

N.B.: (1) Question No 1 is Compulsory.

(2) Attempt any three questions out of the remaining five.

(3) All questions carry equal marks.

(4) Assume suitable data, if required and state it clearly.

QP CODE: 66759

1 Attempt Any Four [20]

a For the given transfer function, find TP, %MP, TS and Tr. $G(s) = \frac{25}{s^2+6s+25}$ [05]

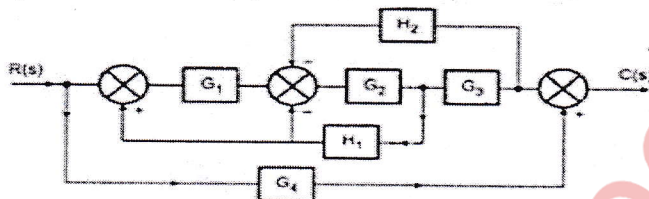
b What are the key features of fuzzy logic control in modern control systems? [05]

c What are the selection criteria for choosing a transducer in an industrial application? [05]

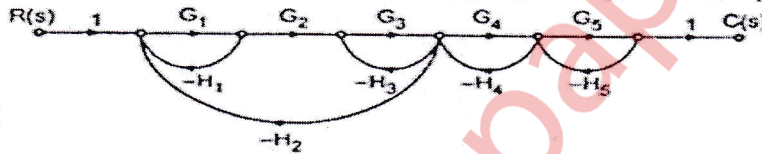
d Explain the role of DAS in an intelligent instrumentation system. [05]

e What is the Fieldbus communication protocol? How does it enhance data exchange in control systems? [05]

2 a Reduce the given block diagram into a canonical (simple) form. Hence obtain equivalent T.F. [10]



b Find the Transfer Function (T.F.) $C(s) / R(s)$ of given Signal Flow Graph. [10]



3 a For Unity Feedback System $G(s) = \frac{k}{s(1+0.4s)(1+0.25s)}$, find range of k, marginal value of k and frequency of sustained oscillation using Routh's criterion. [10]

b Analyse the root locus for a system with the open-loop transfer function $G(s)H(s) = \frac{K}{s^2+4s+8}$ and determine how the poles move in the s-plane as K changes. [10]

4 a Given a transfer function, draw the Bode plot and determine the gain margin and phase margin. $G(s) = \frac{10}{s(s+2)(s+5)}$. Draw the Bode plot and find the stability margins. [10]

b Using a given transfer function, plot the Nyquist diagram and determine the stability of the system based on the Nyquist stability criterion. $G(s) = \frac{3}{s(s+6)}$. Sketch the Nyquist plot and determine whether the system is stable or unstable. [10]

5 a Explain in detail the working of a Linear Variable Differential Transducer (LVDT) and its applications in displacement measurement. [10]

b How is a pressure measurement system designed using a DAS? Explain with a suitable block diagram. [10]

6 Attempt Any Four [20]

a What is the 4-20mA current loop? Why is it commonly used in industrial instrumentation? [05]

b Briefly describe the working principle of a thermistor and its common applications. [05]

c Explain the working of radio telemetry systems. How is data transmitted wirelessly? [05]

d What are the common applications of Fiber optic sensors in industrial instrumentation? [05]

e What is Time Division Multiplexing (TDM)? How does it differ from FDM? [05]
