Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: ME465

Course Name: INDUSTRIAL HYDRAULICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1	a)	What is the flashpoint of a hydraulic fluid?	(2)
	b)	Why can't air be used for all fluid power applications?	(2)
	c)	Differentiate between fluid transport and fluid power systems.	(3)
	d)	Air at 20°C and atmospheric pressure has a density of 1.23 kg/m^3. Find its specific gravity. What is the ratio of the specific gravity of water to the specific gravity of air at 20°C and atmospheric pressure? What is the significance of the ratio?	(3)
2	a)	What is the neutralization number of a hydraulic fluid? Give its importance.	(2)
	b)	Comment on the differences between pneumatic and hydraulic fluid power systems.	(3)
	c)	Differentiate between viscosity and viscosity index.	(3)
	d)	A sample of oil with viscosity index of 70 is tested with a 0 VI oil and a 100 VI oil whose viscosity values at 100°F are 375 and 125 SUS, respectively. What is the viscosity of the sample oil at 100°F in units of SUS?	(2)
3	a)	Derive an expression for the actual volumetric displacement of the vane pump in terms of the dimensions of the pump components.	(5)
	b)	Explain the factors considered for the selection of pump.	(5)
4	a)	Explain with a neat sketch, the working of a gear pump. Also obtain an expression for its volumetric efficiency.	(8)
	b)	Pumps do not pump pressure. Justify this statement.	(2)

PART B

Answer any three full questions, each carries 10 marks.

5	a)	Differentiate between strainers and filters.	(3)
	b)	With the help of a hydraulic circuit, explain any one application of accumulator.	(7)
6	a)	What are the functions of baffle plate in a fluid reservoir?	(4)
	b)	What are the differences between separator and non-separator type of accumulator.	(3)
	c)	How filters are rated.	(3)

7	a)	Explain with a neat sketch, the working of gear motor.	(6)
	b)	Name four different types of hydraulic cylinder mountings.	(2)
	c)	A cylinder is required to extend at a minimum speed of 0.75 m/s in a system with a flow rate of 60 LPM. What cylinder size is required?	(2)
8	a)	With a neat diagram, explain the construction and working of in line piston motor (Bent axis design).	(8)
	b)	State how this motor can be run at different speeds, without changing the hydraulic input power to the motor.	(2)

PART C

Answer any four full questions, each carries 10 marks.

9		Explain with neat sketch, how three way and four way direction control valve operate.	(10)
10	a)	With a neat sketch, explain the construction and working of pressure reducing valve.	(8)
	b)	Give symbolic representation of a pressure-reducing valve.	(2)
11	a)	Explain the construction features and function of flexible hoses.	(5)
	b)	Sketch and explain a spool-type directional control valve actuated using a solenoid.	(5)
12		With a neat circuit diagram, explain the working of a meter in circuit for controlling the speed of a cylinder. State its advantages and disadvantages.	(10)
13		Draw the sequencing circuit for operating two double acting cylinders in a sequence in both strokes. Use appropriate component for the circuit & explain its working for a hydraulic system.	(10)
14		What are the conditions for the two cylinders to be synchronized? Sketch and explain a hydraulic circuit in which two cylinders are arranged in parallel.	(10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: ME465

Course Name: Industrial Hydraulics

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1	a)	Why are additives sometimes used with hydraulic fluid?	(3)
	b)	With the help of a neat sketch, explain the basic components of a hydraulic system.	(5)
	c)	An 8 L sample of oil is compressed in a cylinder until pressure increases from 0.7 to 2.7 MPa. If the bulk modulus equals 80 MPa, find the change in the volume of oil.	(2)
2	a)	Differentiate between viscosity and viscosity index. Under what conditions is viscosity index important?	(5)
	b)	What is the basic law that is important in applying fluid power, and what is its significance?	(2)
	c)	A cylinder container has a diameter of 0.5 m and a height of 1 m. If it is to be filled with a liquid having a specific weight of 2000 N/m^3, how many kg of this liquid must be added?	(3)
3	a)	Discuss why all fluid power systems are fitted with a pressure relief valve.	(3)
	b)	With neat sketch, explain how vane pump can be made to work as a variable displacement pump without changing the speed of the prime mover.	(7)
4	a)	Comment on the relative comparison in performance among gear, vane and piston pumps.	(2)
	b)	Discuss about the influence of pressure, size and speed on pump noise level.	(3)
	c)	Compare the performance curves of typical dynamic and positive displacement pump at constant speed.	(3)
	d)	Why a gear pump cannot be used as a variable displacement pump?	(2)

PART B

Answer any three full questions, each carries 10 marks.

5	a)	Explain the construction and operation of piston-type accumulators.	(7)
	b)	What do you understand by the term degree of filtration?	(3)
6	a)	Sketch and describe a rectangular flat-topped reservoir fitted with basic accessories.	(8)

	b)	Why would a reservoir be pressurized?	(2)
7	a)	Why is the actual flow rate required by a hydraulic motor higher than the theoretical flow rate?	(3)
	b)	With the help of a neat sketch, explain the construction and working of a balanced vane motor. What is its main advantage over vane motor?	(7)
8	a)	Describe end cushion provided in hydraulic cylinder with neat sketch.	(7)
	b)	Why does the rod of a double acting cylinder retract at a greater velocity than it extends for the same input flow rate?	(3)

PART C

Answer any four full questions, each carries 10 marks.

