CBCS SCHEME

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Seventh Semester B.E. Degree Examination, July/August 2022
Fluid Power Systems

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 80

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

Module-1

1　a. Define Pascal's law. Explain any one application of Pascal's law. (06 Marks)
　b. Explain different types of hydraulic fluids. (10 Marks)

OR

2　a. Explain different types of filters used in hydraulic system. (06 Marks)
　b. Explain sealing devices in fluid power systems. (06 Marks)
　c. What are the advantages of fluid power system? (04 Marks)

Module-2

3　a. Sketch and explain the working of vane pump. (05 Marks)
　b. Explain the selection procedure of hydraulic pump. (04 Marks)
　c. A pump has following design data:
　　Discharge volume = 100 cm^3,　discharge = 0.0015 m^3/s,　speed = 1000 rpm,
　　working pressure = 70 bar,　input torque to prime mover = 120 Nm.
　　Find: (i) Overall efficiency　(ii) Theoretical torque (07 Marks)

OR

4　a. A pump supplies oil at 0.0016 m^3/s to a 40 mm diameter double acting hydraulic cylinder. If the extending and retracting load is 5000 N and rod diameter is 20 mm, find the:
　　(i)　Hydraulic pressure during extending and retracting
　　(ii)　Piston velocity during extending and retracting
　　(iii)　Cylinder power during extending and retracting. (06 Marks)
　b. List the applications of accumulator. (04 Marks)
　c. Sketch and explain the second class lever system. (06 Marks)

Module-3

5　a. Explain the details of Popet valve with a neat sketch. (04 Marks)
　b. Explain the working principle of regenerative valve. (06 Marks)
　c. With a neat sketch, explain the solenoid valve. (06 Marks)

OR

6　a. Explain the working of double acting hydraulic cylinder with a circuit diagram. (08 Marks)
　b. Explain how meter-in circuit is used to control the speed of an actuator. (08 Marks)

Module-4

7　a. Explain the end cushioning of pneumatic cylinder. (07 Marks)
　b. State the characteristics of compressed air. (04 Marks)
　c. Explain the structure of pneumatic system with a block diagram. (05 Marks)

OR

8 a. Draw the different symbols used to represent the components of fluid power system.
                                                                                (08 Marks)
   b. What are the functions of FRL unit in pneumatic system?   **(03 Marks)**
   c. Explain the working principle of shuttle valve with neat sketch and symbol. **(05 Marks)**

Module-5

9 a. Write the symbolic representation of sequence valve and explain briefly the working principle.
                                                                                (06 Marks)
   b. With a neat circuit diagram, explain the cascade control in pneumatic system. **(10 Marks)**

OR

10 a. Explain with a circuit diagram the representation of AND logic functions in pneumatic system.
                                                                                (10 Marks)
   b. What are the differences between Hydraulic System and Pneumatic System? **(06 Marks)**

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Seventh Semester B.E. Degree Examination, July/August 2022
Tribology

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of approval design data hand book can be permitted.

Module-1

1 a. Explain Tribology. **(02 Marks)**
   b. List the different types of lubricants and its specific field of applications. **(06 Marks)**
   c. Define viscosity of a lubricant and its effect of temperature and pressure. **(08 Marks)**

OR

2 a. Explain the properties of lubricants (any 6). **(06 Marks)**
   b. With the help of neat sketches, explain the working of any-two viscosity measuring instruments. **(06 Marks)**
   c. Explain standard grades of lubricants. **(04 Marks)**

Module-2

3 a. Explain modified adhesion theory. **(06 Marks)**
   b. Sketch and explain two-friction measuring methods. **(06 Marks)**
   c. Write a short note on friction of non-metallic materials. **(04 Marks)**

OR

4 a. Discuss different types of wear. **(08 Marks)**
   b. Explain Delamination theory of wear and how wear debris analysis in conducted using modern techniques. **(08 Marks)**

Module-3

5 a. Derive an expression for coefficient of friction for an idealized journal bearing. **(08 Marks)**
   b. A lightly loaded journal bearing has the following specifications:
   Diameter of journal =   50mm
   Bearing length =   80mm
   Diametral clearance ratio = 0.002
   Radial load =   750N
   Viscosity of lubricant =   10cP
   Speed =   4000rpm
   Determine:
   i) Frictional torques   ii) Co-efficient of friction   iii) Power loss. **(08 Marks)**

