

5E1767

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5E1767

B.Tech. V- Sem. (Main&Back) Examination, November/December - 2025
Electrical Engineering
5EE3-01 Electrical Materials

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No.205)*

PART- A**(Answer should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. Define skin effect.
2. What is the Hall effect in electrical materials?
3. Differentiate between mono-atomic and poly-atomic dielectric materials.
4. What is polarization in dielectric materials?
5. State any two properties of ferroelectric materials.
6. What are crystalline defects in solids?
7. Define the dielectric constant.
8. What is meant by electronic polarizability?
9. Define Piezoelectricity.
10. Write the scope of studying electrical materials

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.

(5×4=20)

1. Explain temperature dependence of resistivity in solids.
2. Describe the classical theory of electrical conduction in solids.
3. Write a short note on dielectric losses.
4. Explain internal field in solids and liquids with suitable examples.
5. Discuss the frequency dependence of electronic and ionic polarizability.
6. Describe the zero resistance and Meissner effect.
7. Explain the Carrier density and energy gap.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions.

(3×10=30)

1. Discuss in detail dielectric constant of mono atomic gases and poly atomic molecules.
2. Explain dielectric properties of insulators in static and alternating fields.
3. Describe the properties and applications of ferroelectric materials and piezoelectricity.
4. Discuss the classical theory of thermal conduction in solids along with Hall effect.
5. Explain magnetic properties and basics of superconductivity in electrical materials

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5E1760**B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025****Electrical Engineering
5EE4-02 Power System-I
EE, EX****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A**(Answer should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. Discriminate between Self and Mutual GMD.
2. What is skin effect? Why it is absent in DC system?
3. What do you understand by the insulation coordination?
4. Illustrate the importance of neutral grounding in power system.
5. Explain balanced and unbalanced faults.
6. What do you mean by Power grid and Micro grid?
7. Describe service mains, feeder and distributor.
8. Enlist the key steps involved in evaluating Per Unit (P.U) value.
9. What is local corona?
10. Write the expression for capacitance of single phase line.

PART - B**(Analytical / Problem Solving Questions)****Attempt any Five questions.****(5×4=20)**

1. Describe the various methods for reducing Corona effect in an overhead transmission line.
2. Consider the system shown in Fig.1 below. The percentage reactance of each alternator is expressed on its own capacity determine the short circuit current that will flow into a dead 3- ϕ short circuit at F.

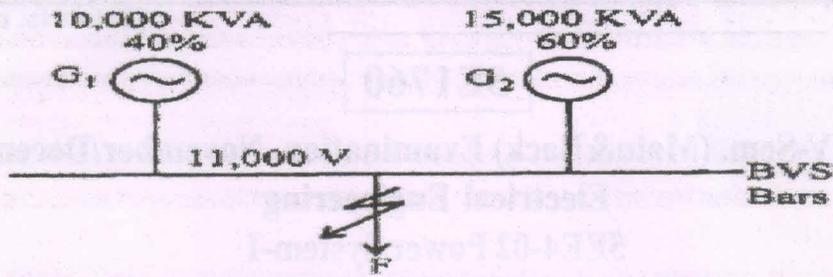


Fig.1

3. Derive an expression for the fault current for the LG and LL fault.
4. What is a nominal π circuit? Find the ABCD constants for nominal π circuit.
5. Derive the Travelling Wave Equation.
6. Why line commutated converter (LCC) are used in HVDC transmission system? Compare AC transmission system with DC transmission system.
7. Explain short circuit of synchronous machine. Also describe steady state, transient and subtransient operation of synchronous machine.

PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any Three questions.

(3×10=30)

1. Derive an expression for the inductance per phase for a three overhead transmission line when
 - a) The conductors are symmetrically placed.
 - b) The conductors are unsymmetrically placed.
2. a) What is meant by insulation coordination? How are the protective devices chosen for optimal insulation level in power system?
 b) What are the key measures taken to safeguard equipment from lightning strikes?
3. a) Draw the reactance diagram for the power system shown in Fig.2 Neglect resistance and use a base of 100MVA, 220KV in 500K Ω line. The ratings of the generator motor and transformers are given below.
 Generator: 40MVA, 25KV, X = 20%.
 Motor: 50MVA, 11KV, X = 30%.
 Transformer T1: 40MVA, 33/220 KV, X= 15%.
 Transformer T2: 30MVA, 11/220 KV, X= 15%.

