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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 - 2016/Jan - 2017

Control Engineering and Machine Tool Technology

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Missing data, if any, may suitably assume.

UNIT - I

1 a. With a neat block diagram explain a regulator feedback control system. 6

b. Draw the equivalent analogy circuit for the mechanical system shown in Fig. Q1(b) and obtain the differential equation. 14

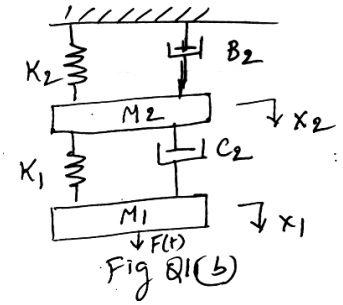

Fig Q1(b)

2 a. Differentiate between open loop and closed loop system. 8

b. Derive the transfer function for a DC motor. 12

UNIT - II

3 a. Explain the following input with graph : 8

i) Step input ii) Ramp input iii) Sinusoidal input.

b. Find the time response, initial value and final values of the functions : 12

i) $F(S)=\dfrac{S(S+10)}{(S+2)(S+4)(S+6)}$ ii) $F(S)=\dfrac{12(S-1)}{S(S+2)^2(S+3)}$.

4 a. Explain the following error constants : 12

i) Position error constant ii) Velocity error constant iii) Acceleration error constant.

b. The unit step response of a system is given as, 8

$c(t)=\dfrac{5}{2}+5t-\dfrac{5}{2}e^{-2t}$ Find the transfer function of the system.

UNIT - III

5 a. Obtain the overall transfer function for the block diagram shown in Fig. Q.5(a) using block diagram reduction. 10

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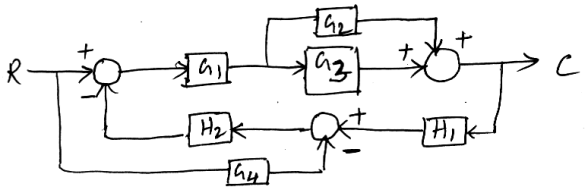

Fig Q.5(a)

b. Convert the block diagram shown in Fig. Q(5(a) into signal flow graph and obtain the transfer function using Mason's gain formula. 10

6 a. Find C/R for the system shown in the Fig. Q.6(a) using block diagram reduction,

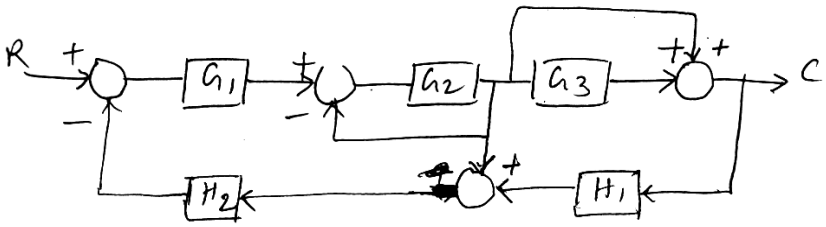

Fig Q.6(a) 10

b. Draw the signal flow graph for the block diagram shown in Fig. Q6(a) and obtain C/R Ratio using Masons's Gain formula 10

UNIT - IV

7 a. What are the characteristics of a machine tool? 10

b. Explain with sketch cutting motion in machine tool. 10

8 a. Explain the various requirement of machine tool. 10

b. Explain the design consideration for the machine tool structure. 10

UNIT - V

9. Design gear box incorporation a rupport drive with 8 speed having a combination 1 x 4 x 2. The maximum speed is 1200 and progression ratio is 1.2. Determine;

a) All the speech b) No. of teeth on each gear 20

c) Gear box layout d) Ray diagram

v) Torque transmitted, if the motor is delivering 10 HP and speed is 1500 rpm.

10a. Explain PIV Drive used in machine tool with a neat sketch. 10

b. Explain with a hydraulic circuit the reciprocating movement of a shaper. 10

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