Q. Code:788035

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

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.	**3**
CO 2	Students will be able to illustrate the construction, working and selection of different hydraulic components.	**3**
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.	**4**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Why hydraulic system is preferred rather than pneumatic for high pressure applications?	**1**	**3**
2.	How pascal's law utilized in hydraulic system to multiply the force?	**1**	**3**
3.	Hydrodynamic pumps can be used in hydraulic power system – TRUE/FALSE. Justify.	**2**	**3**
4.	Draw the ANSI symbol for 4/3 pilot operated directional control valve and pressure relief valve.	**2**	**3**
5.	What is pressure switch? What is its function in fluid power system?	**3**	**3**
6.	Accumulator is the device used to generate the hydraulic energy – TRUE/FALSE. Justify.	**3**	**3**
7.	Muffler is used to reduce the temperature of pneumatic system – TRUE/FALSE. Justify.	**4**	**3**
8.	Why 5/2 DCV is preferred to control the double acting cylinder in pneumatics?	**4**	**3**

9.		Draw the ANSI symbol for i) Intensifier ii) Pneumatic motor.	**5**	**3**	
10.		How PLC is used for low-cost automation?	**5**	**3**	

PART- B (5 x 14 = 70 Marks)

			Marks	CO	RBT LEVEL
11. (a)	**(i)**	Discuss the essential properties of the good hydraulic fluid and their effects on the performance on the hydraulic system.	**(10)**	**1**	**3**
	(ii)	How the head-loss in pipes and valves are calculated?	**(4)**	**1**	**3**
		(OR)			
(b)	**(i)**	Discuss the merits and demerits of pneumatic system compared to electrical system.	**(7)**	**1**	**3**
	(ii)	How the performance like volumetric efficiency and mechanical efficiency of the pumps affected by speed and pressure of oil? Explain with suitable graphs.	**(7)**	**1**	**3**
12. (a)	**(i)**	Can internal gear pump used for operating the hydraulic forklift? If yes, explain the working of the pump with the neat diagram, else justify your answer.	**(10)**	**2**	**3**
	(ii)	How increase in outlet pressure of the pump will affect the flow rate? Explain with suitable graph.	**(4)**	**2**	**3**
		(OR)			
(b)	**(i)**	What type of hydraulic actuator is used for performing the drilling operation? Explain the working of the same with neat diagram.	**(8)**	**2**	**3**
	(ii)	Briefly discuss the applications of telescopic cylinder with neat diagram.	**(6)**	**2**	**3**
13. (a)	**(i)**	What is the device used as leakage compensator in hydraulic system? Design and explain the same with neat circuit diagram.	**(7)**	**3**	**4**

	(ii)	How does the extension and retraction speeds of the double acting actuator are controlled by meter-in circuit? Explain the same with neat circuit diagram.	**(7)**	**3**	**4**
		(OR)			
(b)	**(i)**	How the sequence valve is used to perform the bending operation? Explain the same with neat circuit diagram.	**(7)**	**3**	**4**
	(ii)	Design the hydraulic circuit to perform the punching operation and explain the same.	**(7)**	**3**	**4**
14. (a)	**(i)**	What is FRL unit? Explain the construction and working of the same with neat diagram.	**(10)**	**4**	**3**
	(ii)	What is the significance of quick exhaust valve? Draw its symbol.	**(4)**	**4**	**3**
		(OR)			
(b)	**(i)**	What device is used to generate the pneumatic power? Explain the working of the same with neat diagram.	**(8)**	**4**	**3**
	(ii)	Describe how to identify problems and maintain a double-acting pneumatic cylinder.	**(6)**	**4**	**3**
15. (a)		Design the cascade pneumatic circuit to perform the clamping and blanking operation with the sequence A_1^+, A_2^+, A_2^-, A_1^-.	**(14)**	**5**	**4**
		(OR)			
(b)	**(i)**	Design the hydraulic circuit to perform the surface grinding operation and explain its working principle.	**(7)**	**5**	**4**
	(ii)	Design the hydraulic circuit to perform the punching operation with the help of sequence valves and explain its working principle.	**(7)**	**5**	**4**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Design the hydraulic forklift for carrying the load of 5000 Kg. Assume two double acting hydraulic cylinders with identical shape and size are used for this purpose. Calculate the total force required to lift the car using the cylinders diameter of 0.4m.	**(10)**	**5**	**4**

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