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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January 2024 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Mechanical Engineering **Duration: 3 hrs.**
Course Code: 20ME7DEHAP **Max Marks: 100**
Course: Hydraulics and Pneumatics

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Draw a neat schematic figure showing all the components of hydraulic system.	*CO1*	*PO1*	**04**
	b)	A pump has a displacement of 120 cm^3. It delivers 1.5×10^{-3} m^3/s at 900 rpm, and 75 bars. If the prime mover input torque is 150 Nm, Compute the following (i) Volumetric efficiency, (ii) Mechanical efficiency, (iii) Overall efficiency (iv) Theoretical torque input.	*CO5*	*PO2*	**06**
	c)	How are hydraulic pumps classified? With a neat sketch explain the construction and working of a balanced vane pump.	*CO2*	*PO1*	**10**
		OR			
2	a)	Discuss any four types of hydraulic fluids used in hydraulic systems.	*CO1*	*PO1*	**04**
	b)	A hydraulic motor has a 100 cm^3 of volumetric displacement. If it has a pressure rating of 140 bar and receives oil from a 0.001 m^3/s theoretical flow rate pump. Find the motor: (i) Speed, (ii) Theoretical torque, and (iii) Theoretical power in kW.	*CO5*	*PO2*	**06**
	c)	Classify hydraulic actuators. Draw the neat sketch of (i) unbalanced fixed displacement vane motor and (ii) axial piston motor	*CO2*	*PO1*	**10**
		UNIT - II			
3	a)	List the different types of direction, pressure, and flow control valves. With a neat sketch describe the construction and working of pilot operated pressure relief valve.	*CO1*	*PO1*	**10**
	b)	With a neat sketch explain the construction and working of (i) Simple needle valve and (ii) Globe valve	*CO1*	*PO1*	**10**

			UNIT - III			
	4	a)	Provide a clear illustration and description of the structure and operation of a dual pump hydraulic circuit employing a 4/3 push lever-operated directional control valve with spring return.	*CO3*	*PO2*	**10**
		b)	Sketch the cylinder synchronizing hydraulic circuit when cylinders are in (i) parallel with lever operated, spring return 4/3 DCV and (ii) series with solenoid operated, spring returned 4/3 DCV.	*CO3*	*PO2*	**10**
			UNIT - IV			
	5	a)	One of the basis of classification of pneumatic system is based on pressure range of the working medium. List and briefly explain such pneumatic system.	*CO2*	*PO1*	**04**
		b)	With a neat sketch briefly explain the working of (i) Piston type compressor and (ii) diaphragm compressor.	*CO2*	*PO1*	**08**
		c)	List four major components required in the preparation of the compressed air. Explain with a neat sketch, working of an air filter.	*CO2*	*PO1*	**08**
			UNIT - V			
	6	a)	With neat sketch explain the construction & working of (i) simple poppet valve and (ii) suspended seat type slide valve.	*CO4*	*PO1*	**10**
		b)	With neat circuit diagram explain the supply air throttling and exhaust air throttling.	*CO4*	*PO1*	**10**
			OR			
	7	a)	With neat sketch explain an air cooled and water-cooled heat exchanger system used in hydraulic system.	*CO4*	*PO1*	**10**
		b)	Describe (i) types of contamination and sources of contamination and (ii) reservoir in hydraulic system.	*CO4*	*PO1*	**10**

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