**Reg. No. \_\_\_\_\_\_\_\_**

**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination - June 2011**

**Subject Title: CONTROL SYSTEMS Time: 3 hours**

**Subject Code: 09EI219 Maximum Marks: 100**

#### **Answer ALL questions**

**PART – A (10 x 1 = 10 MARKS)**

1. What is actuator?

2. What are the basic elements used for modeling mechanical rotational system?

3. Define peak overshoot.

4. Define corner frequency.

5. What is phase margin?

6. What is dominant pole?

7. What is the effect of adding a zero to a system?

8. Define BIBO stability.

9. Why derivative controller is not used in control system separately?

10. What is synchro?

**PART – B (5 x 3 = 15 MARKS)**

11. Write the analogous electrical elements in force-voltage analogy for elements of mechanical translational system.

12. What are the frequency domain specifications?

13. What are the advantages of Nichol’s chart?

14. What happens when lag, lead, lag-lead compensators are employed to a system?

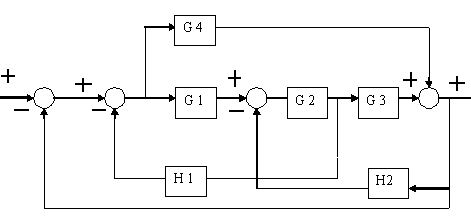
15. Draw the block diagram of a fuzzy controller and explain its operation.

**PART – C (5 x 15 = 75 MARKS)**

16. Determine the transfer function θ(s)/Ea(s) of the armature controlled DC motor having armature resistance Ra and Inductance La. Also construct the block diagram for the same system.

(OR)

17. Construct the equivalent signal flow graph for the block diagram shown and find the transfer function.



R

C

[P.T.O]

18. A second order mechanical system is represented by the transfer function = . A step input of 10 N-m is applied to the system and the results are given below: Peak overshoot, Mp = 6%, peak time, tp =1 sec and steady state error, ess = 0.5 rad. Determine the values of J, f and k.

(OR)

19. Evaluate the static error constants for a unity feedback system having a forward path transfer function G(s) = . Estimate the steady state errors of the system for the input r(t) given by r(t) = 1 + 2t + t2 .

20. The open loop transfer function of an unity feedback system is given by,

G(s) = . Draw the bode plot and hence find the gain margin and phase margin.

(OR)

21. Check the stability of the system G(s) by Nyquist criteria for the transfer function:

G(s) = .

22. For the unity feedback system whose transfer function is G(s) = .

a. Find the range of k for stability b. Find the value of k for marginally stable

c. Find the actual location of the closed loop poles when the system is marginally stable by using Routh Hurwitz criterion.

(OR)

23. Sketch the root locus for a system with open loop transfer function and comment on the stability of the system G(s)H(s) = .

24. Explain the working principle of a.c and d.c servo motor and derive the expression of the transfer function for the a.c. servo motor.

(OR)

25. Explain the working of a fuzzy logic controller based temperature control.