**Q.P. Code :18298**

**(Time: 3 HOURS) (MAX. MARKS : 80)**

Please check whether you have got the right question paper.

**Note:**

1. Question **No. 1** is compulsory.
2. Attempt any **three** questions out of remaining **five** questions.
3. Assume suitable data wherever necessary.
4. Figures to right indicate full marks.

Q.1 Answer the following **( Any four)**

a. Explain air to open pneumatic control valve. 5

b. Explain linearization in process dynamics. 5

c. Explain the importance of controllers in feed back control system. 5

d. Derive the time constant for liquid level system. 5

e. Define Overshoot, rise time, period of oscillation, Decay ratio, response time. 5

Q.2 a. A step change of magnitude 5 is introduced into the unity feedback control system. The second order system is being controlled by means of P-controller having Kc = 15. Find the response of given control system as a function of time and also find overshoot, decay ratio and rise time. 10

b. Derive the transient response of PID controller for servo problem. 10

Q.3 a. A thermometer having first order dynamics is placed in a temperature bath of 45$^{o}$C. After the thermometer reaches the equilibrium with the bath, the bath temperature is subjected to sinusoidal forcing function about its average temperature of 45$^{o}$C with an amplitude of 15$^{o}$C. If the period of oscillation is 45 sec per cycle and the time constant of thermometer is 15 sec, determine the following 10

i) Max. and minimum temperatures indicated by the thermometer

ii) Amplitude ratio

iii) Phase lag

b. Derive the transfer function for regulatory mechanism control problem for positive feedback system. 10

**TURN OVER**

Q.4 a. List different types of pressure measuring devices. Explain any one in detail. 6

b. The open loop transfer function of a control system is given by 14

$G(s) = \frac{K_c(s+1)}{(10s+1)(0.2s+1)}$ Sketch the Bode plot of the control system.

Q.5 a. Explain procedure for Routh's stability criteria. 10

b. The open loop transfer function of a control system is given as 10

$G(s) = \frac{K_c(0.5s+1)}{s(s+0.5)}$. Sketch the root locus of the control system. Determine the value of gain of the controller Kc for which the system becomes just unstable.

Q.6 Write a note on any four

a. Radiation pyrometer 5

b. Phase and gain margin 5

c. Feed forward control system 5

d. Cascade control 5

e. Transducers 5