PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION – AUGUST- 2024

Semester : 4	**Date : 7/08/2024**
Course Code : MEC3062	**Time :9.30pm to 12.30pm**
Course Name : Hydraulics and Pneumatics	**Max Marks : 100**
Program : B.Tech	**Weightage : 50%**

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A		
ANSWER ANY 4 QUESTIONS		**4Q X 5M=20M**
1	Discuss the characteristics of Centrifugal pumps used in general applications.	(CO 1)	[Knowledge]
2	Describe two differences between single acting and double acting cylinder.	(CO 2)	[Knowledge]
3	What is a positive displacement pump? In what ways does it differ from a centrifugal pump?	(CO 3)	[Knowledge]
4	Generalize the expression for overall pump efficiency.	(CO 4)	[Knowledge]
5	Briefly explain advantage and disadvantage of directional control valve.	(CO 1)	[Knowledge]
6	Give reason why hydraulic systems are slower in operation.	(CO 2)	[Knowledge]

PART B		
ANSWER ANY 5 QUESTIONS		**5Q X 10M=50M**
7	Briefly explain 4/3 way DCV with a neat sketch.	(CO 1)	[Comprehension]
8	Write a brief note on conditioning and distribution of compressed air.	(CO 2)	[Comprehension]
9	A pump has a displacement volume of 98.4 cm³. It delivers 0.0152 m³/s of oil at 1000 RPM and a pressure of 70 bar, with the prime mover input torque being 124.3 N-m. What is the overall efficiency of the pump? Additionally, what is the theoretical torque required to operate the pump?	(CO 3)	[Comprehension]

10	a. What is the theoretical flow rate from a fixed-displacement axial piston pump with a nine-bore cylinder operating at 2000 RPM? Each bore has a diameter of 15 mm and stroke is 20 mm. b. How much hydraulic power would a pump produce when operating at 140 bar and delivering 0.001 m3/s of oil? What power rated electric motor would be selected to drive this pump if its overall efficiency is 85%?	(CO 1)	[Comprehension]
11	a. A hydraulic motor receives a flow rate of 72 LPM at a pressure of 12000 kPa. If the motor speed is 800 RPM and if the motor has a power loss of 3 kW, find the motor actual output torque and overall efficiency. b. A hydraulic motor has a volumetric efficiency of 90% and operates at a speed of 1750 RPM and a pressure of 69 bar. If the actual flow rate consumed by the motor is 0.0047 m3/s and the actual torque delivered by the motor is 147 Nm, find the overall efficiency of the motor.	(CO 1)	[Comprehension]
12	A pair of two-way valves is used to fill and drain a vessel. Write the schematic diagram of the hydraulic circuit of entire hydraulic system.	(CO 1)	[Comprehension]
13	Draw the schematic diagram of control of single acting hydraulic cylinder.	(CO 4)	[Comprehension]

PART C			
ANSWER ANY 2 QUESTIONS		**2Q X 15M=30M**	
14	A pump has a displacement volume of 98.4 cm³. It delivers 0.0152 m³/s of oil at 1000 RPM and a pressure of 70 bar, with the prime mover input torque being 124.3 Nm. What is the overall efficiency of the pump? Additionally, what is the theoretical torque required to operate the pump?	(CO 1)	[Application]
15	A compressor delivers 400 m3 of free air per hour at a pressure of 6 bar gauge and a temperature of 40. Atmospheric air at compressor intake has a relative humidity of 80 % and a temperature of 20. Determine the amount of water that can be extracted from the compressor plant per hour. Note: (a) At 20 and zero bar gauge pressure, 100 m3 of free saturated air contains 1.73 kg of water. (b) corresponding to 40 and 6 bar compressor output pressure, amount of water per 100 m³ of free saturated air is given by 0.728	(CO 2)	[Application]
16	a. Calculate the required size of the receiver that must supply air to pneumatic system consuming for 10 minutes between 828 kPa and 690 kPa before the compressor resumes operation. b. what size is required if the compressor is running and delivering at 0.170 m³/min.	(CO 3)	[Application]