



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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; Dec - 2017/Jan - 2018

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) Assume suitably missing data if any.

UNIT - I

- 1 a. With a neat sketch, explain any two open loop system. 8
- b. Derive a differential equation for DC motor with field controlled and obtain transfer function. 12
- 2 a. Differentiate between open loop and closed loop system. 10
- b. Explain the various requirements of an ideal control system. 10

UNIT - II

- 3 a. Explain the following : 12
 - i) Step unit ii) Ramp input iii) Parabolic input.
- b. Define steady state response and steady state errors. 8
- 4 a. Determine the effect of steady state error reference in; 15
 - i) Step Input ii) Ramp Input iii) Parabolic Input.
- b. Derive steady state error for closed loop system using negative feedback loop as shown in Fig. Q 4(b).

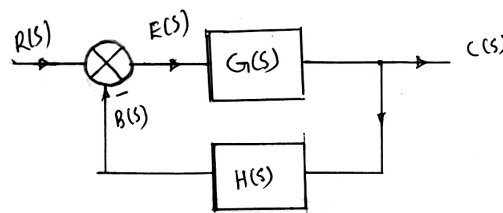


Fig Q 4 (b)

UNIT - III

- 5 a. Reduce the block diagram shown in Fig. Q 5(a) to its canonical form and obtain $\frac{C(S)}{R(S)}$. 15

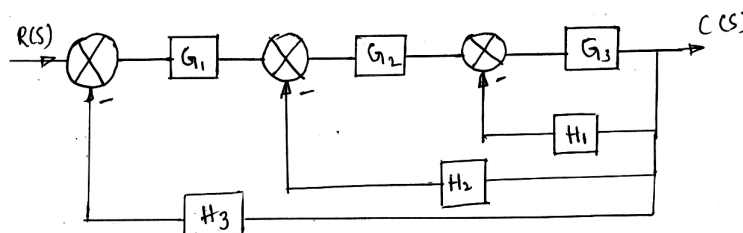
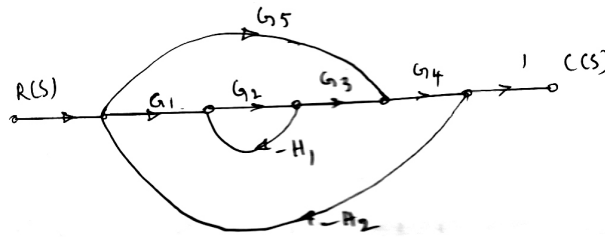


Fig Q 5(a)

- b. Explain the block diagram reduction rules for shifting the summing point behind the block. 5

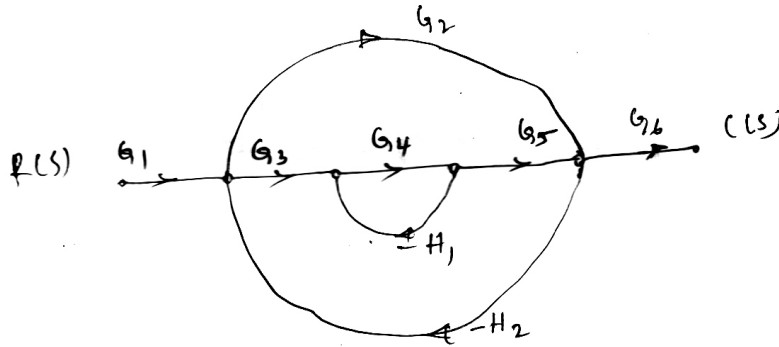
6 a. Find the overall T.F by using Mason's gain formula for the signal flow graph shown in Fig. Q. 6(a).



10

Fig Q 6 (a)

b. Find $\frac{C(s)}{R(s)}$ using Mason's gain formula for the signal flow graph shown in Fig. Q. 6(b).



10

Fig Q 6 (b)

UNIT - IV

- 7 a. Explain essential characteristics of Machine tool. 7
- b. Explain the methods of production of surfaces in metal cutting. 8
- c. Enumerate the objective of Machine tool. 5
- 8 a. Explain any two cutting motion in Machine tool. 10
- b. With a neat sketch, explain the control system of Machine tools. 10

UNIT - V

- 9 a. With a neat sketch explain PIV drive. 8
- b. Draw a speed distribution for 9 speed gear box with minimum speed 200 rpm and maximum speed 1300 rpm. Determine; 12
 - i) Number of Spindle Speed
 - ii) Speed Distribution
 - iii) Gear layout
 - iv) Number of teeth on each gear.
- 10. Design a gear box incorporating Ruppert drive with clutch arrangement with minimum speed of 250 rpm and maximum speed of 1400 rpm with 12 speed (1×3×4) using geometric progression. Determine; 20
 - i) Spindle Speed
 - ii) Speed Distribution
 - iii) Gear Layout
 - iv) Number of teeth on each gear
 - v) Torque transmitted on shaft.

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