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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : B.Tech V Semester Regular Examinations December-2024
Course Name : Control Systems
Course Code : A402305
Branch : Electrical & Electronics Engineering
Date & Session : 18-12-2024 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions
Each question carries ONE mark.

10x1=10M

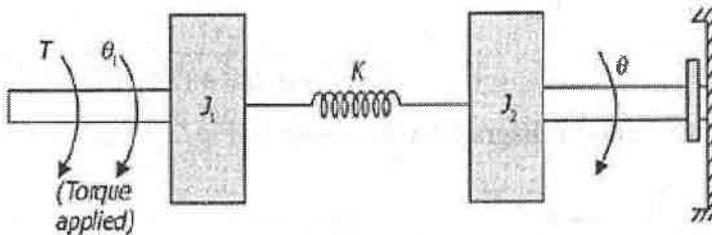
1. Write the Manson's gain formula. 1 M
2. What are the different types of control systems? 1 M
3. What are the types of standard signals? 1 M
4. Define steady state error. 1 M
5. What are the advantages of frequency domain analysis? 1 M
6. What are the limitations of Routh's criterion? 1 M
7. Define gain and Phase margin. 1 M
8. Explain lag compensation. 1 M
9. What are the advantages of state variable techniques? 1 M
10. Define state variables. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Find the transfer function $\frac{\theta(s)}{T(s)}$ of the following system shown in figure. 10M



OR

11. B). Discuss the differences between open loop and closed loop control systems. 10M
12. A). A unity feedback system has a forward path transfer function $G(s) = 10/s(s+2)$. Find the value of damping ratio, undamped natural frequency of the system, percentage over shoot, peak time and settling time. 10M

OR

12. B). The open loop transfer function of an unity feedback control system is given as 10M

$$G(S) = \frac{K}{S(1 + ST)}$$

Determine the factor by which the gain 'K' should be multiplied so that the overshoot of the unity step response be reduced from 80% to 25%?

(P.T.O.)

13. A). A unity feedback system has an open loop function $G(S) = \frac{K}{S(S^2+3s+10)}$ make a rough sketch of root locus plot by determining the following (a) Centroid, number and angle of asymptotes (b) angle of departure of root loci from the poles (c) Breakaway points if any. 10M

OR

13. B). Sketch the Bode plot for the following transfer function and determine the system gain K for which the magnitude plot crosses the 0 db line at $\omega = 15$ rad/sec. 10M

$$G(S) = \frac{K}{s(s+1)(1+0.1s)(1+0.01s)}$$

14. A). Draw the complete Nyquist plot for the following open loop transfer function $G(s)H(s) = \frac{2(s+0.25)}{s^2(s+1)(s+0.5)}$. If the system is unstable, how many poles of the closed loop system are in the right half of s-plane? 10M

OR

14. B). The open-loop transfer function of a system is given by $G_P(S) = \frac{K}{s(1+0.1s)(1+0.2s)}$ Design a lag-lead compensator to meet the $K_v=100\text{sec}^{-1}$ and Phase margin 30° . 10M

15. A). Determine the state and output equations in vector matrix form for the system whose transfer function is given by $G(S) = \frac{s+2}{s(s^2+4s+3)}$. 10M

OR

15. B). The state equation of a linear-time invariant system is given as, 10M

$$\dot{X} = \begin{bmatrix} 0 & 5 \\ -1 & -2 \end{bmatrix} X + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u \text{ and } y = [1 \quad 1] X$$

Find the transfer function and draw the state diagram.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech V Sem Regular Examinations December-2024
Course Name : Power System Protection
Course Code : A402309
Branch : Electrical & Electronics Engineering
Date & Session : 20-12-2024 AN **Duration:** 3 hours **Max. Marks:** 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions
Each question carries ONE mark.

10x1=10M

1. List the major components of Circuit Breaker. 1 M
2. What is resistance switching, and how does it work in electrical circuits? 1 M
3. Define Relay and list the classifications of relays. 1 M
4. What is the universal torque equation? 1 M
5. What is pilot wire protection? 1 M
6. How can various faults in an alternator be identified? 1 M
7. What are the effects of an ungrounded system on the performance of an electrical system? 1 M
8. List the types of grounding. 1 M
9. What are the different types of lightning arresters used in electrical systems? 1 M
10. What is insulation coordination? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). How does an SF6 circuit breaker operate and what are its applications in power systems? 10M
Illustrate your explanation with a neat diagram of the circuit breaker.

