

CBCS SCHEME

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15MT53

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Hydraulics and Pneumatics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With a neat sketch, explain the hydraulic circuit and the laws plugged to develop the circuit. (06 Marks)
- b. List out any 4 important advantages of hydraulic system. (04 Marks)
- c. Two hydraulic cylinders are connected at their piston ends (cap ends rather than rod ends) by a single pipe. Cylinder 'A' has a diameter of 50mm and cylinder 'B' has a diameter of 100mm. A retraction force of 2222N is applied to the piston rod of cylinder 'A'. Determine the following:
- i) Pressure at cylinder A.
- ii) Pressure at cylinder B.
- iii) Output force of cylinder B. (06 Marks)

OR

- 2 a. Explain the design and working of a vane pump. (08 Marks)
- b. List out any 4 important advantages of positive displacement pump over non-positive displacement pump. (04 Marks)
- c. With a neat sketch, explain the pumping theory. (04 Marks)

Module-2

- 3 a. With a neat sketch, explain the operation of external gear motor. (06 Marks)
- b. List out the differences between motor and pump. (04 Marks)
- c. A hydraulic motor has a volumetric displacement of 123cm^3 operating at a pressure of 60 bar and speed 1800 rpm. If the actual flow rate consumed by the motor is $0.004\text{ m}^3/\text{sec}$ and the actual torque delivered by the motor is 100Nm. Find:
- i) Volumetric efficiency
- ii) Mechanical efficiency
- iii) Overall efficiency. (06 Marks)

OR

- 4 a. Explain with a neat sketch, the construction and operation of simple pressure relief valve. (06 Marks)
- b. With a neat sketch, explain the working principle of the solenoid actuation in DCV's. (06 Marks)
- c. Symbolically represent the following hydraulic DCV's :
- i) 4/2 DCV with push button actuation and spring retraction.
- ii) 4/3 DCV with solenoid actuation and spring retraction with open centre. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, $42+8=50$, will be treated as malpractice.

Module-3

- 5 a. With a neat hydraulic circuit, explain the controlling of single and double acting cylinders. (08 Marks)
- b. With a neat hydraulic circuit, explain the application of regenerative circuit for drilling operation. (08 Marks)

OR

- 6 a. Name the desirable properties of hydraulic oil. (05 Marks)
- b. What are hydraulic accumulators? Classify the accumulators used in hydraulic system. (06 Marks)
- c. What is strainer? With a neat sketch explain the strainer. (05 Marks)

Module-4

- 7 a. Briefly explain the characteristics of compressed air. (05 Marks)
- b. Explain end position cushioning in pneumatic cylinder with diagram. (06 Marks)
- c. Define pneumatic system. List out the differences between hydraulic and pneumatic system. (05 Marks)

OR

- 8 a. Draw the pneumatic circuit of indirect control of cylinder with double piloted DCV. (07 Marks)
- b. Explain the design and construction features of 3/2 way ball type of DC valves of pneumatic systems. (05 Marks)
- c. Symbolically represent the following pneumatic DCV's:
- i) 3/2 DCV with roller actuated and spring retraction.
- ii) 5/2 DCV with solenoid actuated and spring retraction. (04 Marks)

Module-5

- 9 a. Explain a typical pneumatic circuit with OR logic using shuttle valve. (08 Marks)
- b. Draw the control diagram for a 3/2 roller actuated spring return valve and recommend the procedure for the same. (08 Marks)

OR

- 10 a. Write a short note on:
- i) Electromagnetic relay
- ii) Limit switch. (10 Marks)
- b. Draw the circuit diagram of electro pneumatic control of a double acting cylinder using a 4/2 solenoid actuated spring return cylinder. (06 Marks)
