

Reg. No.

Question Paper Code

12098

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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Third Semester

Mechanical and Automation Engineering

20EIPC304 - BASIC ELECTRONICS AND CONTROL SYSTEM

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|---|-------------------------------|
| 1. What are the applications of PN-junction diode? | 2,K2,CO1 |
| 2. Define the term 'Pinch-off' voltage in JFET. | 2,K1,CO1 |
| 3. What must be the biasing condition for BJT to act as amplifier? | 2,K2,CO2 |
| 4. Draw the inverting amplifier network using op-amp. | 2,K2,CO2 |
| 5. What is peak detector? Write its usage. | 2,K1,CO3 |
| 6. What are the types of ADCs? | 2,K1,CO3 |
| 7. Define transfer function and mention its applicability. | 2,K1,CO4 |
| 8. Tabulate the parameters of mechanical translational system and mechanical rotational system. | 2,K2,CO4 |
| 9. List the standard test signals. | 2,K1,CO5 |
| 10. Determine the type and order of the following system | 2,K2,CO5 |
| $G(s) = \frac{1}{s(s+1)(s^2+6s+8)}$ | |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Classify the BJT configurations and explain the Common Emitter configuration in detail. 13,K2,CO1
- OR**
- b) Explain the operation of PN-junction diode with V-I characteristics. 13,K2,CO1
12. a) Explain the operation of OP-AMP based integrator and differentiator. 13,K2,CO2
- OR**
- b) Explain the operation of Wein-bridge operation with neat diagram. Derive its frequency of oscillation and write its applications. 13,K2,CO2
13. a) Describe the operation with neat sketch.
- (i) Sample and hold circuit. 7,K2,CO3
- (ii) Peak detector. 6,K2,CO3

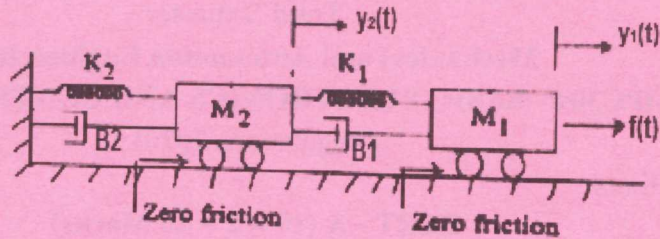
OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

12098

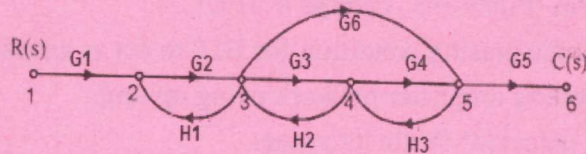
- b) Explain the operation of successive approximation ADC with neat sketch. Write its advantages and disadvantages. 13.K2.CO3

14. a) Apply the force-voltage and force-current analogy to obtain the Analogous circuit and write its mesh and nodal equations. 13.K3.CO4



OR

- b) Simplify the following signal flow graph by applying Mason's gain formula to find the overall transfer function. 13.K3.CO4



15. a) Derive the time response second order un damped system and critically damped system with unit step input. 13.K3.CO5

OR

- b) (i) How the static error constant and steady state error are interrelated? Correlate your answer for the following open loop transfer function. 7.K3.CO5

$$G(s) = \frac{10(s+2)}{s^2(s+1)}$$

- (ii) For the given system, calculate the positional, velocity and acceleration error constants. $G(s) = 20/S(S+1)$ 6.K3.CO5

PART - C (1 × 15 = 15 Marks)

16. a) As an automation engineer, you want to design an electric furnace with precise control feature. Draw and explain its block diagram as open loop system. Modify the design and make it as closed loop system and explain it briefly. 15.K3.CO4

OR

- b) Apply block diagram reduction technique to find the transfer function of the system. 15.K3.CO4

