Code No: R1622024 **R16** SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, November - 2020
CONTROL SYSTEMS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define a terms System & Control System with suitable examples. (2M)

   b) Consider system function $G(S)=\frac{K}{S(S+5)}$ and H(s)=1. Discuss the significance of open loop gain as function of damping ratio. (2M)

   c) Find the range of 'K' for system stability using Routh-Hurwitz criterion. $GH(S)=\frac{K}{S(S+10)(S+8)^2}$. Also, determine gain margin in dB, if K=5. (2M)

   d) Sketch the polar plot of $GH(S)=\frac{100}{(S+1)(S+3)(S+5)}$, and determine its phase crossover frequency. (2M)

   e) Discuss the merits & demerits of Lag & Lead compensators. Also, comment on the applications. (3M)

   f) Define Observability and Controllability of a given Control System. (3M)

PART –B

2. a) Find the transfer function for the electrical network shown in **Fig.Q2(a).** (7M)

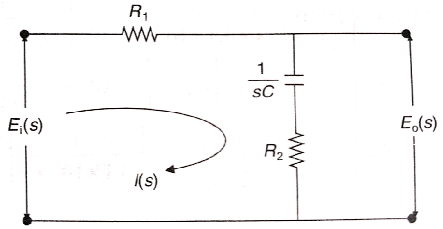

Fig. Q2(a)

   b) For the system shown in **Fig.Q2(b),** find the transfer function $G(S)=\frac{\theta_2(s)}{T(s)}$. (7M)
   Consider J_1=1 kgm^2, K_1=1 Nm/rad, K_2 = 1 Nm/rad, B_1 = 1Nm/rad/sec, B_2 = 1 Nm/rad/sec.

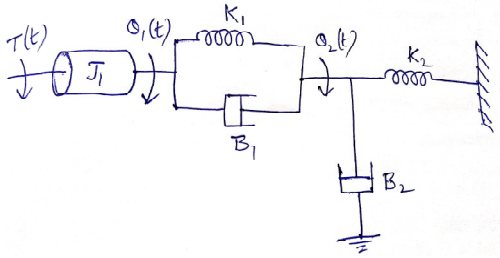

Fig. Q2(b)

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3. a) If the system function $G(S) = \frac{100}{(S^2 + 8S + 100)}$, determine damping factor, percentage peak overshoot, rise time (t_r), peak time (t_p) and settling time (t_s). Also, if K=50, comment of the significance of change in K value in terms of time indices. (7M)

   b) For servomechanisms, with open loop transfer function given below explain what type of input signal gives rise to a steady state error and calculate its values. $G(s) = \frac{20(s+2)}{s(s+1)(s+3)}$ (7M)

4. a) Sketch the Root Locus diagram of the control system with $GH(S) = \frac{K(S+1)}{S(S+3)(S+5)}$. Illustrate all the relevant steps. (7M)

   b) Using basic simple steps, sketch the Root Locus diagrams of the following Control Systems; (i) $GH(S) = \frac{K}{S^3}$ (ii) $GH(S) = \frac{K(S^2+2S+2)}{S^2}$ (iii) $GH(S) = \frac{K}{(S+1)(S+2)(S+3)}$ (iv) $GH(S) = \frac{K(S+2)(S+3)}{S^2+2S+2}$ (7M)

5. a) Define the following terms: Gain margin, phase margin, bandwidth, resonant peak, resonant frequency and gain cross over frequency. (7M)

   b) Draw the Bode plot and find Gain Margin and Phase margin for the given transfer function $G(s) = \frac{K}{s(1+0.1s)(1+0.5s)}$. (7M)

6. a) Enumerate the design steps involved in the phase lead compensation. (7M)

   b) Design a lag compensator for the system $G(S) = \frac{K}{s(s+1)(0.2s+1)}$ with unity feed back to achieve the specifications: velocity error constant Kv=8 sec^{-1} and phase margin=40^0. (7M)

7. a) Briefly discuss Steady-State errors constants. (7M)

   Also, consider a given system as; $\dot{\overline{X}} = AX$, where $A = \begin{bmatrix} -2 & -4 \\ 1 & -2 \end{bmatrix}$. Find $\phi(s)$, $\phi(t)$ and X(t), if $\overline{X(0)} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$.

   b) Discuss Observability and Controllability. (7M)

   Also, consider a system $G(S) = \frac{K(S+1)}{S(S+4)(S^2+2S+2)}$ with Unity Feed-back and sketch the Root-Locus diagram using detailed steps.

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Code No: RT22015 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, November – 2020
CONCRETE TECHNNOLOGY
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	What are accelerators and mention its purpose	(4M)
	b)	Define workability of concrete	(3M)
	c)	What is the affect of Water / Cement ratio on workability and strength	(4M)
	d)	Define shrinkage and creep of concrete	(3M)
	e)	What is carbonation of concrete	(4M)
	f)	What is polymer concrete	(4M)

PART -B

2.	a)	what are the properties of good aggregates for making concrete and discuss in brief various tests carried out on aggregates	(7M)
	b)	Explain about the different tests conducted on cement in the laboratory to check its suitability	(7M)
3.	a)	What is segregation and bleeding of concrete why they occur, discuss how to prevent them	(7M)
	b)	Discuss bout the Flow table test to measure the workability and its significance	(7M)
4.	a)	i. Discuss about the maturity concept of concrete, ii. The strength of sample of fully matured concrete is found to be 40Mpa. Find the strength of identical concrete at the age of 7 days when cured at an average temperature during day time at 20^0C and night time at 10^0C	(7M)
	b)	Discuss about the rebound hammer test method on concrete structures and its limitations	(7M)
5.	a)	What is Shrinkage of concrete and types and discuss about the factors affecting the shrinkage of concrete.	(7M)
	b)	Discuss in detail about the relation between creep and time	(7M)
6.		Design M25 grade concrete mix using IS method for mild exposure and good quality control. The workability required is 0.9 CF. Maximum size of coarse aggregate is 20mm and fine aggregate confirmed to Zone.III. The specific gravity of cement is 3.05, specific gravity of coarse aggregate and fine aggregate is 2.77. Cement is OPC 53 grade. Water absorption by CA is 1.5% and moisture content in FA is 3%. Assume any other suitable data if necessary.	(14M)
7.	a)	Discuss about the development of Polymer concrete and its Properties	(7M)
	b)	What are the fresh properties of SCC to be checked and discuss about any two methods to verify fresh properties of SCC	(7M)

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