GUJARAT TECHNOLOGICAL UNIVERSITY

MECHANICAL (I.C. ENGINE & AUTOMOBILE ENGINEERING) (11)
HYDRAULIC & PNEUMATIC SYSTEMS IN AUTOMOTIVE VEHICLES
SUBJECT CODE: 2741101
SEMESTER: IV

Type of course: Advanced

Prerequisite: - Nil

Rationale: All automotive vehicles are equipped by hydraulic and pneumatic systems. Hence the fundamental knowledge of hydraulic and pneumatic systems is most essential for an automobile engineer. This course will help the students to get fundamental knowledge in working of various types of pumps, motors, air compressors and their different associative systems. Knowledge of this course will also be helpful to the students in recent advancements in electro pneumatics, hydro-pneumatic suspension, air brake and other associative systems.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	PA (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	0	4	70	30	30	0	10	10	150

Content:

Sr. No	Course Content	Hours	% Weightage
1	**Unit 1:** Introduction to fluid properties, hydraulic fluids, hydraulic and pneumatic systems.	8	17%
2	**Unit 2:** Different elements of hydraulic system, constructional and working details of each component; Pumps and motors, characteristics, Maintenance of hydraulic system, Selection criteria for cylinders, valves, pipes etc.	14	31%
3	**Unit 3:** Different elements of hydraulic system, constructional and working details of each component; air compressor, air motor, control valves, actuators and mountings, filter, regulator and lubricator.	8	17%
4	**Unit 4:** Hydro-Mechanical servo systems, Electro pneumatics, ladder diagram, Servo and Proportional valves, PLC-construction, Hydraulic tipping mechanism, power steering, fort lift hydraulic gear, hydro-pneumatic suspension, air brake, maintenance and trouble shooting of pneumatic circuits.	16	35%

References Books:

1. Majumdar, S.R., "Oil Hydraulic Systems: Principles and Maintenance", TataMcGraw- Hill Publishing Company Ltd., New Delhi, Fourth Reprint, 2003.
2. Peter Rohner, "Fluid Power Logic Circuit Design – Analysis, Design Method and Worked Examples", The Macmillan Press Ltd., UK, 1979.
3. Festo KG, "Pneumatic Tips", Festo, Germany, 1987.
4. Andrew Parr, "Hydraulic and Pneumatics", Jaico publishing house, 1999.

5. Mc Clay Donaldson, “Control of fluid power analysis and design”, Ellis HorwoodLtd.
6. Anthony Espisito, “ Fluid Power with Application”, Pearson Education Singapore)Pte.Ltd, Delhi, India, Fifth Edition, First Indian Reprint, 2003
7. Werner Deppert and Kurt Stoll, “Pneumatic Controls : An introduction to Principles“, Vogel-Druck Wurzburg, Germany, 1975
8. Pippenger, J.J, “Industrial Hydraulic & Pneumatics”, McGraw Hill, 2002.
9. Anderson B W “The analysis and design of pneumatic systems”, John Wiley.
10. A. B. Goodwin, “ Fluid Power Systems”, McMillan Pub. Co.

Course Outcome:

After successful completion of the course, student will be able to:

- Understand the concept of Fluid, types of fluid and its properties.
- Element and maintenance of hydraulic system.
- Construction and working of hydraulic system.
- Application of hydraulic, pneumatic, electronic systems in automobile.

Design based Problems (DP)/Open Ended Problem:

Group Discussion / Technical Debate on advanced topic.

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.