GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: Plastics Technology

Subject Code: BE03023031

Subject Name: Hydraulics & Pneumatics in Plastic Industry

w.e.f. Academic Year:	2024-25
Semester:	3
Category of the Course:	PCC

Prerequisite:	NA
Rationale:	A Plastic Technologist has to supervise operations and maintenance of various molding machines. The injection molding, blow molding, thermoforming, extruder, rotational molding machines require knowledge of construction and working of different components of hydraulic and pneumatic systems. Hence the course has been designed to develop these competencies.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Apply knowledge of Hydraulic and Pneumatic in Injection Molding Machine, Compression and Blow Molding Machines.
02	Draw symbols used in hydraulic systems.
03	Classify the valves used in hydraulic systems. Operate different types of valves used in hydraulic systems
04	Maintain different valves and auxiliaries.

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL*	TH		ESE (E)	PA (M)	PA/ (I)	PBL (I)	ESE (V)	
45	0	60	15	120	04	70	30	20	30	50	200

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

*** Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.**

Course Content:

Unit No.	Content	No.of Hours	%of Weightage
1.	Introduction: Pascal's law & its applications, Bernoulli's Principle & its application, Comparison between Hydraulics and Pneumatics, Advantages and Disadvantages of Hydraulics, Hydraulic Oil-Requirements, Maintenance of Hydraulic oil, Gauges, Connectors, Packing and Seals, Filters and Strainers, Reservoirs, Symbols of Hydraulics and Pneumatics	8	20
2.	Hydraulic Pumps and Motors Pump Specification, Construction and working of Various Pumps like Gear pump, vane pump and radial piston pump. Hydraulic motor specification, Construction and working of various motors like Gear Motor, Vane motor and Radial piston motor.	6	13
3.	Hydraulic Valves Classification, Direction Control Valve- Types : Check valve, Two way Valve , Four way Valve its Application. Flow Control Valve. Pressure Control Valve: Relief Valve, Balanced Valve, Piston Type, Unloading Valves , Sequence Valves, Counter Balance Valve, Pressure Reducing Valves	10	25
4.	Accumulators and Pressure Intensifiers: Accumulators Types like Weight Loaded, Spring Loaded, Gas Charged, Pressure Intensifiers Types single stage and double stage	6	12
5.	Pneumatic System Air Compressor -Single Acting and Double Acting , Components of Pneumatic System, Intercooler, Lubricator, Filter	5	10
6.	Hydraulic Circuit Clamp control circuit, Injection Control Circuit, Reciprocating Screw Circuit, Deceleration Circuit, Prefill Circuit, Hydraulic motor circuit, Hi Low Pump circuit, Pneumatic circuit for Plastic Processing Machine	10	20
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	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	25	15	5	5	5

WhereR:Remember;U:Understanding;A:Application,N:AnalyzeandE:EvaluateC:Create(asper Revised Bloom's Taxonomy)

References/SuggestedLearningResources:

(a) Books:

1. Industrial Hydraulic Manual- Vickers
2. Injection Moulding- Irwin I. Rubin
3. Hydraulic and Pneumatic- Andrew Parr

(b) Open sources of tware and website:

https://nptel.ac.in/courses

Suggested Course Practical List: If any

Practical based on above topics.

List of Laboratory/Learning Resources Required:

*** List of suggested activities for Problem Based Learning:**

Sr. No.	Activity	No. of hours	Total hours claimed	Evaluation Criteria
1	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h	10	Based on report submitted.
2	Poster/chart/power point preparation on technical topics	Duration = 10 h	10	Based on Poster/Chart/PPT preparation and presentation skills
3	Assignment writing.	5 assignments of 2h each.	10	Based on the assignment submitted.
4	Technical Video based learning related to the	Duration of video = 5h Report preparation = 5h	10	Report /presentation based on the video learning outcomes.

	subject			
5	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	-	Based on performance in group discussion, technical depth, knowledge etc.
6	Attending Expert Lecture/Webinar/Seminar	Duration- 1hr each	--	Based on Short report
7	Self-learning on-line course	Minimum duration of the course should be 10h.	10	Examination based assessment at the end of course. Based on the certificate produced
8	Exhibition/ Conference/ Trade Fair/ Industrial exposure for 2-3 days	Visit- 15 hr Report preparation- 5 hr	20	Based on learning, observations and short report.
9	Working model on technical topics	Working = 15 h	15	Based on design, understanding & presentation of the model
10	Non-working model on technical topics	Non- working = 5 h	5	Based on design, understanding & presentation of the model
11	Videos on Industrial safety aspects based on subject	Duration of video = 5h Report preparation = 5h	10	Based on report submitted

- Above activities are suggestive, faculty can choose any of these activities and cover up the rest of the 45 Self Learning Hours.
- The number of hours is suggestive. Faculty can sub-divide the number of hours based on the activity. However, the total number of hours is fixed.
- All records pertaining to the evaluation and assessment of self-learning activities must be properly maintained and preserved at the institute level. These records should be made available to the university upon request.

- Institutes are encouraged to utilize digital platforms, such as Microsoft Teams, for effective record-keeping and to ensure transparency in the evaluation and assessment of self-learning activities.

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