Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: III (Biomedical & Instrumentation) Engineering

CBCS Regular Examination November – December 2014

2BM302 Medical System Actuators & Electrical Machines

Time: 3 Hours **Total Marks: 70**

Instruction:
1. Write each section in separate answer book.
2. Figures to the right indicate marks.
3. Assume suitable data, if necessary.
4. Answer should be brief and to the point.

Section - I

Que. – 1 **12**

a) What is actuator? Enlist different types of actuators. Explain how actuator work as a system component in open and close loop control mode.

b) Enlist the types of stepper motor. Explain the working of 1-phase ON mode and 2-phase ON mode operation with neat sketches.

OR

Que. – 1 **12**

a) Define "Relay". Draw and explain the structural diagram of electromechanical relay.

b) Draw the schematic arrangement of hydraulic power system and explain in detail.

Que. – 2 **11**

a) What is hall effect? Explain the working magnetostrictive actuator.

b) Draw the schematic arrangement of solenoid valve and explain in detail. What is the use of solenoid valve?

OR

Que. – 2 **11**

a) Which type of arrangement is used for electro-pneumatic actuator? Explain in detail.

b) What is the use of pressure regulator? Draw spring loaded and weight loaded self-compensating pressure regulator and explain in detail.

Que. – 3 **12**

a) A stepper motor has a step angle of 1.8 degree and is driven at 4000 pulse per second. Determine i) Resolution ii) Motor speed iii) Number of pulses required to rotate through 54 degree.

b) What are the advantages and disadvantages of hydraulic and pneumatic system?

c) Compare electro-mechanical and solid state relay.

d) Enlist different direction control valve. Draw the neat sketch of any one valve.

Section – II

Que. – 4 12

a) Explain Losses and Efficiency of Induction motor. Derive the equation of mechanical power and Rotor output.

b) An 8 pole DC machine armature is wound with 1200 number of conductors. The magnetic flux per pole is 0.03wb.find out the EMF generated for LAP winding and Wave Winding.

OR

Que. – 4 12

a) Explain Direct loading Test of Transformer. A 150W, 12V lamp is connected to a secondary of a Transformer. The primary is supplied from 240V mains. Calculate the turns ratio and current drawn from the circuit.

b) Differentiate between the DC generator and DC motor. Explain the principle of DC generator.

Que. – 5 11

a) Explain the principle of operation of Transformer and derive the EMF equation of the transformer.

b) Derive the equation of torque and speed of DC motor.

OR

Que. – 5 11

a) Explain Construction of the DC Machine with neat diagram.

b) Explain capacitor start -capacitor run and shaded pole Induction motor.

Que. – 6 Write Short note on following(Any Three) 12

a) Three point DC shunt Motor Starter.

b) Define all day efficiency and Regulation of Transformer.

c) Explain the Double Revolving Field Theory of Induction Motor.

d) Working of an Autotransformer.

END OF PAPER