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PART-A

① C

② d.

③ b.

④ b.

⑤ a

⑥ c.

⑦ c

⑧ a

⑨ a

⑩ d.

PART-B

①

Open loop system.	closed loop system.
→ The system whose control action is free from the O/P it is known as Open loop control system	→ In closed loop the O/P depends on the control action of the system.
→ Non-feedback system.	feedback system.
→ Controller and controlled Process.	→ Amplifier, Controller, Controlled Process, feedback.

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→ It is simple in construction.	→ It is complex in construction.
→ Not Reliable.	→ Reliable.
→ Accuracy depends on calibration.	→ Accuracy is because of feedback.
→ More stable.	→ less stable.
→ Optimization is Not Possible.	→ Optimization is possible.
→ Fast response.	→ Slow response.
→ Open loop system is Non-linear	→ closed loop system is linear.
→ Ex:- Traffic lights, automatic washing machine.	Ex: AC, temperature control system, Speed and pressure control system.

3) Time response of first order system for unit step input :-

Consider closed loop with unity feedback 1st order system.

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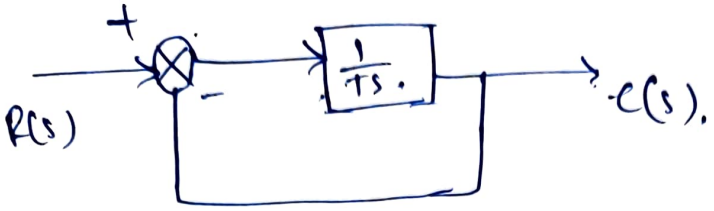

⇒ Eliminating -Ve feedback.

$$\frac{C(s)}{R(s)} = \frac{1}{1+TS}.$$

$$C(s) = R(s)\frac{1}{1+TS}.$$

let R(s) be a unit step input.

$$\therefore R(s) = \frac{1}{s}.$$

$$C(s) = 1/s \times \frac{1}{1+TS}.$$

$$= \frac{1/T}{s(s+1/T)}.$$

By partial fraction $C(s) = \frac{A}{s} + \frac{B}{s+1/T}.$

$$C(s) = \frac{1}{s} - \frac{1}{s+1/T}.$$

Inverse laplace on b.s.

$$c(t) = L^{-1}\left(\frac{1}{s} - \frac{1}{s+1/T}\right).$$

$$\underline{c(t) = 1 - e^{-t/T}.}$$

$$A = C(s) \times s\Big|_{s=0} = \frac{1/T}{s\left(s+\frac{1}{T}\right)} \times s$$

$$\Big|_{s=0} = \frac{1/T}{s+\frac{1}{T}}\Big|_{s=0} = \frac{1/T}{1/T} = 1.$$

$$B = C(1) \times \left(s+\frac{1}{T}\right)\Big|_{s=1/T} = \frac{1/T}{s\left(s+\frac{1}{T}\right)}$$

$$\times \left(s+\frac{1}{T}\right)\Big|_{s=1/T} = \frac{1}{\frac{T}{s}}\Big|_{s=1/T} = \frac{\frac{1}{T}}{\frac{-1}{1/T}} = -1$$

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for step response.

$$c(t) = A(1 - e^{t/T})$$

$t = 0 \Rightarrow c(t) = 0.$

$t = \infty \Rightarrow c(t) = 1.$

$$c(t) = \mathcal{L}^{-1}\{C(s)\} = \mathcal{L}^{-1}\left\{\frac{1}{s} - \frac{1}{s + 1/T}\right\}$$

$$= 1 - e^{t/T}. \quad //$$

Response will be as follows:-