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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. - Industrial and Production Engineering

Semester End Examination; Dec. - 2015

Control Engineering and Machine Tool Technology

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each **unit**.*

UNIT - I

1 a. With a neat sketch explain feedback and feed forward system. 12

b. Differentiate between open loop and closed loop system. 8

2 a. Draw the equivalent mechanical system for a given figure.

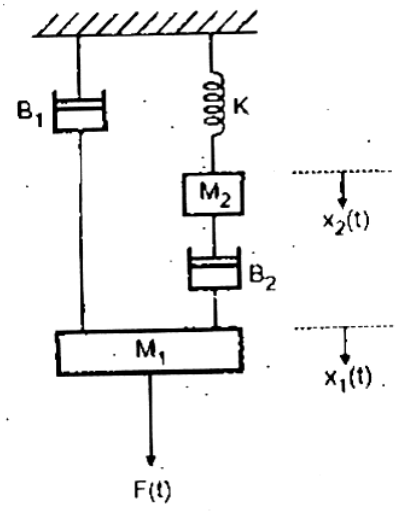

Fig Q 2(a)

12

Hence write set of equilibrium equation and obtain electrical analogue circuit using

i) F – V analogy ii) F – I analogy

b. Derive the differential equation for DC motor with armature controlled and obtain Transfer function. 8

UNIT - II

3 a. Explain the following with a graph, i) Step input ii) Ramp input iii) Parabolic input. 9

b. Determine the effect of steady state error reference input is ramp and parabolic of magnitude 'A'. 11

4. Determine the effect of change in G(s) H(s) on steady state error considering the input selected as step input and ramp input of magnitude 'A' for the type of system 0, 1 and 2. 20

Contd….2

UNIT - III

5 a. Obtain the overall transfer function for the block diagram shown in figure to its canonical form. 12

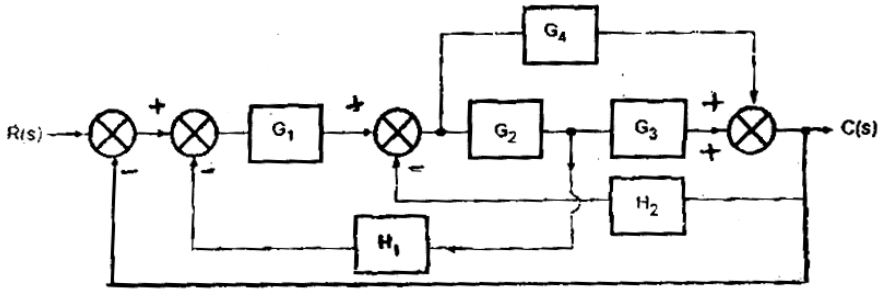

Fig Q5(a)

b. Determine $\frac{Y(S)}{R(S)}$ for the system shown below: 8

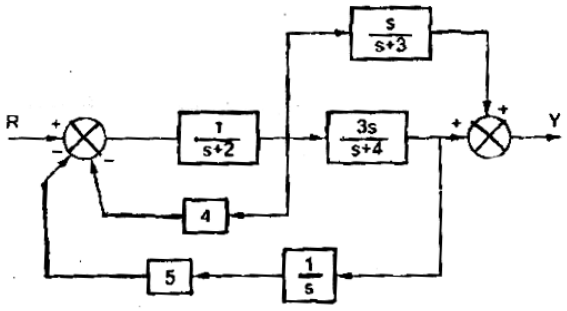

Fig Q5(b)

6. a. For the block diagram shown below obtain $\frac{C(S)}{R(S)}$ by using Mason's gain formula and draw signal flow graph: 16

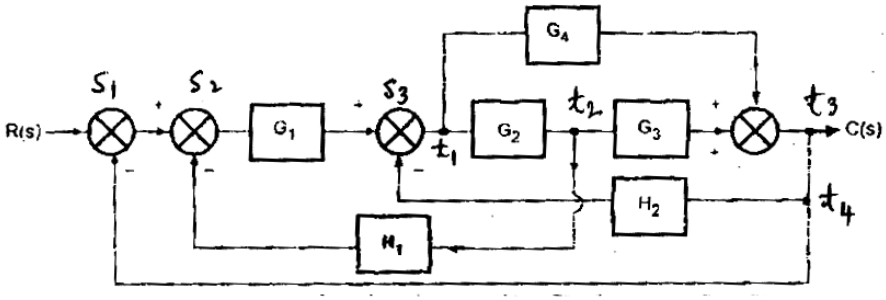

Fig Q6(a)

b. Define: 4

i) Source node

ii) Sink node

Contd….3

UNIT - IV

7 a. With a neat sketch explain cutting motion in machine tool 12

b. Explain the control system of machine tools. 8

8 a. Explain the methods of production of surfaces in metal cutting. 12

b. Explain essential requirements of machine tool. 8

UNIT - V

9. Draw the speed distribution and layout for gear box of minimum speed 200 rpm and maximum speed 1500 rpm with progression ratio of 1.20 using geometric progression determine, 20

a) All the speeds b) Number of teeth on each gear

c) Torque transmitted d) Gear box layout

10. Design a gear box incorporating Ruppert drive with clutch arrangement with minimum speed 124 rpm and maximum speed 1400 rpm with 12 speed (1 x 3 x 4) using geometric progression determine; 20

a) All the speeds

b) No. of teeth on each gear

c) Torque transmitted

d) Gear box layout

e) Speed distribution (ray diagram)

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