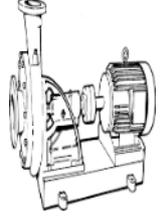


Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bangalore

	Course Title: HYDRAULICS AND PNEUMATIC LAB		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15ME45P
	Type of Course: Tutorial and practice	Credit : 03	Core/ Elective: Core(practice)
CIE- 25 Marks		SEE- 50 Marks	

Prerequisites: Learning concepts of Hydraulics and Pneumatics

Course Objectives:

1. Exposure to the Hydraulics and field application of Fluid Power

Course Outcomes:

On successful completion of the course, the students will be able to attain CO:

Course Outcome		CL	Linked Exercise	Linked PO	Teaching Hrs
CO1	Apply Bernoulli's equations in flow experiments to determine the coefficient of discharge	U/A	1	1,2,3,8,9,10	06
CO2	Determine hydraulic coefficients of notches	U/A	2	1,2,3,8,9,10	06
CO3	Analyze, Variation in flow rates, pressure changes, and minor and major head losses for viscous flows through various diameter pipes.	U/A	3	1,2,3,8,9,10	06
CO4	Evaluate the performance of turbines	U/A	4,5,6	1,2,3,8,9,10	18
CO5	Evaluate the operation and performance of different types of pumps	U/A	7,8	1,2,3,8,9,10	12
CO6	Create the various fluid power circuits for an Engineering application for sustainable development in societal and environmental contexts	U/A	9,10,11,12,13,14	1,2,3,6,8,9,10	30
				TOTAL HOURS	78

Legend: R; Remember, U: Understand A: Application

1. COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
HYDRAULICS AND PNEUMATIC LAB	3	3	3	3	3	1	-	3	3	3
<p>Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.</p> <p>Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.</p>										

LIST OF GRADED PRACTICAL EXERCISES

The practical/Graded exercises should be properly designed and implemented with an attempt to develop different types of learning out comes in affective domain and psychomotor domain, so that students are able to acquire the necessary skills. Following is the list of experiments to be carried out.

Exer cise No.	Practical/Exercise	Apprx. Hrs. Required
A. HYDRAULICS		
1	Determination of Coefficient of discharge of Venturimeter	06
2	Determination of hydraulic coefficients of Rectangular and V-Notch and compare	06
3	Evaluate the major losses in pipes of varying diameter due to friction and interpret their results	06
4	Interpret the performance characteristics for Pelton wheel	06
5	Evaluate the performance characteristics for Kaplan turbine	06
6	Analyzethe performance characteristics for Francis turbine.	06
7	Draw the performance characteristics for Centrifugal pump and compare the same with reciprocating pump	06
8	Draw the performance characteristics for Reciprocating pump	06
B. PNEUMATICS		
9	Control of actuators by simple hydraulic circuits.	06
10	Control of actuators by simple Pneumatic circuits.	09
11	Crate and Demonstration of meter in and meter out circuit.	06
12	Demonstration of sequencing circuit.	03
13	Demonstration of pneumatic circuit for speed control of double acting cylinders.	03
14	Demonstration of pneumatic circuit for speed control of pneumatic motor..	03
TOTAL		78



1.R.S.Khurmi, “*Fluid Mechanics and Machinery*”,S.Chand and Company, 2nd Edition, 2007.

2.*Hydraulics& Pneumatics* – Andrew Parr, Jaico Publishing House New Delhi.

SUGGESTED LIST OF STUDENT ACTIVITYS

Note: the following activities or similar activities for assessing CIE (IA) for 05 marks (Any one)

1. Each student should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned Teacher and HOD.

1	Ask the students to Study of a jet pump and submersible pump used in the fields
2	Take the students to Polytechnic machine shop; ask to observe the hydraulic circuit in shaper machine. Make the sketch and analyze its operation
3	Take the students to nearby earthmoving equipment (JCB) servicing work shop; ask to observe the hydraulic circuit installed in earthmoving equipment. Make the sketch and analyze its operation
4	Study of trouble shooting procedures of various hydraulic and pneumatic circuits
5	Study and think an oil power circuit for an application beyond the syllabus and Draw the circuit diagram , submit hand written report of 500 words
6	Study and think an pneumatic circuit for an application beyond the syllabus and Draw the circuit diagram , submit hand written report of 500 words

2. Each student should conduct different activity and no repetition should occur

Course Delivery:

1. Prepare/Download a dynamic animation to illustrate the following:
 - Working principle of hydraulic pumps.
 - Working principle of hydraulic valves and actuators.
 - Working of different types of hydraulic devices (applications).
 - Download the catalogue of Hydraulic devices.
 - Download the catalogue of pneumatic devices.
2. The course will be delivered through Demonstration and Shop practices

• **MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY**

RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	Unsatisfactory	Developing	Satisfactory	Good	Exemplary	Student Score
	1	2	3	4	5	
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfil team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	5
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	2
Average / Total marks=(4+5+3+2)/4=14/4=3.5=4						

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the given activity.

Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECT ASSESSMENT	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two Tests (Average of two tests to be computed)	10	Blue books	1,2,3,4,5,6
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2,3,4,5,6
				Activity	05	Report	1,2,3,4,5,6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4,5,6
INDIRECT ASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2,3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4,5,6 Effectiveness of Delivery of instructions & Assessment Methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.
3. Student suggested activities report for 5 marks
4. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods

Scheme of Valuation for End Examination

Serial no	Description	Marks
1	Writing procedure a)One experiment on Fluid mechanics/Machines b)One experiment on Pneumatics	05+05=10
2	Conducting of Experiment a)One experiment on Fluid mechanics/Machines(Group of Five)b) One experiment on Pneumatics (Individual)	10+10=20
3	Calculation, results, Inference(Both experiments)	15+5=20
	TOTAL	50

MODEL QUESTION PAPER**IV Semester Diploma in Mechanical Engineering**
HYDRAULIC & PNEUMATICS LAB

Time: 3 Hours

[Max Marks: 50]

1. Determine the Coefficient of discharge of a Venturi meter.
2. Draw the pneumatic circuit to control double acting cylinders by using 5/2 H.L. Valve and Demonstrate.

EQUIPMENT LIST:**Quantity: 01 Each**

1. Bench mounted Test Rig for Venturi meter
2. Bench mounted Test Rig for Notches
3. Bench mounted Test Rig for Friction through pipes
4. Bench mounted Test Rig for Centrifugal Pumps
5. Bench mounted Test Rig for Reciprocating Pumps
6. Bench mounted Test Rig for Kaplan Turbines
7. Bench mounted Test Rig for Francis Turbines
8. Bench mounted Test Rig for Pelton Wheel
9. Pneumatics Trainer Kit with all standard accessories.
10. Oil power hydraulics Trainer Kit with all standard accessories.

