MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

FIFTH SEMESTER B.TECH. (ELECTRONICS & INSTRUMENTATION ENGG.)
END SEMESTER DEGREE EXAMINATIONS, MARCH - 2021

CONTROL SYSTEM COMPONENTS [ICE 3151]

TIME: 3 HOURS   23-03-2021   MAX. MARKS: 50

Instructions to candidates : *Answer ALL questions and missing data may be suitably assumed.*

1A. Draw and explain the torque-speed characteristics of a servomotor. Also define the performance specifications of servomotor.

1B. Draw the schematic of a resolver and explain its working.

1C. Consider the stator and rotor position of a synchro given in Fig. Q1C. Calculate the stator voltage if the rotor is supplied with 230V, 50Hz supply with a winding turns ratio of 2.5:1.

(4+4+2)

2A. Draw all the schematic symbols used in synchros.

2B. Explain the working of a variable reluctance stepper motor with neat sketches.

2C. List all types of the directional valves and explain working of any two types with necessary figure.

(2+4+4)

3A. Describe the modes of operation of stepper motor.

3B. Determine the uncontrollable flow rate through a 4 in. globe valve where C_v equals 50 and rangeability equals 10.4:2. Assume the full flow (wide open) differential pressure across the valve equals 5 psi.

3C. Explain the working of proportional relay type pneumatic controllers with neat diagram.

(4+3+3)

4A. For the hydraulic actuated system shown in Fig. 4A, draw the symbol.

4B. Consider a chemical mixing process system in which pressure and temperature are process variables. Chemical composition is diluted with steam in the process. Outflow is regulated to maintain the pressure whereas steam inflow is regulated to maintain the temperature. Draw the P&I diagram.

4C. Draw the schematic of a hydraulic power system and explain its working.

(3+4+3)

5A. What do you understand from loop gain? Explain with necessary figure.

5B. Draw the sketch of any two type of gear pumps and describe their construction and working.

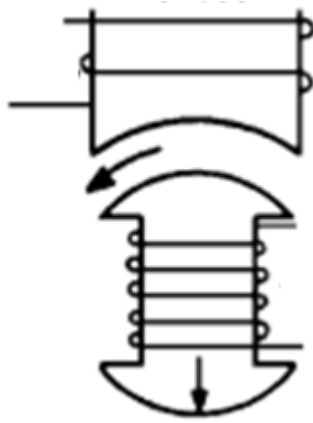5C. Explain the working of gyroscope with relevant representation of angular motion vectors.

(3+4+3)

Fig Q1C
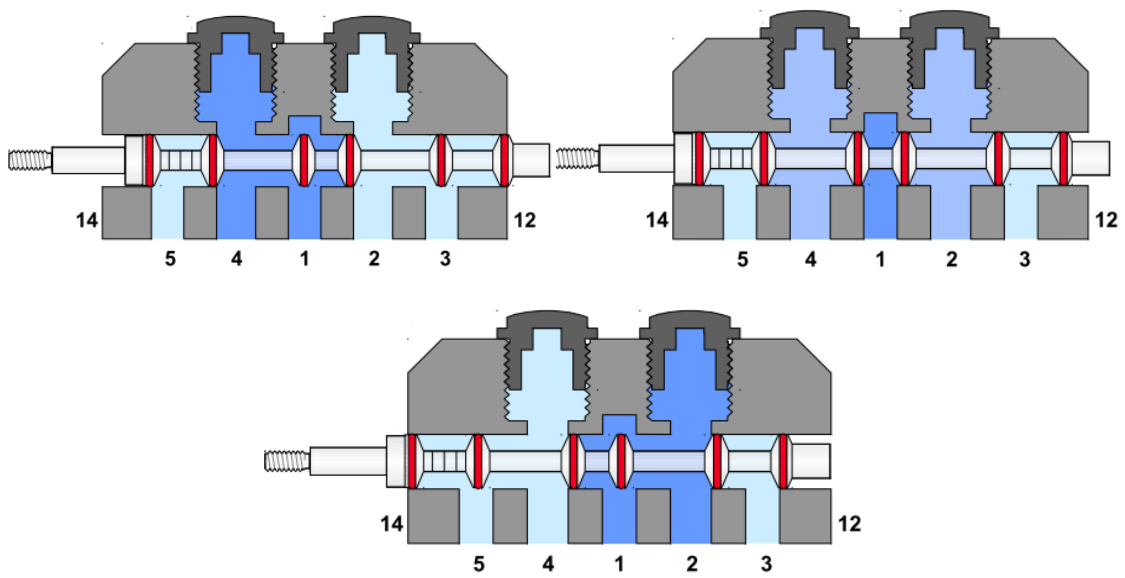

Fig Q4A

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