OR

6 State the assumptions made in the derivation of Reynold's equation, Hence derive the Reynold's equation in 2-D. **(16 Marks)**

Module-4

7   Derive an Analytical expression for pressure distribution along an idealized plane slider bearing with a fixed shoe.   **(16 Marks)**

OR

8   a.   Derive an expression for the rate of flow through a Hydrostatic step bearing.   **(08 Marks)**

     b.   A hydrostatic step bearing for a turbine rotor has the following specifications:

Diameter of shaft =	150mm
Diameter of pocket =	100mm
Vertical thrust on bearing =	70kN
Shaft speed =	1000 rpm
Viscosity of lubricant =	0.025 Pa-sec
Desirable oil film thickness =	0.125mm

Determine:
i)   Rate of oil flow through the bearing.
ii)   Power loss due to viscous friction.
iii)   Co-efficient of friction.   **(08 Marks)**

Module-5

9   a.   List out commonly used bearing materials and their respective properties in few words.   **(08 Marks)**

     b.   Explain any 2-surface modification process.   **(08 Marks)**

OR

10   a.   Explain:
i)   Physical Vapour Deposition (PVD)
ii)   Chemical Vapour Deposition (CVD)
Processes with a neat sketch.   **(10 Marks)**

     b.   Explain thermo-mechanical treatment such as
i)   Carburizing
ii)   Nitriding.   **(06 Marks)**

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Seventh Semester B.E. Degree Examination, July/August 2022
Mechatronics

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Define Mechatronics. Briefly enumerate the evolution stages of mechatronics. **(08 Marks)**
   b. List the advantages of mechatronics systems. **(04 Marks)**
   c. Differentiate between the following:
      (i)   Primary and Secondary transducers.
      (ii) Active and Passive trasducers. **(04 Marks)**

OR

2 a. With a neat sketch, explain the working principle of Eddy current type proximity sensor and photoelectric type proximity sensor. **(10 Marks)**
   b. Explain the principle of operation of Hall Effect Sensor. **(06 Marks)**

Module-2

3 a. What are microcontrollers? Differentiate clearly between microprocessor and microcontroller. **(08 Marks)**
   b. What do you mean by 'Bus'? With block diagram, explain the different types of Bus used in 8085 micro processor. **(08 Marks)**

OR

4 a. Explain with block diagram, the architecture of Intel's 8085A microprocessor. **(10 Marks)**
   b. What are Interrupts? With block diagram, explain how an interrupt signal communicates with the microprocessor. **(06 Marks)**

Module-3

5 a. Briefly explain the basic architecture of a PLC. **(08 Marks)**
   b. List the criteria's needed for the selection of a PLC. **(04 Marks)**
   c. Briefly explain how a latching circuit works. **(04 Marks)**

OR

6 a. What is the meaning of integration? Highlight some of the features, which a real-time mechatronic control system should satisfy. **(08 Marks)**
   b. Explain the role of sensors in an industrial robot. Briefly explain its classification of Robot sensors. **(08 Marks)**

Module-4

7 a. What are Cams? With sketches, explain the various types of Cam followers. **(06 Marks)**
   b. Write a note on Belt drive system. Also explain the types of belts. **(06 Marks)**
   c. With sketch, explain Ratchet and Pawl mechanism. **(04 Marks)**

OR

8 a. List and explain the stepper motor specifications. (08 Marks)
   b. Explain the characteristics curve of a diode. (04 Marks)
   c. Explain the principle of operation of a Relay. (04 Marks)

Module-5

9 a. With a block diagram, explain the various components and their functions of a typical hydraulic system. (06 Marks)
   b. What are directional control valves? Explain with sketches sliding spool valve and poppet valve. (10 Marks)

OR

10 a. What is the basic principle of operation of a Flow Control Valves? With sketches, explain needle valve and globe valve. (10 Marks)
    b. With sketch, explain how the single acting cylinder is controlled. (06 Marks)

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