OR

11. B). Explain the terms recovery voltage, restriking voltage and RRRV. Derive the expression for the restriking voltage in terms of system capacitance and inductance. 10M

12. A). Explain the Operation principle and characteristics of MHO and off set MHO relay. 10M

OR

12. B). Explain microprocessor based Directional and Distance Relay in detail. 10M

13. A). i) How does the percentage differential protection scheme work for transformers, and what are its advantages in detecting faults? 5M

- ii) A 3 – phase, 6 pole, 66 KV, 2000 KVA alternator has neutral earthed through a resistance of 10 ohms. The machine has current balance protection which operates up on out of balance current exceed 25 % of full load. Determine % of winding protected against earth fault. 5M

OR

13. B). i) Explain the Concept of Carrier Current Protection. 5M

- ii) Explain protection of generator against rotor fault. 5M

(P.T.O..)

14. A). Explain in detail about the need and different methods for neutral grounding with suitable diagram. 10M

OR

14. B). Compare solid grounding and Peterson coil grounding methods, including their operational differences and benefits, and illustrate each with clear sketches. 10M

15. A). i) What is Insulation Coordination? Explain in detail. 5M
ii) Differentiate surge Diverter and surge absorber. 5M

OR

15. B). i) Explain Volt-Time characteristics of surge Diverter in detail with neat sketch. 5M
ii) Explain the working of Zinc-Oxide Lightning Arrester. 5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech V Sem Regular Examinations December-2024
Course Name : Power Electronics
Course Code : A402306
Branch : Electrical & Electronics Engineering
Date & Session : 23-12-2024 AN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions
Each question carries ONE mark.

10x1=10M

1. Draw the symbol and V-I Characteristics of BJT. 1 M
2. List any two applications of power electronics. 1 M
3. How many thyristors conduct in a single phase fully controlled rectifier with continuous dc load current? 1 M
4. What is the primary effect of source inductance on the performance of a phase-controlled rectifier? 1 M
5. What are the advantages of using a buck converter in DC-DC conversion? 1 M
6. Write the mathematical formula for output voltage in terms of duty cycle and input voltage of a buck converter. 1 M
7. What are the main components of an inverter? 1 M
8. Write any two differences between 180 degree and 120 degree mode of operation of an inverter. 1 M
9. What is an AC voltage controller? 1 M
10. Write any two applications of Cycloconverters. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Compare and contrast the working mechanisms of power MOSFETs and power BJTs, using diagrams to highlight the differences. 10M

OR

11. B). i) Describe the various types of power semiconductor devices indicating clearly the differences among them. 5M
ii) Illustrate the static V-I characteristics of a SCR with the help of a neat sketch. 5M

12. A). Illustrate the operation of a single-phase semi-converter with an R-L load and derive the expressions for its average and RMS output voltage using appropriate formulas. 10M

OR

12. B). i) For a 3-phase full converter, sketch the time variations of input voltage and voltage across one thyristor for one complete cycle for a firing angle delay of 30° . 5M
ii) A 3-phase full converter feeds power to a resistive load of 10Ω . For a firing angle delay of 30° , the load takes 5kW. Find the magnitude of per phase input supply voltage. 5M

(P.T.O.)

13. A). What is a dc chopper? Describe the various types of chopper configurations with appropriate diagrams wherever necessary. 10M

OR

13. B). Explain class A DC to DC converter power circuit, analysis, waveforms at steady state conditions. 10M

14. A). Illustrate the working of a single-phase bridge inverter with an R load using a neat circuit diagram and explain its operation. 10M

OR

14. B). What is pulse width modulation? List the various PWM techniques. How do these differ from each other? 10M

15. A). Explain principle of operation of single phase A. C voltage controller with R-L load and give its applications. 10M

OR

15. B). Discuss about the circulating current mode of operation of cyclo- converter. 10M

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech V Sem Regular Examinations December-2024
Course Name : Microprocessors & Microcontrollers
Course Code : A402312
Branch : Electrical & Electronics Engineering
Date & Session : 26-12-2024 AN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

**Answer all TEN questions
Each question carries ONE mark.**

10x1=10M

1. Name the different types of interrupts supported by 8086. 1 M
2. The offset address of data is 341BH and the data segment value is 123AH. Generate the physical address of the data. 1 M
3. What is the purpose of control word used in 8255? 1 M
4. Evaluate the value of ICW4 such that the 8259 is configured for use in an 8086 system, with normal EOI, buffered-mode master, and special fully nested-mode disabled. 1 M
5. What is the use of USART? 1 M
6. What voltage levels are used in RS-232C serial communication standard? 1 M
7. Mention the significance of the GATE bit in the TMOD control register. 1 M
8. Distinguish between microprocessor & microcontroller. 1 M
9. List the applications of Microcontroller. 1 M
10. What is the necessity to interface DAC with microcontroller? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Draw the pin diagram of 8086 and examine all the signals available in the 8086 processor. 10M
- OR**
- 11.B). Explain the data transfer group and logical group of 8086 instructions with necessary examples. 10M
- 12.A). Choose an integrated chip to be used for Analog to Digital conversion and explain how it is interfaced with the 8086 processor. 10M
- OR**
- 12.B). Discuss how microprocessors are interfaced with I/O and memory in detail. 10M
- 13.A). Discuss the RS-232C interface standard protocol. 10M
- OR**
- 13.B). With neat diagram explain about USART and its mode of operations. 10M
- 14.A). Describe the architectural features of 8051 microcontroller with necessary diagram. 10M
- OR**
- 14.B). Summarize the various modes of 8051 timers with their associated registers. 10M

(P.T.O..)