9	a)	Explain pressure relief valve with a neat sketch.	(8)
	b)	Give its graphical symbol.	(2)
10		With a neat sketch, explain spool type direction control valve used to control double acting cylinder.	(10)
11	a)	Suggest a suitable servo valve for the hydraulic power steering system of automobiles. Explain its working with a neat sketch.	(7)
	b)	Differentiate between the term burst pressure and working pressure of conducting lines.	(3)
12		With a neat circuit diagram, explain the working of a meter out circuit for controlling the speed of a cylinder. State its advantages and disadvantages.	(10)
13		With the help of an appropriate hydraulic circuit diagram, explain rapid traverse and speed control.	(10)
14		The table of a surface grinding machine needs automatic reciprocating motion. Draw a hydraulic circuit to achieve this motion.	(10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: ME465

Course Name: Industrial Hydraulics

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1 a) What are the common power transmission systems? Write the merits of fluid power system over the others. (4)

b) Explain the components of a simple fluid power system with a neat diagram. (6)

2 a) Draw the symbols of 2/2, 3/2, 4/2 and 4/3 DCV. (4)

b) Write a note on the essential properties of good hydraulic fluids. (6)

3 a) How positive displacement pumps are classified? Give the merits of each. (4)

b) A positive displacement pump has a displacement volume of 8.2×10^{-5} m^3. It delivers 1.26×10^{-3} m^3/s at 1000 rpm and 70 bar pressure. If the prime mover input torque is 100 Nm, find the volumetric efficiency, mechanical efficiency and overall efficiency of the pump. (6)

4 a) Explain the working of an internal gear pump with a neat diagram. State the advantages, limitations and applications of the same. (10)

PART B

Answer any three full questions, each carries 10 marks.

5 a) What makes the filter an essential component in a fluid power circuit? (4)

b) With neat diagrams explain the different locations in which filters can be included in a hydraulic circuit. (6)

6 a) Draw a neat diagram of a hydraulic reservoir. Explain how a reservoir is designed to; (10)

i. Serve as a heat exchanger.

ii. Act as collecting points for all the dirt particles and contamination in the system.

iii. Keep the temperature of the fluid at 45 – 50 °C during varying working and atmospheric conditions.

7 a) State the necessity of cushioning in a linear actuator. (2)

	b)	How a telescopic cylinder is constructed? Explain with a neat diagram.	(6)
	c)	Give any two applications of telescopic cylinders.	(2)
8	a)	Explain the working of a radial piston motor with a neat diagram.	(7)
	b)	Differentiate between rotary and semi-rotary actuators.	(3)

PART C

Answer any four full questions, each carries 10 marks.

9	a)	Differentiate the operation of a sequence valve and pressure reducing valve with diagrams.	(10)
10	a)	With a simple diagram explain the construction of a solenoid actuated 4/3 DCV.	(4)
	b)	Explain the following centre configurations of 4/3 DCV with symbols and applications. i. All blocked ii. H type iii. Y type	(6)
11	a)	Describe and draw the symbols of any five actuation methods used for moving the spool of direction control valves.	(10)
12	a)	Draw the circuit for a hydraulic shaper and describe the provisions made to achieve the following; i. Slow cutting and quick return motions. ii. Speed control for the cutting stroke. iii. Provision for changing the stroke length.	(10)
13	a)	What is meant by meter-in and meter-out circuits?	(4)
	b)	Explain the working of a meter-in circuit for controlling the motion of a rotary actuator with a neat diagram.	(6)
14	a)	Draw a sequencing circuit with two single acting cylinders A and B such that the cylinder A extends first and after full extension of A cylinder B extends. In return stroke both will return simultaneously. Explain the working in steps.	(10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

Course Code: ME465
Course Name: Industrial Hydraulics

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1	a)	Name few applications of fluid power in stationary and mobile systems.	(4)
	b)	Explain the different types of hydraulic fluids with merits and demerits of each.	(6)
2	a)	With neat sketches explain any two devices used for measuring the flow in a fluid system.	(10)
3	a)	Explain the working of a vane pump with a neat diagram.	(8)
	b)	Describe how the flow rate is varied in such pumps.	(2)
4	a)	What is an axial plunger pump? Draw a neat diagram and explain the working.	(10)

PART B

Answer any three full questions, each carries 10 marks.

5	a)	State the functions of an accumulator in a hydraulic circuit.	(4)
	b)	With suitable example, explain how the use of an accumulator reduces the pump size and hence the motor size.	(6)
6	a)	How accumulators are classified?	(3)
	b)	Describe the construction and working of compressed gas accumulator with a neat sketch.	(7)
7	a)	With a neat diagram explain the construction and working of a double acting hydraulic cylinder.	(7)
	b)	Which are the common types of cylinder mountings in use?	(3)
8	a)	Explain the working of a gear motor with a neat diagram.	(8)
	b)	How the direction of rotation is changed in gear motors?	(2)

PART C

Answer any four full questions, each carries 10 marks.

9	a)	What is the meaning of pilot controlled direction control valve? Explain its working with a suitable example.	(7)

	b)	List other types of valve actuators in use with symbols.	(3)
10	a)	Differentiate between 4/3 and 3/2 direction control valves.	(2)
	b)	Draw the symbols of both.	(2)
	c)	Draw simple circuits showing the application of these valves.	(6)
11	a)	Describe the application of the following valves with circuit diagrams: i. counter balance valve ii. unloading valve	(10)
12	a)	A hydraulic vehicle lift has to be designed with two cylinders working in synchronisation. Draw the circuit diagram of this hydraulic system and explain how the synchronised motion of the cylinders is achieved.	(8)
	b)	Explain a method to control the speed of such circuits.	(2)
13	a)	What is meant by regenerative circuits?	(1)
	b)	Explain the working of a regenerative circuit with a neat diagram.	(6)
	c)	List the advantages and applications these circuits.	(3)
14	a)	Describe the working of the following circuits with neat diagrams. i. actuator locking circuit ii. counter balance circuit	(10)

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