLC applications in fluid power control. Installation and Maintenance of Hydraulic and Pneumatic power packs – fault finding – principles of low cost automation, case studies

Total : 45 Hours

TEXT BOOKS:

1. Andrew Parr, Hydraulics And Pneumatics (HB), Jaico Publishing House, 2005
2. R.Srinivasan, Hydraulic and Pneumatic Controls, Second Edition, Vijay Nicole Imprints PVT, 2006.

3. REFERENCES:

1. Anthony Esposito, Fluid Power with applications – Prentice Hall, 2006
2. Dudleyt A. Pease and John j. Pippenger, Basic Fluid Power, Prentice Hall, 1987.
3. Jamco L.Johnson, Introduction to fluid Power, Eswar Press, 2003.
4. Majumdar S.R,"Pneumatic systems-Principles and Maintenance", Tata McGraw Hill, 1995.

Computer usage:

Professional component

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

Broad area : Fluid Mechanics

Test Schedule

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

Mapping of Instructional Objectives with Program Outcome

To know the advantages and applications of Fluid Power Engineering and Power Transmission System. To learn the Applications of Fluid Power System in automation of Machine Tools and others Equipments.	Correlates to program outcome		
	H	**M**	**L**
1. Identify hydraulic and pneumatics components.	a,b,k,l	h,i	c
2. Ability to design hydraulic and pneumatic circuits	a,b,k,l	h,j	c
3. Design and preparation of hydraulic circuits for applications	a,b,k,l	h,j	
4. Design hydraulic circuits.	a,k,l	b,h,i	c
5. Learn to select materials	b	a,h,I,k,l	c
6. Introduction of industrial application	b	a,h,I,k,l	c

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

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT – I INTRODUCTION			
1.	Introduction to fluid power system	no	(T2) Chapter 1 (R1) Chapter 1 Chapter 2
2.	Advantages and applications of FPS	no	
3.	Hydraulic pumps Classifications of pumps	no	
4.	Gear pumps, vane pumps and piston pumps	no	
5.	Pump performance and selection of pumps	no	
6.	Problems on pumps	yes	
7.	Hydraulic actuators	no	
8.	Pressure valves. Flow control valves	no	
9.	Direction control valves applications	no	
UNIT – II	HYDRAULIC CIRCUITS		
10.	Fluid power symbols	no	(T2) Chapter 10 (R1) Chapter 5
11.	Hydraulic circuits	no	
12.	Location of flow control valve	no	
13.	Regenerative cicuit	no	
14.	Synchronizing circuit	no	
15.	Sequencing circuit	no	
16.	Intensifier	no	
17.	Accumulator	no	
18.	.Applications	no	
UNIT – III HYDRAULIC CIRCUIT DESIGN			
19.	Design of Hydraulic circuits	no	(T2) Chapter 11 (R1) Chapter 7
20.	selection of Fps components	no	
21.	Hydraulic circuit for shapers	no	
22.	Hydraulic circuit for surface grinding	no	
23.	Hydraulic circuit for vertical milling machine	no	
24.	Forklift, Hydraulic press	no	
25.	Safety circuits	no	
26.	Automatic reciprocating system,	no	
27.	Robot Arm	no	
28.	Hydrostatic Transmission – Power Pack.	no	
UNIT – IV PNEUMATIC SYSTEMS			
29.	Basic concepts and principles of pneumatic circuits	no	(T2) Chapter 12 (T2) Chapter 11
30.	Relative merits and demerits over hydraulic Systems	no	
31.	Pneumatic conditioners	no	
32.	Filters, Regulators,	no	
33.	Lubricators,Mufflers	no	
34.	Air dryers. Pneumatic actuators,	no	
35.	pneumatic circuits, Hydro Pneumatics-	no	

36.	Pneumatic logic controls	no	
37.	Electro hydraulic systems – Servo Systems	no	
UNIT – V DESIGN & SELECTION			
38.	Design of pneumatic circuits	no	(T2) Chapter 15 (T2) Chapter 14
39.	Classic – cascade Circuits	no	
40.	Step counter – selection criteria for pneumatic components	no	
41.	PLC applications in fluid power control.	no	
42.	Installation and Maintenance of Hydraulic	no	
43.	Installation and Maintenance of pneumatic	no	
44.	Pneumatic power packs	no	
45.	Fault finding pneumatic circuits	no	
46.	principles of low cost automation, case studies.	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.
- Practical 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 S.Nakkeeran, Assistant Professor
Dated : 7.8.2017

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
S.Nakkeeran Mr.Thirumavalavan	

Course Coordinator **HOD/MECH**
Mr.Thirumavalavan