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BIEEE-004

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

June, 2017

00397

BIEEE-004 : MECHATRONICS

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. All questions carry equal marks. Use of scientific calculator is permitted.*

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1. (a) Explain the functioning of a servo motor with the help of a diagram.

(b) Describe armature speed control of a DC motor. *5+5*

2. (a) Differentiate between active and passive sensors. What are the requirements for selecting a sensor ?

(b) What are the advantages and limitations of hydraulic systems over other systems ? *5+5*

3. (a) How does a microcontroller differ from a microprocessor ?

(b) Draw the block diagram of a basic microcontroller and explain the function of each subsystem. *5+5*

4. (a) Describe the working principle of directional control valves with the help of a neat diagram.

(b) Explain communication interface with the help of block diagram. *5+5*

5. (a) Describe the mechanism of a cam. Also discuss the application and working of a cam-controlled system.

(b) Draw the block diagram of a digital control system. Explain how a digital control system is different from an analog control system. *5+5*

6. (a) With the help of a neat sketch, explain the working principle of Ratchet and Pawl system.

(b) A platinum resistance temperature sensor has a resistance of 120 Ω at 0°C and forms one arm of a Wheatstone bridge. At this temperature, the bridge is balanced with each of the other arms being 120 Ω. The temperature coefficient of resistance of the platinum is 0·0039/K. What will be the output voltage from the bridge for a change in temperature of 20°C ? The loading across the output is effectively open-circuit and the supply voltage to the bridge is from a source of 6·0 V with negligible internal resistance. *5+5*

7. (a) Explain the role of Robots in industries and also give their advantages.

(b) Draw the ladder logic to represent the following case :

"Two switches are normally open and both have to be closed for a motor to operate." *5+5*

8. (a) A d.c. motor behaves like a first-order system with a transfer function of relating output position to which it has rotated a load to input signal of $\frac{1}{s(1+s\tau)}$. If the time constant τ is 1 sec and the motor is to be used in a closed-loop control system with unity feedback and proportional controller, determine the value of the proportionality constant which will give a closed-loop response with a 25% overshot.

(b) What are the different components in PLC ? Also write the advantages of PLC. *5+5*

9. Write short notes on any ***two*** of the following : *2×5=10*

(a) Fax Machine

(b) N.C. Machine

(c) Mechanical Control of Automobile System

(d) Signal Conditioners
