*U.S.N* | | | | | | | | | |

# 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

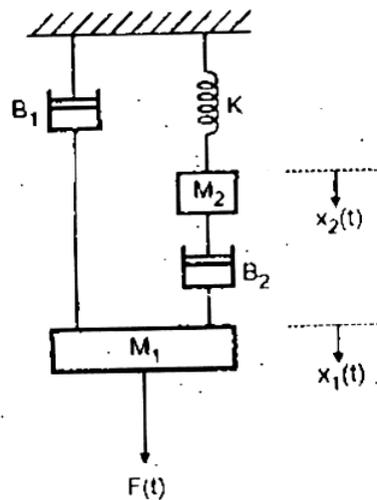2 a. Draw the equivalent mechanical system for a given figure.



Fig Q 2(a)

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

    i) F – V analogy        ii) F – I analogy                  12

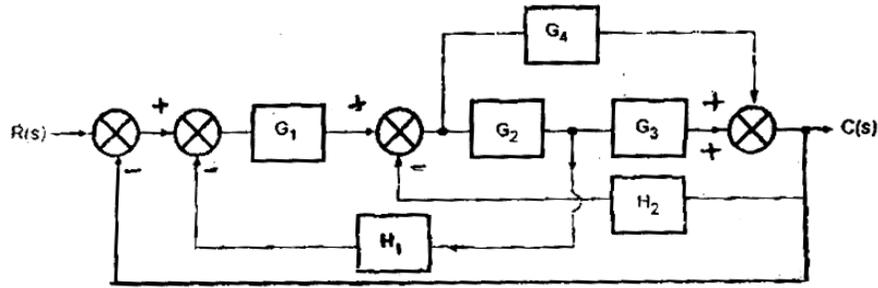  b. Derive the differential equation for DC motor with armature controlled and obtain Transfer function.                                                                         8

## 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
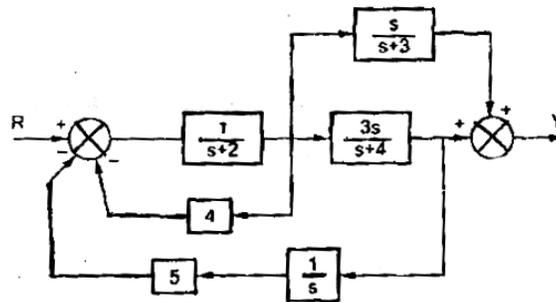
**UNIT - III**

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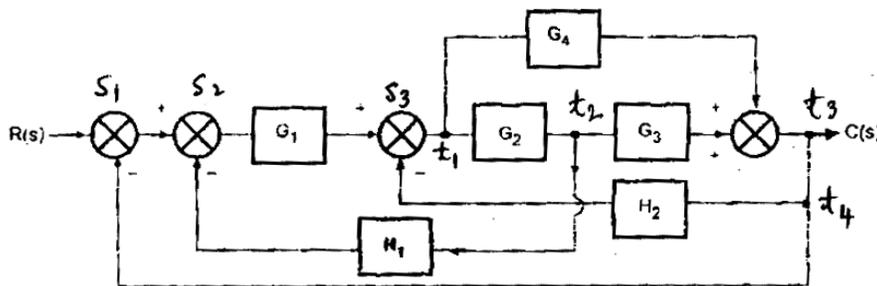
form.



Fig Q5(a)

12

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



Fig Q5(b)

8

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

signal flow graph:



Fig Q6(a)

16

b.  Define:

i) Source node

ii) Sink node

4

**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;

   a) All the speeds

   b) No. of teeth on each gear                    20

   c) Torque transmitted

   d) Gear box layout

   e) Speed distribution (ray diagram)

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