

Reg. No. 

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**B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023**  
 Fourth Semester  
**ME18404– HYDRAULICS AND PNEUMATICS SYSTEMS**  
 (Mechanical Engineering)  
 (Regulation 2018/2018A)

**TIME: 3 HOURS**

**MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Students will have the ability to illustrate the principles, basic laws, applications, advantages and disadvantages of fluid power systems.	2
CO 2	Students will be able to illustrate the construction, working and selection of different hydraulic components.	2
CO 3	Students will have the ability to design the basic hydraulic circuits for different industrial applications.	3
CO 4	Students will be able to distinguish the construction, working and selection of different pneumatic components & fluidic elements and apply them for designing the basic industrial pneumatic circuits.	3
CO 5	Students will describe the concepts of Electrohydraulic, microprocessor, PLC, and able to design the hydraulic & pneumatic circuits for the automation of different industrial processes.	3

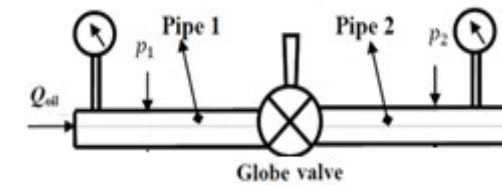
**PART- A (10 x 2 = 20 Marks)**  
 (Answer all Questions)

Q. No.	QUESTION	CO	RBT LEVEL
1.	What are the different power-packs used in fluid power system? List the components in each one of them.	1	2
2.	The kinematic viscosity of a hydraulic fluid is 0.0001m <sup>2</sup> /s. If it is flowing in a 20 mm diameter steel pipe at a velocity of 10 m/s. Find the friction factor.	1	2
3.	What type of pumps are used for hydraulic applications? Justify.	2	3
4.	A gear pump has 80 mm outside diameter, a 60 mm inside diameter and 25 mm width. If the actual pump flow at 2000 rpm and rated pressure is 0.00183 m <sup>3</sup> /s, what is the volumetric efficiency?	2	2
5.	How is hydrostatic transmission different from mechanical transmission of power?	3	2
6.	What is the role of pressure intensifier in a hydraulic circuit?	3	2
7.	What are limit switches? List the types of limit switches.	4	2
8.	What is the significance of a muffler in a pneumatic system?	4	2
9.	What is meant by low cost automation?	5	2
10.	How will the usage of microprocessors be advantageous in low cost automation?	5	2

**PART- B (5 x 14 = 70 Marks)**

Marks CO RBT LEVEL

11. (a) For the given arrangement find pressure drop-in units of bar. (14) 1 2  
 Pipe 1: length = 6m, ID = 20mm, Pipe 2: length =6m, ID = 20mm. The globe valve is 20mm in size and is wide open. Sp. Gravity =0.85, kinematic viscosity is 0.0002 m<sup>2</sup>/s and Q =0.003 m<sup>3</sup>/s.

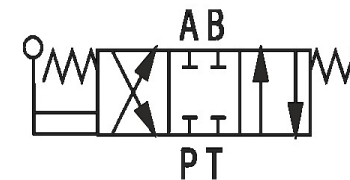


(OR)

- (b) (i) The kinematic viscosity of a hydraulic fluid is 0.0001 m<sup>2</sup>/s. If it is flowing in a 30-mm diameter pipe at a velocity of 6 m/s, find the head loss due to friction in units of bars for a 100-m smooth pipe. The oil has a specific gravity of 0.90. Comment on the nature of flow and explain the various types of flow. (10) 1 2  
 (ii) At a velocity of 3.5 m/s, how many m<sup>3</sup>/s of fluid will flow through a 0.15 m inside diameter pipe? (4) 1 2
12. (a) Explain the construction and working of a Bent axis piston pump. What is the significance of bend axis in controlling the discharge of the pump? (14) 2 3

(OR)

- (b) Identify the valve and operation mechanism from the given ANSI symbol. Explain its construction and discuss in detail the working of the valve in different positions using a simple circuit. (14) 2 3



13. (a) A hydraulic application involves encountering frequent load variations. As a result there may be frequent leaks in the circuit as well. Identify a component that can be used in the circuit, which will help in overcoming the leakage and shocks due to load variation. Explain the cases with individual circuit diagrams. (14) 3 3

(OR)

- (b) By positioning the flow control valve suitably, same hydraulic circuit can be used to control the speed of the actuator for using in surface grinding and boring operations. Identify the circuits and explain with neat sketches. (14) 3 3
14. (a) (i) Explain the working of a single stage air compressor with neat diagram. (8) 4 2  
(ii) With neat diagram explain the working principle of quick exhaust valve. (6) 4 2

(OR)

- (b) With neat sketches explain the working of FRL unit used in a pneumatic circuit. (14) 4 2
15. (a) Design and explain the hydraulic circuit using CASCADE method to perform the pressing operation using two hydraulic cylinders with the following sequence; i) A+, ii) B+, iii) B-, iv) A-. (14) 5 3

(OR)

- (b) (i) Discuss how the fault finding and maintenance techniques will be helpful to avoid the failure of pneumatic system. (8) 5 3  
(ii) With suitable examples, justify the microcontrollers and PLC are essential parts of automation. (6) 5 3

**PART- C (1 x 10 = 10 Marks)**

(Q.No.16 is compulsory)

- |  | Marks | CO | RBT<br>LEVEL |
|--|-------|----|--------------|
| 16. With a neat circuit diagram explain unloading of a low pressure pump in a double pump hydraulic system using for punching operation. | (10)  | 3  | 3            |

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