Roll No. .....

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

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

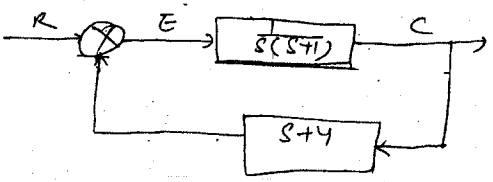
SECTION – B

4. A position servomechanism consists of a system with inertia of 10 kg m^2 and damping Coefficient of 120 Nms/rud. The controller gives a torque of 1500 Nm/rud.

(i) If the system is at rest and one reference input is suddenly displayed 20°, find out the damped frequency of oscillation and also find out the peak output and percentage peak overshoot. 20

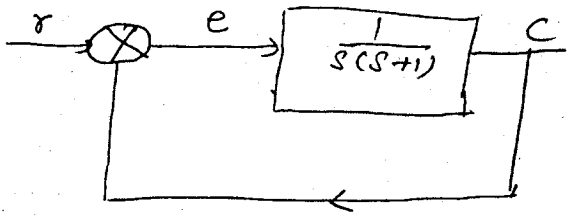
(ii) If the input shaft is rotated at a constant speed of 10 RPM, find out the steady state position error.

5. For the system of fig. Shown below, find out the peak valve 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 valve of k for the system to be Unstable. 20

SECTION – D

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
