

CBCS Scheme

15ME72

USN

--	--	--	--	--	--	--	--	--	--

Seventh Semester B.E. Degree Examination, December 2018/January 2019

Fluid Power systems (Model QP)

Time: 3 hrs

Max marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module

Module-1															
1	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30px;">a.</td> <td>Explain the structure of hydraulic system with a neat sketch. (08 Marks)</td> </tr> <tr> <td>b.</td> <td>What do you understand by the term “wear of moving parts due to solid particle contamination of the fluid”? Explain it with a neat sketch. (08 Marks)</td> </tr> </table>	a.	Explain the structure of hydraulic system with a neat sketch. (08 Marks)	b.	What do you understand by the term “wear of moving parts due to solid particle contamination of the fluid”? Explain it with a neat sketch. (08 Marks)										
a.	Explain the structure of hydraulic system with a neat sketch. (08 Marks)														
b.	What do you understand by the term “wear of moving parts due to solid particle contamination of the fluid”? Explain it with a neat sketch. (08 Marks)														
OR															
2	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30px;">a.</td> <td>Explain the principle of operation of water cooled heat exchanger and air cooled heat exchangers with a neat sketch. (08 Marks)</td> </tr> <tr> <td>b.</td> <td>Explain the different types of seals used in hydraulic systems. (08 Marks)</td> </tr> </table>	a.	Explain the principle of operation of water cooled heat exchanger and air cooled heat exchangers with a neat sketch. (08 Marks)	b.	Explain the different types of seals used in hydraulic systems. (08 Marks)										
a.	Explain the principle of operation of water cooled heat exchanger and air cooled heat exchangers with a neat sketch. (08 Marks)														
b.	Explain the different types of seals used in hydraulic systems. (08 Marks)														
Module-2															
3	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30px;">a.</td> <td>Explain with a neat sketch the working principle of unbalanced vane pump. (06 Marks)</td> </tr> <tr> <td>b.</td> <td>Define accumulators. Classify the different accumulators used in hydraulic systems. (04 Marks)</td> </tr> <tr> <td>b.</td> <td>A hydraulic pump has a displacement volume of 120cm³. Its actual flow rate is 0.0015m³/s at 900rpm and 75 bars. If the actual torque input by the prime mover to the pump is 150N-m, determine the overall efficiency of the pump. Also, find the theoretical torque input to the pump for its operation. (06 Marks)</td> </tr> </table>	a.	Explain with a neat sketch the working principle of unbalanced vane pump. (06 Marks)	b.	Define accumulators. Classify the different accumulators used in hydraulic systems. (04 Marks)	b.	A hydraulic pump has a displacement volume of 120cm ³ . Its actual flow rate is 0.0015m ³ /s at 900rpm and 75 bars. If the actual torque input by the prime mover to the pump is 150N-m, determine the overall efficiency of the pump. Also, find the theoretical torque input to the pump for its operation. (06 Marks)								
a.	Explain with a neat sketch the working principle of unbalanced vane pump. (06 Marks)														
b.	Define accumulators. Classify the different accumulators used in hydraulic systems. (04 Marks)														
b.	A hydraulic pump has a displacement volume of 120cm ³ . Its actual flow rate is 0.0015m ³ /s at 900rpm and 75 bars. If the actual torque input by the prime mover to the pump is 150N-m, determine the overall efficiency of the pump. Also, find the theoretical torque input to the pump for its operation. (06 Marks)														
OR															
4	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30px;">a.</td> <td>Describe the working of Bent axis axial piston motor with a neat sketch. (08 Marks)</td> </tr> <tr> <td>b.</td> <td> <p>A hydraulic transmission operating at 70 bar pressure has the following characteristics</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Pump</th> <th style="padding: 5px;">Motor</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">$V_D = 82\text{cm}^3$</td> <td style="padding: 5px;">$V_D = ?$</td> </tr> <tr> <td style="padding: 5px;">$\eta_v = 82\%$</td> <td style="padding: 5px;">$\eta_v = 92\%$</td> </tr> <tr> <td style="padding: 5px;">$\eta_m = 88\%$</td> <td style="padding: 5px;">$\eta_m = 90\%$</td> </tr> <tr> <td style="padding: 5px;">$N = 500\text{ rpm}$</td> <td style="padding: 5px;">$N = 400\text{ rpm}$</td> </tr> </tbody> </table> <p>Find i) Displacement of the motor. ii) Motor output torque (8 Marks)</p> </td> </tr> </table>	a.	Describe the working of Bent axis axial piston motor with a neat sketch. (08 Marks)	b.	<p>A hydraulic transmission operating at 70 bar pressure has the following characteristics</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Pump</th> <th style="padding: 5px;">Motor</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">$V_D = 82\text{cm}^3$</td> <td style="padding: 5px;">$V_D = ?$</td> </tr> <tr> <td style="padding: 5px;">$\eta_v = 82\%$</td> <td style="padding: 5px;">$\eta_v = 92\%$</td> </tr> <tr> <td style="padding: 5px;">$\eta_m = 88\%$</td> <td style="padding: 5px;">$\eta_m = 90\%$</td> </tr> <tr> <td style="padding: 5px;">$N = 500\text{ rpm}$</td> <td style="padding: 5px;">$N = 400\text{ rpm}$</td> </tr> </tbody> </table> <p>Find i) Displacement of the motor. ii) Motor output torque (8 Marks)</p>	Pump	Motor	$V_D = 82\text{cm}^3$	$V_D = ?$	$\eta_v = 82\%$	$\eta_v = 92\%$	$\eta_m = 88\%$	$\eta_m = 90\%$	$N = 500\text{ rpm}$	$N = 400\text{ rpm}$
