

Code No: 07A71401

R07**Set No. 2****IV B.Tech I Semester Examinations, NOVEMBER 2010****MOTION CONTROL DESIGN****Mechatronics****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Distinguish between Automation and Mechanization.
 (b) Explain necessity for special purpose machines in automation and mechanization. Illustrate with specific examples. [8+8]
2. (a) Discuss the role of FRL unit in pneumatic system.
 (b) Describe pressure gauge used in pneumatic system with a neat sketch. [8+8]
3. Write short notes on:
 (a) Closed loop control systems.
 (b) Adoptive control system. [8+8]
4. (a) Explain the use of idler pulley in belt drives with their advantages.
 (b) A shaft which rotates at a constant speed of 160 rpm is connected by belt to a parallel shaft 720 mm apart, which has to run at 60, 80 and 100 rpm. The smallest pulley on the driving shaft is 40 mm radius. Determine the remaining radii of the two stepped pulleys for
 i. A crossed belt and
 ii. An open belt. Neglect belt thickness and slip. [6+10]
5. (a) Describe Vane motor used in hydraulic systems with a neat sketch.
 (b) Describe piston motor used in hydraulic system. [8+8]
6. (a) Write the advantages of Stepper motors over Electric motors.
 (b) Describe Optical Incremental encoders used in DC brushless servo motors. [16]
7. Describe the role of semiconducting devices in the mechatronic systems. [16]
8. Derive the composite rotation matrix for the following sequence of rotation:
 (a) Rotation about OZ axis by 45°
 (b) Rotation about OX axis by 90° . [16]

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R07**Set No. 4**

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MOTION CONTROL DESIGN
Mechatronics

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain open loop and closed loop control system with an example.
(b) Explain the significance and disadvantage of feed forward control system. [8+8]
2. Differentiate between conductors, insulators and semiconducting materials with examples. [16]
3. (a) What is a timing belt? Discuss the use of Timing belts in power transmission?
(b) Discuss various types of lead screws in power transmission mentioning its nomenclature. [8+8]
4. (a) Draw the symbolic representation of the following pneumatic elements.
 - i. Vacuum pump.
 - ii. Double acting cylinder with single ended piston rod.
 - iii. Air filter.
 - iv. Flexible pipeline.
(b) Describe twin lobe air compressor with a neat sketch. [8+8]
5. Explain the different types of Robot languages used in robot programming. [16]
6. (a) Compare and contrast industrial pneumatics and industrial hydraulic circuit highlighting their limitations.
(b) Explain any two types of control valves used in hydraulic system. [8+8]
7. (a) Describe DC brushless motor with a neat sketch. State the characteristics.
(b) Write the advantages and applications of DC brushless motors over DC brushed motors. [8+8]
8. (a) Discuss characteristics of hydraulic actuators and their limitations.
(b) Describe various types of working fluids used in hydraulic systems. [8+8]

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R07**Set No. 1**

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MOTION CONTROL DESIGN
Mechatronics

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Classify various hydraulic control valves and their principle and specific applications in industrial hydraulics.
 (b) Discuss operation of Electro-Hydraulic actuator used in machine tools with the help of neat diagram. [8+8]
2. Explain the fundamental concepts of adoptive and fuzzy control systems. [16]
3. Describe bipolar junction transistor with a neat sketch and discuss the applications in electronic circuits. [16]
4. Draw a circuit diagram to control and operate hydraulic acting cylinder using 4/3 Direction control valve, solenoid control using a PLC and explain the principle of working of the Components of the system. [16]
5. Discuss different types of Inductive and Capacitive Sensors used in mechatronic systems. [16]
6. (a) Describe the various types of flat belt drives. State the applicaitons of each type.
 (b) The power is transmitted from a pulley 800 mm diameter running at 300 rpm to a pulley 2000 mm diameter by means of a belt. Find the speed lost by the driven pulley as a result of creep, if the stress on the tight and slack side of the belt is 1.2MPa and 0.4 MPa respectively. The young's modulus of the material of the belt is 90 MPa. [6+10]
7. Describe any three pneumatic hand tools used in manufacturing industry. [16]
8. For the point $auvw = (6,2,3)T$ perform following operations:
 (a) Rotate 60° about X axis, followed by translation of 6 units along Y axis.
 (b) Translate 6 units along Y axis, followed by rotation of 45° about X axis.
 (c) Rotate 45° about Z axis followed by translation of 5 units along the rotated U axis. [16]

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R07**Set No. 3**

IV B.Tech I Semester Examinations, NOVEMBER 2010
MOTION CONTROL DESIGN
Mechatronics

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain about forward biasing and reverse biasing in semiconducting devices.
(b) Describe NPN transistor with a neat sketch. [8+8]
2. Write short notes on:
(a) Open loop control systems.
(b) Fuzzy logic system. [8+8]
3. Describe compound gear train and derive an expression for the speed ratio. [16]
4. (a) Draw the block diagram depicting the operation of an industrial hydraulic system. also draw the symbolic representation of any two elements shown in the block diagram.
(b) State the merits of Pneumatic systems in automation applications. [8+8]
5. Discuss characteristics of pneumatic actuators and their limitations. Suggest remedial measures to counteract limitations. [16]
6. Discuss the features of SCARA and cylindrical robot and also find the D-H matrix for cylindrical robot. [16]
7. (a) Explain meter-in and meter-out hydraulic circuits.
(b) Explain the basic components of a hydraulic system. [8+8]
8. Explain the working principle of AC induction motors and write their advantages and applications. [16]