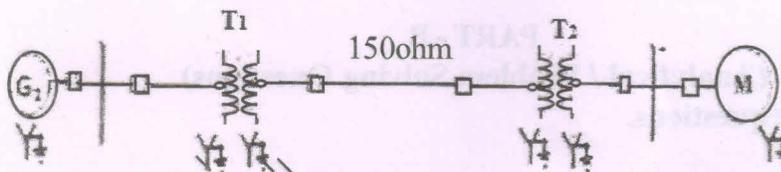


Fig.2

- b) A Discuss the principle of symmetrical components. Derive the necessary equations to convert: Phase quantities into symmetrical components.
4. a) Designate solar PV panels for the generation of electricity and draw their characteristics.
- b) A 1 km long single core cable has a core diameter of 2.5cm, insulation thickness of 1.25cm and resistivity of the insulation is 4.5×10^4 ohms-cm. Calculate the insulation resistance/km.
5. Write down short note on the following protection schemes with their application.
- a) Over-Current.
- b) Directional Protection.
- c) Distance Protection.
- d) Differential Protection.

5E1761

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[Total No. of Pages : 2]

5E1761**B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025****Electrical Engineering
5EE4-03 Control System
EE, EX****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A**(Answer should be given up to 25 words only)****All questions are Compulsory.****(10×2=20)**

1. What is meant by controller?
2. Define the initial and final value theorem.
3. Write any two difference between linear and Non-linear control system.
4. What is an actuating signal?
5. What is the state transition matrix?
6. What type of feedback is employed in control system?
7. Define the order of the system.
8. What is meant by modeling of system?
9. What is the meaning of marginally stable system?
10. Why Root locus must be symmetrical about the real axis?

PART - B**(Analytical / Problem Solving Questions)****Attempt any Five questions.****(5×4=20)**

1. Define the gain margin and phase margin of the system.
2. Explain the concept of controllability and observability.

- Discuss the compensation techniques employed in the design of control system.
- Obtain the nodal equations for the system shown in Fig.1 and draw its analogous electrical networks.

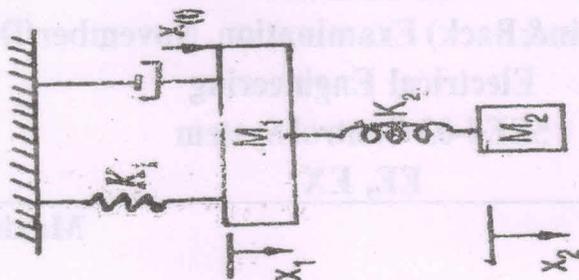


Fig.1

- Explain the concept of poles and zeros in control system analysis and design.
- Show that the PID controller base has phase-lag behaviour in low frequency region and phase-lead behavior in high frequency region.
- What are the effects of feedback in control system?

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any Three questions.

(3×10=30)

- Draw the root locus of unity feedback control system with open-loop transfer function given by $G(s)H(s) = \frac{k}{s(s+3)(s^2+2s+2)}$ as K is varies from zero to infinite. Also find the value of steady-state error to a unit-ramp input for this system. For what value of K is this error minimum?
- What is PID controller and how does it combine the beneficial effect of both PD and PI controller? Does such a controller change the system order?
- Use the Routh-Hurwitz criterion to determine the stability of the systems with characteristic equation as given below. Also find the number of roots of each equation that lie on the right half of the s-plane.
 - $S^5 + 2S^4 + 2S^3 + 4S^2 + S + 1 = 0.$
 - $S^6 + 3S^5 + 5S^4 + 9S^3 + 8S^2 + 6S + 4 = 0.$
- The characteristic equation of a feedback control system is found as $S^4 + 9S^3 + 11S^2 + 6S + K = 0$. Determine the value of K for which the system is absolutely stable and marginally stable. Also determine the frequency of sustained oscillation.
- Describe the procedure for constructing a Bode plot. How do, Bode plot represent the frequency response of a system?

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B.Tech. V-Sem (Main & Back) Examination, November/December - 2025
Electrical Engineering
5EE4-04 Microprocessor
EE, EX

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A**(Answer should be given up to 25 words only).****All questions are compulsory.****(10×2=20)**

1. Differentiate between 16-bit and 32-bit microcontrollers.
2. Compare the features, merits and demerits of Single chip Microcontroller and Single chip Microprocessor.
3. Give the details of PSW register of 8051 and explain the functions of all bits.
4. Distinguish between the memory mapped I/O and I/O mapped I/O.
5. What is PPI? Why are they known so?
6. Write short note on synchronous and Asynchronous communication.
7. Differentiate between Interrupt and Polling.
8. Differentiate between Static and Dynamic RAM.
9. Explain the functions of the following pins with respect to 8051 microcontroller:
 $\overline{\text{PSEN}}$ and $\overline{\text{EA}}$, ALE
10. State the purpose of ISR and IVT in 8051 microcontroller.

