Code No: 157BQ

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, July/August - 2022
FLUID POWER SYSTEMS
(Mechanical Engineering)

Time: 3 Hours **Max.Marks:75**

Answer any five questions
All questions carry equal marks
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1.a) Differentiate between hydraulic and pneumatic systems for control units with sufficient examples.
b) With a suitable sketch, explain the basic components required in a hydraulic system.[7+8]

2.a) What is meant by the K factor of a valve or fitting? "To minimize pressure losses, the K factor of a valve should be made as small as possible". True or false? Justify.
b) Illustrates the operation of an external gear pump. Obtain the expressions for volumetric displacement, theoretical flow rate and volumetric efficiency. [7+8]

3.a) What is hydraulic actuator? Classify hydraulic actuators based on their principles of operation.
b) Describe the construction and working of double-acting cylinders with a piston rod on one side and on both sides. [5+10]

4. A pressure relief valve contains a poppet with a 4.20 cm^2 area on which system pressure acts. During assembly a spring with a spring constant of 3200 N/cm is installed in the valve to hold the poppet against its seat. The adjustment mechanism is then set so that the spring is initially compressed 0.50 cm from its free-length condition. In order to pass full pump flow through the valve at the PRV pressure setting, the poppet must move 0.30 cm from its fully closed position. Determine the cracking pressure and full pump flow pressure. [15]

5.a) What is the difference between closed-circuit and open-circuit hydrostatic transmissions?
b) Explain how valves are actuated using manual, mechanical, fluid pilot, and electric solenoid methods. [7+8]

6. Describe in detail about the construction, principle, working and applications of regenerative cylinder circuit. [15]

7.a) Explain the various types of compressors used in pneumatic applications.
b) What is a time delay valve? What are its components? Explain the principle of operation and applications of a time delay valve. [8+7]

8.a) List and explain seven basic electrical devices used in electro pneumatics.
b) Draw the Displacement-Step Diagram and Displacement-Time Diagram for a pneumatic drilling operation. [7+8]

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