

**24357**

**B. Tech. (ME) 6th Sem.**

**Examination – May, 2015**

**AUTOMATIC CONTROL**

**Paper : ME-308-F**

***Time : Three Hours ]***

***[ Maximum Marks : 100***

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

***Note :*** Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*.

1. (a) What is transfer function representation ? 5
- (b) Define the equivalent unity feedback system. 5
- (c) What are various rules for drawing forms of root loci ? 5
- (d) What is Nyquists criterion ? 5

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P. T. O.

## SECTION - A

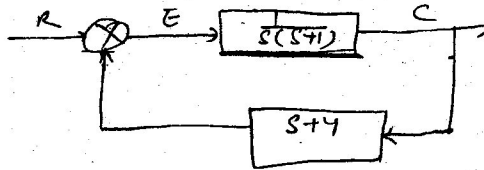
2. (a) What are different types of control system ?  
Explain in detail. 10
- (b) Discuss the representation of feedback Control system. 10
3. Explain the following ; 20
- (i) Hydraulic controllers
  - (ii) Electronics controllers

## SECTION - B

4. A position servomechanism consists of a system with inertia of  $10 \text{ kg m}^2$  and damping Coefficient of  $120 \text{ Nms/rud.}$  The controller gives a torque of  $1500 \text{ Nm/rud.}$
- (i) If the system is at rest and one reference input is suddenly displayed  $20^\circ$ , find out the damped frequency of oscillation and also find out the peak output and percentage peak overshoot. 20
  - (ii) If the input shaft is rotated at a constant speed of  $10 \text{ RPM}$ , find out the steady state position error.

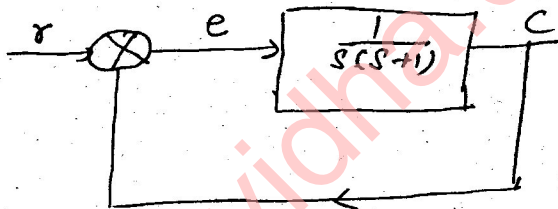
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5. For the system of fig. Shown below, find out the peak value of  $M$  and the frequency at which it occurs. Use M Circle/Bode/Nichols charts after finding the equivalent system. Check the result by calculations. 20



### SECTION - C

6. Draw the Nyquist diagram for the control system. With the block diagram shown below : 20



7. For a system with open loop transfer function  $GH(s) = \frac{k(s+10)}{s^2(s+20)}$ , draw the root loci and find out the value of  $k$  for the system to be Unstable. 20

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(3)

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SECTION - 2  
JobOfficer.com 8. (a) Discuss the representation of sampled signal. 10

(b) Discuss the Routh's stability criterion. 10

9. For the system with transfer function:  
$$\frac{y(s)}{u(s)} = \frac{8}{(s+1)(s+2)(s+4)}$$
 write the State-Space equation using Partial Fraction method. 20

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