15. A). With a neat circuit diagram, explain how 4x4 Keypad is in interfaced with 8051 10M microcontroller and write 8051 ALP for keypad scanning.

OR

15. B). Draw the diagram to interface a stepper motor with 8051 microcontroller and explain and 10M Write its ALP to run the stepper motor in forward direction with delay.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech V Sem Regular Examinations December-2024
Course Name : Utilization of Electrical Energy
Course Code : A402402
Branch : Electrical & Electronics Engineering
Date & Session : 28-12-2024 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions
Each question carries ONE mark.

10x1=10M

1. Classify the types of electric drives. 1 M
2. What do you mean by load equalization? 1 M
3. List any two advantages of induction heating. 1 M
4. Write the principle of electric welding. 1 M
5. Define the term: Lumen in illumination engineering. 1 M
6. Classify the types of illumination methods. 1 M
7. Define Crest speed and Scheduled speed. 1 M
8. Justify the reason of tapered wheels in bogies and train engines. 1 M
9. What do you mean by plugging? 1 M
10. Define adhesive weight. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Identify the speed control methods of electric drives and explain with neat diagrams. 10M
- OR**
11. B). i) Identify the factors involved in the selection of motors. 6M
ii) Compare continuous load and intermittent load. 4M
12. A). i) Explain the principle of induction heating with neat diagrams. 6M
ii) Analyze the merits and demerits of various types of electric heating. 4M
- OR**
12. B). i) Infer the concept of resistance welding with neat diagrams. 6M
ii) Distinguish DC welding from AC welding. 4M
13. A). i) Develop the expressions for the illumination on a surface in two cases such as normal and inclined to the axis of beam of incident light. 8M
ii) A 250 V lamp has a total flux of 3000 lumens and takes a current of 0.8 A. Solve it to calculate lumens per watt and MSCP per watt. 2M
- OR**
13. B). i) Explain the working principle of mercury vapour lamp with neat diagrams. 6M
ii) Compare the characteristics of tungsten filament lamp and fluorescent lamp. 4M

(P.T.O..)

14. A). i) Compare AC and DC system for railway electrification. 6M
ii) Analyze the suitability of DC series motor in electric traction. 4M

OR

14. B). i) Illustrate the procedure to apply the dynamic and regenerative braking methods on DC shunt motor. 5M
ii) Explain the speed time curve for different services. 5M

15. A). Devise the tractive effort required for the propulsion of train and also devise the power and energy output from the driving axels. 10M

OR

15. B). Analyze the factors affected when there are the variations in acceleration and braking retardation. 10M

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech V Sem Regular Examinations December-2024
Course Name : Special Electrical Machines
Course Code : A402410
Branch : Electrical & Electronics Engineering
Date & Session : 30-12-2024 FN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. List the any two advantages of PMSM motor. 1 M
2. What is the role of permanent magnet in the motors? 1 M
3. Mention the applications of permanent magnet synchronous motor. 1 M
4. Name any two constructional features of PMSMs. 1 M
5. What type of torque is produced in switched reluctance motors? 1 M
6. List any two advantages of switched reluctance motors? 1 M
7. What is the basic principle of operation of a stepper motor? 1 M
8. Mention the any two applications of stepper motor. 1 M
9. What are the advantages of Hysteresis motor? 1 M
10. Mention any two applications of linear motors. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain the construction and working principle of a Permanent magnet brushless DC motor with neat diagram. 10M
- OR**
11. B). Describe the process of electronic commutation in a BLDC motor. How does it replace the function of brushes in a traditional DC motor? 10M
12. A). Describe the construction of PMSM. Explain the role of the rotor, stator and types of permanent magnets used? 10M
- OR**
12. B). Explain the torque - speed characteristics of Permanent magnet synchronous motor (PMSM) with neat diagram. 10M
13. A). Explain the working principle of a switched reluctance motor with neat diagram. 10M
- OR**
13. B). Explain the methods for controlling speed and positions in Switched Reluctance Motors (SRMs). Describe one controlling technique in detail. 10M
14. A). Describe the concept of step angle and its significance in stepper motors. How does step angle influence the motor's performance? 10M

(P.T.O.)

OR

14. B). Compare and contrast permanent magnet stepper motors, variable reluctance stepper motors and hybrid stepper motors. 10M

15. A). Explain the construction and working principle of an AC series motor with neat diagram. 10M

OR

15. B). Describe the torque – speed characteristics of a Hysteresis motor and its behavior during start-up. 10M
