

GANPAT UNIVERSITY
B. TECH SEM- III (BME) REGULAR EXAMINATION- NOV-DEC 2016
2BM303 Medical System Actuators

TIME: 3 HRS

TOTAL MARKS: 60

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
 (2) Figures on right indicate marks.
 (3) Be precise and to the point in answering the descriptive questions.

SECTION: I

- Q.1** (10)
- a) What is relay? Explain solid state relay with neat diagram. 5
- b) What is step angle? Explain Permanent magnet stepper motor with neat diagram. 5

OR

- Q.1** (10)
- a) What is solenoid valve? Explain thermal relay with neat diagram. 5
- b) What is stepper motor? Explain hybrid stepper motor with 1 phase ON mode operation. 5

- Q.2** (10)
- a) What is the use of accumulator in hydraulic system? Draw the schematic arrangement for it. 2
- b) Determine the steady state equation of spring diaphragm actuator. 4
- c) What is used as a source of power in hydraulic actuator? 4
 Find the working force resulting from 200 N is applied to 1 cm radius forcing piston: i) If a working piston has a radius of 6 cm then ii) find hydraulic pressure.

OR

- Q.2** (10)
- a) Make comparison between hydraulic system and pneumatic system. 5
- b) What is the principle of operation for pneumatic actuator? Draw the functional arrangement of linear spring – diaphragm actuator for fixed spring orientation (Direct Action) and explain. 5
- Q.3** (10)
- a) What is electro-pneumatic actuator? Draw the component arrangement of it and explain in detail. 5
- b) What is the use of directional control valve? Draw the spool valve and poppet valve. Explain their performance operation. 5

SECTION: II

Q.4 (10)
a) Derive the EMF equation of transformer. Write the difference between core type and shell type transformer. 5

b) Explain open circuit test on transformer. 5

OR

Q.4 (10)
a) The core of a 100-kVA, 11000/550V, 50-Hz, 1-phase, core type transformer has a cross section of 20cm×20cm. Find (i) the number of H.V. and L.V. turns per phase and (ii) the e.m.f. per turn if the maximum core density is not to exceed 1.3 Tesla. Assume a stacking factor of 0.9. 5

b) Write the short note on classification of transformer. 5

Q.5 (10)
a) What is the function of the Actuator? Explain its elementary components with neat diagram. 5

b) Explain the construction and working of the variable reluctance stepper motor with 1 phase ON mode operation. 5

OR

Q.5 (10)
a) What is micro stepping? Explain Two Phase AC Servo Motor with neat diagram. 5

b) What is the working principle of linear motor? Explain its working with neat diagram. 5

Q.6 (10)
a) Describe the construction and working of the DC Permanent Magnet Motor. 5

b) Describe the construction and working of the electromechanical relay. 5

-----END OF PAPER-----