

USN

--	--	--	--	--	--	--	--	--	--

10ME82

Eighth Semester B.E. Degree Examination, June/July 2018
Control Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

1.
 - a. What are the requirements of an ideal control system? (05 Marks)
 - b. Differentiate between open loop and closed loop control systems. (05 Marks)
 - c. With a block diagram, explain (i) Proportional controller (ii) Integral controller. (10 Marks)

2.
 - a. A thermometer is dipped in a vessel containing liquid at a constant temperature of $\theta_1(t)$. The thermometer has a thermal capacitance for storing heat as C and thermal resistance to limit heat flow as R. If the temperature indicated by the thermometer is $\theta_0(t)$. Obtain the transfer function of the system. (10 Marks)
 - b. With the help of circuit diagram for armature controlled D-C motor, obtain transfer function which relates angular displacement θ of motor shaft to the armature input voltage. (10 Marks)

3.
 - a. Obtain the overall transfer function of the block diagram, shown in Fig. Q3 (a) by reduction technique. (10 Marks)

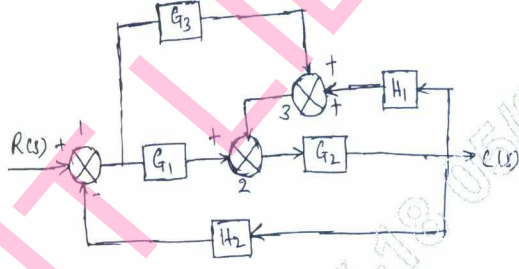


Fig. Q3 (a)

- b. Find the transfer function for the signal flow graph shown in Fig. Q3 (b) by using Mason's gain formula. (10 Marks)

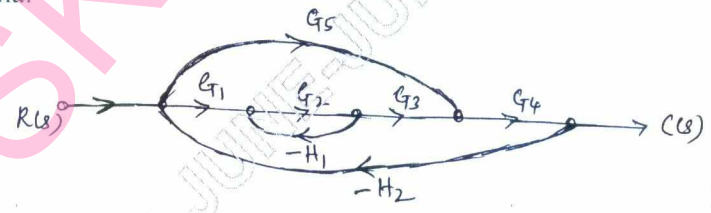


Fig. Q3 (b)

4.
 - a. A unity feedback control system is characterized by an open loop transfer function $G(s)H(s) = \frac{K}{s(s+10)}$. Determine the system gain K, so that the system will have a damping ratio of 0.5. For this value of K, find the peak time, settling time and peak over shoot for a unit step input. (10 Marks)
 - b. Comment on the stability of the system for the characteristic equation, $s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$ by Routh-Hurwitz criterion? (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

PART – B

- 5 Using Nyquist criterion, investigate the stability of a system whose open loop transfer function is $G(s)H(s) = \frac{K}{(s+1)(s+2)(s+3)}$. (20 Marks)

- 6 Draw the Bode plot for the following transfer function and determine Gain margin and Phase margin,

$$G(s)H(s) = \frac{10.5}{(s+0.2)(s+0.8)(s+10)}. \quad (20 \text{ Marks})$$

- 7 Sketch the root locus plot of a unity feed back with an open loop transfer function, $G(s) = \frac{K}{s(s+2)(s+4)}$. Find the value of K for stability. (20 Marks)

- 8 a. Explain the series and feedback compensation, with block diagrams. (10 Marks)
b. Determine the controllability of control system with state equation,

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(t).$$

by Gilbert's test?

(10 Marks)

USN

--	--	--	--	--	--	--	--	--	--

10ME833

Eighth Semester B.E. Degree Examination, June/July 2018
Power Plant Engineering

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Draw a general layout of a steam power plant, showing the different system and explain them. (12 Marks)
- b. Explain with a neat sketch of multi-retort stoker. (08 Marks)
- 2 a. What are the advantages and disadvantages of pulverized coal? (06 Marks)
- b. With a neat sketch, explain the Ball Mill Pulverized system. (07 Marks)
- c. Explain with neat sketch of Benson Boiler. (07 Marks)
- 3 a. With neat sketch, explain the Velox steam generation mention its advantages. (06 Marks)
- b. With a neat sketch, explain the forced Draught and induced draught system. (10 Marks)
- c. Explain with sketch
 - i) Air preheater
 - ii) Super heater. (04 Marks)
- 4 a. Name the Different methods used for starting Diesel engine plant and explain briefly. (08 Marks)
- b. Explain the important functions of Lubrication system. (03 Marks)
- c. Sketch and explain the layout of a Diesel engine power plant. (09 Marks)

