

Hall Ticket No.

Question Paper Code: AME519



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-II

B.Tech V Semester End Examinations, November - 2019

Regulations: R16

DESIGN OF HYDRAULICS AND PNEUMATIC SYSTEMS

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. a) Describe the environmental issues dealing with developing biodegradable fluids; reduce oil leakage and reducing noise levels. [7M]
b) Discuss the general criteria to be considered for selection of hydraulic fluid. [7M]
2. a) Compare the use fluid power to a mechanical system by listing the advantages and disadvantages of each. [7M]
b) Differentiate between hydraulics and pneumatics. [7M]

UNIT – II

3. a) Why cushioning needed in a hydraulic cylinder. Explain with a neat sketch, the principle of operation of a fixed cushioned cylinder. [7M]
b) Classify the hydraulic pumps. Describe the working of rotary pumps Piston pumps. What are merits of it? [7M]
4. a) Explain detail about selection, specifications and characteristics of linear rotary Actuators. [7M]
b) A cylinder has a bore of 125mm diameter and a rod of 70mm diameter. It drives a load of 2000kg vertically up and down at a maximum velocity of 3m/s. The load is slowed down to rest in the cushioning length of 50mm. If the relief valve is set at 140 bar, determine the average pressure in the cushions while extending and retracting. [7M]

UNIT – III

5. a) Design and sketch pressure relief valve for 10 to 20 bar pressure valve. [7M]
b) Discuss the details of the following factors in selection of hydraulic pump. [7M]
6. a) Design and sketch the hydraulic power pack of 20 liters capacity with a gear pump and induction motor and other required elements. [7M]
b) How the hydraulic motors are rated and derive on equation for torque of the motor. [7M]

MODULE – IV

7. a) Design a bleed-off circuit in pneumatic systems. Write down the applications of bleed-off circuit. [7M]
b) Design a hydraulic circuit with check valves. Explain the use of check valves. Merits, demerits and applications. [7M]
8. a) Design a hydraulic circuit with Safety valves. Explain the use of Safety valves. Merits, demerits and applications. [7M]
b) What is an accumulator? State the application of accumulator. Enumerate the different configurations of linear actuators. [7M]

MODULE – V

9. a) Explain PLC and logical gates in PLC with examples. [7M]
b) Differentiate between LCA and microcontroller. [7M]
10. a) Explain functioning of Relay circuit. How it is used in automation. [7M]
b) Explain use of microcontroller for sequencing, Explain how microcontroller is used in automation, with a neat sketch, application. [7M]



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COURSE OBJECTIVES:

The course should enable the students to:

I	Understand of basic knowledge of hydraulic and pneumatic systems.
II	Classification of pumps based on the working phenomenon.
III	Use of hydraulic power pack in the hydraulic systems.
IV	Design of hydraulic circuits based on the application.

COURSE OUTCOMES (COs):

CO 1	To expose the student to the different types of hydraulic and pneumatic systems and their operating principle. To learn the fundamentals and working of different pumps used in the hydraulic system.
CO 2	Understanding the application of hydraulic power pack in the domain of a hydraulic system.
CO 3	To enhance the different hydraulic circuits and function of accumulator used in the hydraulic system. Applying the knowledge of hydraulic and pneumatic systems in the field of automation in the industries and various applications.
CO 4	To expose the student to the different types of hydraulic and pneumatic systems and their operating principle.
CO 5	To learn the fundamentals and working of different pumps used in the hydraulic system.

COURSE LEARNING OUTCOMES (CLOs):

AME519.01	Outline of various systems.
AME519.02	Understand the principles.
AME519.03	Understand the properties of hydraulic fluid.
AME519.04	Define pump and its types.
AME519.05	Understand the flow rate of pumps and efficiency.
AME519.06	Selection and specifications of different types of pumps.
AME519.07	Discuss about actuators and effect of pressure.
AME519.08	Define elements of power pack systems.
AME519.09	Discuss about the capacity of hydraulic systems.
AME519.10	Understand the importance of safety systems.
AME519.11	Define hydraulic circuits and valves.
AME519.12	Explain about different hydraulic circuits.
AME519.13	Discuss the various types of control valves.
AME519.14	Understand the working of solenoid valve
AME519.15	Understand the hydraulic and pneumatic equipment in detailed.
AME519.16	Understand the programmable logic circuits and controllers.
AME519.17	Discuss the maintenance and troubleshooting of hydraulic systems.
AME519.18	Understand the hydraulic and pneumatic equipment in detailed.

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Bloom's Taxonomy Level
1	a	AME519.01	Describe the environmental issues dealing with developing biodegradable fluids; reduce oil leakage and reducing noise levels.	CO 1	Understand
	b	AME519.02	Discuss the general criteria to be considered for selection of hydraulic fluid.	CO 1	Understand
2	a	AME519.02	Compare the use fluid power to a mechanical system by listing the advantages and disadvantages of each.	CO 1	Understand
	b	AME519.03	Differentiate between hydraulics and pneumatics.	CO 1	Understand
3	a	AME519.04	Why cushioning needed in a hydraulic cylinder. Explain with a neat sketch, the principle of operation of a fixed cushioned cylinder.	CO 2	Remember
	b	AME519.05	Classify the hydraulic pumps. Describe the working of rotary pumps Piston pumps. What are merits of it?	CO 2	Understand
4	a	AME519.04	Explain detail about selection, specifications and characteristics of linear rotary Actuators.	CO 2	Remember
	b	AME519.06	A cylinder has a bore of 125mm diameter and a rod of 70mm diameter. It drives a load of 2000kg vertically up and down at a maximum velocity of 3m/s. The load is slowed down to rest in the cushioning length of 50mm. If the relief valve is set at 140 bar, determine the average pressure in the cushions while extending and retracting.	CO 2	Understand
5	a	AME519.07	Design and sketch pressure relief valve for 10 to 20 bar pressure valve.	CO 3	Remember
	b	AME519.08	Discuss the details of the following factors in selection of hydraulic pump.	CO 3	Remember
6	a	AME519.09	Design and sketch the hydraulic power pack of 20 liters capacity with a gear pump and induction motor and other required elements.	CO 3	Understand
	b	AME519.10	How the hydraulic motors are rated and derive on equation for torque of the motor.	CO 3	Understand
7	a	AME519.11	Design a bleed-off circuit in pneumatic systems. Write down the applications of bleed-off circuit	CO 4	Remember
	b	AME519.12	Design a hydraulic circuit with check valves. Explain the use of check valves. Merits, demerits and applications.	CO 4	Understand
8	a	AME519.13	Design a hydraulic circuit with Safety valves. Explain the use of Safety valves. Merits, demerits and applications.	CO 4	Understand
	b	AME519.14	What is an accumulator? State the application of accumulator. Enumerate the different configurations of linear actuators.	CO 4	Remember
9	a	AME519.15	Explain PLC and logical gates in PLC with examples.	CO 5	Understand
	b	AME519.17	Differentiate between LCA and microcontroller.	CO 5	Remember
10	a	AME519.16	Explain functioning of Relay circuit. How it is used in automation.	CO 5	Understand
	b	AME519.18	Explain use of microcontroller for sequencing, Explain how microcontroller is used in automation, with a neat sketch, application.	CO 5	Understand

Signature of Course Coordinator

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