No. of Printed Pages : 3

BIEE-035

DIPLOMA - ELECTRICAL ENGINEERING (DELVI)

00141

Term-End Examination

December, 2012

BIEE-035 : CONTROL SYSTEMS

Time : 2 hours *Maximum Marks : 70*

Note : *There are total **eight** questions. All questions carry **equal** marks. Question No. **1** is **compulsory**. **Four** questions are to be attempted out of questions No **02** to **08**.*

1. Write ***'True'/'False'*** and justify. **2x7=14**

(a) Manual control system is better than automatic control system.

(b) Temperature control system is an example of servo system.

(c) The settling time for 1st order control system is 4T.

(d) $\zeta > 1$ denotes an underdamped system.

(e) A pole in RHS of a S-plane denotes an unstable system.

(f) To work as an error detector, potentiometers must be used in pair.

(g) The term 'Robot' is derived from the Greek word 'Robota' meaning a *master*.

2. (a) Compare open loop and closed loop control system. 7

(b) Draw and explain the working of Automatic Control System with the help of a block diagram. 7

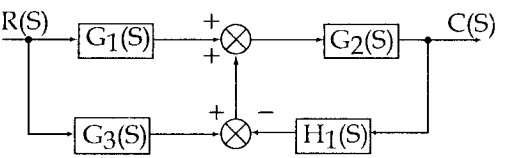
3. (a) Derive and draw the unit step response of a 1st-order system. 7

(b) For the transfer function : 7

$$G(S) = \frac{1}{2} \frac{\left(S^2 + 4\right)(1 + 2.5s)}{\left(S^2 + 2\right)(1 + 0.5s)}$$

Plot the poles and zero's in S-plane and determine the value of transfer function at $S = 2$.

4. (a) Reduce the following block diagram and find the transfer function : 7



(b) The transfer function of a series RC-circuit is given by : 7

$$I(S) = \frac{C(S)}{RCs + 1} . E(S)$$

Where E(S) is the supply voltage. If $E = 100$ V, $R = 2M\ \Omega$ and $C = 1\mu F$ find the initial value of charging current.

5. (a) Define stability. What do you understand by absolute and relative stability ? 7

(b) The characteristic equation of a closed loop control system is given by : 7

$S^3 + 4.5S^2 + 3.5S + 1.5 = 0$.

Investigate its stability using Routh-Hurwitz criterion.

6. (a) Explain ON-OFF control scheme with example and draw its o/p response. What are its advantages and disadvantages ? 10

(b) What do you understand by the term "resetrate" and "integral wind up" ? 4

7. (a) Explain the working of a 2 phase a.c. servo motor. Also explain the constructional differences w.r.t. a normal induction motor. 7

(b) Explain the working of a potentiometer error detector with a diagram and an example. 7

8. Write short notes on ***any four*** : 14

(a) Advantages of Automatic Control System

(b) Gain Margin

(c) Location of Poles and Stability.

(d) Proportional Offset.

(e) D.O.F. of a Robot

(f) Advantages and Disadvantages of a Robot over a human operator.