a.	Describe the working of Bent axis axial piston motor with a neat sketch. (08 Marks)														
b.	<p>A hydraulic transmission operating at 70 bar pressure has the following characteristics</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Pump</th> <th style="padding: 5px;">Motor</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">$V_D = 82\text{cm}^3$</td> <td style="padding: 5px;">$V_D = ?$</td> </tr> <tr> <td style="padding: 5px;">$\eta_v = 82\%$</td> <td style="padding: 5px;">$\eta_v = 92\%$</td> </tr> <tr> <td style="padding: 5px;">$\eta_m = 88\%$</td> <td style="padding: 5px;">$\eta_m = 90\%$</td> </tr> <tr> <td style="padding: 5px;">$N = 500\text{ rpm}$</td> <td style="padding: 5px;">$N = 400\text{ rpm}$</td> </tr> </tbody> </table> <p>Find i) Displacement of the motor. ii) Motor output torque (8 Marks)</p>	Pump	Motor	$V_D = 82\text{cm}^3$	$V_D = ?$	$\eta_v = 82\%$	$\eta_v = 92\%$	$\eta_m = 88\%$	$\eta_m = 90\%$	$N = 500\text{ rpm}$	$N = 400\text{ rpm}$				
Pump	Motor														
$V_D = 82\text{cm}^3$	$V_D = ?$														
$\eta_v = 82\%$	$\eta_v = 92\%$														
$\eta_m = 88\%$	$\eta_m = 90\%$														
$N = 500\text{ rpm}$	$N = 400\text{ rpm}$														
Module-3															
5	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30px;">a.</td> <td>Describe the working principle of the following control valves along with its graphic symbol. i) Pressure sequencing valve ii) Simple Needle valve. (8 Marks)</td> </tr> <tr> <td>b.</td> <td> <p>Draw neat hydraulic symbols for the following valves:</p> <ul style="list-style-type: none"> i) Four way, spring centered, three position manually actuated valve. ii) Four way, two positions, mechanically actuated valve. iii) Four way, spring centered, three positions pilot actuated valve. iv) Four way, spring centered, three positions solenoid actuated valve. (08 Marks) </td> </tr> </table>	a.	Describe the working principle of the following control valves along with its graphic symbol. i) Pressure sequencing valve ii) Simple Needle valve. (8 Marks)	b.	<p>Draw neat hydraulic symbols for the following valves:</p> <ul style="list-style-type: none"> i) Four way, spring centered, three position manually actuated valve. ii) Four way, two positions, mechanically actuated valve. iii) Four way, spring centered, three positions pilot actuated valve. iv) Four way, spring centered, three positions solenoid actuated valve. (08 Marks)										
a.	Describe the working principle of the following control valves along with its graphic symbol. i) Pressure sequencing valve ii) Simple Needle valve. (8 Marks)														
b.	<p>Draw neat hydraulic symbols for the following valves:</p> <ul style="list-style-type: none"> i) Four way, spring centered, three position manually actuated valve. ii) Four way, two positions, mechanically actuated valve. iii) Four way, spring centered, three positions pilot actuated valve. iv) Four way, spring centered, three positions solenoid actuated valve. (08 Marks)														

		OR
6	a	Explain with suitable circuits ,how the single and double acting hydraulic cylinders are controlled. (08 Marks)
	b	Explain briefly the cylinder sequencing circuit with a neat sketch. (08 Marks)
		Module-4
7	a	Explain the characteristics of compressed air. (04Marks)
	b	Explain with a neat sketch the working of single and double acting pneumatic cylinder (06Marks)
	c	Explain with a neat diagram the structure of Pneumatic control system (06 Marks)
		OR
8	a	Explain with a suitable circuit diagram the application of a memory valve. (06Marks)
	b	Explain the working of shuttle valve and time delay valve with a neat sketch. (10 Marks)
		Module-5
9	a	Explain in detail supply air throttling and exhaust air throttling with a neat sketch. (08 Marks)
	b	Explain a typical pneumatic circuit with OR logic gate using shuttle valve. (08 Marks)
		OR
10	a	Explain signal overlapping elimination using reversing valves. Draw a neat pneumatic circuit involving two cylinders and a reversing valve. (10Marks)
	b	Explain clearly the following as applied to electro-pneumatic controls. i) Normally closed Relay switch ii) Normally open relay switch. (06 Marks)