PART – B

- 5 a. With a neat sketch, explain the flow Duration and mass curves. (05 Marks)
- b. Explain the following :
 - i) Water hammer
 - ii) Surge tanks. (05 Marks)
- c. The runoff data of a river at a particular site is tabulated below:

Month	Mean Discharge per month (Millions of cum)	Month	Mean Discharge per month (Millions of cum)
January	40	July	75
February	25	August	100
March	20	September	110
April	10	October	60
May	0	November	50
June	50	December	40

- i) Draw a hydrograph and find the mean flow.
- ii) Draw the flow duration curve
- iii) Find the power in MW available at mean flow if the head available is 80m and overall efficiency of generation is 85%.

Take each month of 30 days.

(10 Marks)

- 6 a. Explain the functions of the following elements in the Nuclear Reactor.
- i) Reactor core
 - ii) Reflector
 - iii) Moderator
 - iv) Coolants. (06 Marks)
- b. With a neat sketch, explain the pressurized water reactor and mention its advantages. (08 Marks)
- c. Write a note on Radioactive waste Disposal system. (06 Marks)
- 7 a. Enumerate the various factors to be considered while selecting a site for hydro electric power plant. (04 Marks)
- b. Define:
- i) Demand factor
 - ii) Load factor
 - iii) Diversity factor
 - iv) Utilization factor
 - v) Capacity factor. (10 Marks)
- c. The following data relates to a steam power plant
- | | | |
|--------------------|---|------------------|
| Maximum demand | = | 30000kW |
| Load factor | = | 0.42 |
| Coal consumption | = | 1.1kg/kwh |
| Boiler efficiency | = | 84% |
| Turbine efficiency | = | 88% |
| Price of coal | = | Rs. 70 per tonne |
- Determine the following :
- i) Thermal efficiency of the plant
 - ii) Coal bill of the plant for one year. (06 Marks)
- 8 a. What are the objectives and requirements of Tariff? (06 Marks)
- b. What are Different types of tariffs? Explain any two of them. (08 Marks)
- c. Explain the performance and operating characteristics of power plant. (06 Marks)

USN

--	--	--	--	--	--	--	--	--	--

10ME844

Eighth Semester B.E. Degree Examination, June/July 2018
Automotive Engineering

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Mention the different cylinder arrangements of a IC engine and discuss their merits and demerits. (08 Marks)
- b. Sketch and Explain,
 - (i) Thermosyphon system of engine cooling.
 - (ii) Pump circulation system of engine cooling. (12 Marks)
- 2 a. Discuss normal and abnormal combustion in SI engine. (06 Marks)
- b. What are OCTANE and CETANE rating of IC engines? (06 Marks)
- c. With neat sketch, explain S.U. carburetor. (08 Marks)
- 3 a. Discuss various methods of super charging of IC engines. (08 Marks)
- b. Discuss with sketches of various types of superchargers. (12 Marks)
- 4 a. Sketch and explain battery coil ignition system. What are its advantages and disadvantages? (10 Marks)
- b. Explain following types of automatic ignition advance mechanisms:
 - (i) Centrifugal advance.
 - (ii) Vacuum advance. (10 Marks)

PART – B

- 5 a. What are the requirements of clutch? Sketch and explain cone clutch. (08 Marks)
- b. With neat sketch, explain the working of three speed synchromesh gear box. (12 Marks)
- 6 a. Sketch and explain the working of a Differential. (08 Marks)
- b. A motor vehicle has a wheel base of 2.75 m and pivot centers are at a distance of 1.05 m apart. The front and rear wheel track is 1.25 m. Determine the correct angle of outside lock and turning circle radius of the outer front and inner rear wheels when the angle of inside lock is 40°. (05 Marks)
- c. Sketch and explain power steering arrangement. (07 Marks)
- 7 a. Sketch and explain following suspension systems:
 - (i) Torsion bar
 - (ii) Leaf spring. (10 Marks)
- b. Sketch and explain hydraulic braking system. (10 Marks)
- 8 a. Sketch and explain positive crank case ventilation system. (08 Marks)
- b. Sketch and explain EGR system of NO_x reduction. (06 Marks)
- c. Write short notes on emission standards. (06 Marks)

* * * * *

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.