5E1762 / 435**(1)****[Contd....**

PART - B
(Analytical/Problem solving questions)

Attempt any Five questions. (5×4=20)

1. Write short notes on any two:
 - a) Assembler directives
 - b) 8051 register banks and Stack
 - c) Inter segment and Intra segment calls
2. Name and explain the various flag bits available in 8051. What is its significance in 8051 programming
3. Fifteen 8-bit binary coded decimal numbers are available in successive RAM locations starting at 60H. Write an 8051 ALP to add these numbers and store the BCD result in locations 70H and 71H.
4. What do you mean by interrupt priority? What is the significance of attaching priority to various interrupts of 8051? List the priority order used by 8051 when it is reset or powered on.
5. Explain the functions of the following instructions of 8051. Illustrate with suitable example
 - a) DIV AB
 - b) XCHD A, @R0
 - c) MOVX A, @R1
 - d) JNZ BACK
6. Write a brief note on RS232 serial communication standard and list the RS 232 DB9 signals. Discuss the necessity of voltage converters while connecting 8051 serial port to RS232 port.
7. Define the following : a) Memory latency b) Memory Bandwidth

PART - C
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. (3×10=30)

1. With the help of a neat sketch, explain the architecture (internal organisation) of 8051 microcontroller.

2. Describe the different addressing modes supported by the instruction set of 8051 with the help of relevant examples.
 3. Interface the following memory devices to 8051. Show the complete interfacing circuit. Avoid fold back space.
 - a) 1K X 8 RAM as data memory - with starting address 8000h
 - b) 2K X 8 EPROM as Program memory-with starting address 5000h.
 4. Discuss the necessity analog to digital converters in 8051 based systems. Describe the functions of all the pins(signals) of ADC 0809 (8 channel, 8-bit ADC). Show the interfacing circuit to interface ADC 0809 to 8051 and write an 8051 ALP to convert the analog input applied to channel 4 to equivalent digital and store the digital output at external RAM location 905AH.
 5. Describe the necessity of stack memory in 8051 programs. What is the role of stack pointer register in accessing the stack memory? what is the default stack memory space in 8051? Describe the PUSH and POP instructions of 8051 in detail by taking a relevant example.
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5E1768

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Electrical Engineering
5EE4-05 Electrical Machine Design

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination
(Mentioned in form No.205)*

PART A**(Answer should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. Write the output equation of the electrical machine giving the relation between output, diameter, and length of the machine.
2. Name two commonly used insulating materials in machines.
3. Define the heating time constant.
4. Write the relation between heat flow, thermal resistance, and temperature rise.
5. What is the purpose of a yoke in a transformer?
6. Give the equation of EMF in a transformer.
7. Name the different types of windings used in transformers.
8. Name two types of transformer cores.
9. What is the typical value of window space factor?
10. Name two hard or permanent magnetic materials.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.

(5×4=20)

1. Discuss the major considerations and design factors in Electrical Machine Design.
2. Discuss the properties that good magnetic materials should possess.
3. During a heat run test of a 100 kVA transformer, the temperature rise after one hour and two hours is found to be 24°C and 34°C, respectively. Calculate the heating time constant and final steady-state temperature rise.
4. Derive the output equation of the DC machine in terms of main dimensions.
5. Enumerate specifications of a Transformer that are required prior to designing a transformer.
6. Discuss type of synchronous generators and their applications.
7. Discuss the short circuit ratio of a synchronous machine and its significance.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions.

(3×10=30)

1. Discuss the properties and classification of insulating material. Give some examples of solid, liquid, and gas-type insulating materials and their applications.
2. Determine the main dimensions of a 350 kVA, three phase, 50 Hz, star-delta, 11,000 V/3,300V, core - type distribution transformer. Assume distance between core centres as twice the width of core (assume current density (δ) as 2.5 A/mm², constant K= 0.45 and flux density 1.2T)
3. A three-phase, 50 Hz oil cooled core-type transformer has the following dimensions. Distance between core centres=0.2m, height of window=0.24m, diameter of circumscribing circle = 0.14 m. The flux density in the core = 1.25 Wb/m², current density in conductor = 2.5 A/mm². Assume a window space factor of 0.2 and core area factor of 0.56. The core is two stepped. Estimate the kVA rating of transformer.
4. Draw the flow chart for the design of the induction motor for its air gap length, stator core, winding, rotor design.
5. Discuss the necessity and type of cooling in turbo-generators. Discuss the advantages of hydrogen Cooling.

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5E1769

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Electrical Engineering
5EE5-11 Restructured Power System (Elective - I)

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. What are the key objectives of restructuring in the power industry?
2. Why is deregulation important in modern power system?
3. Explain the law of diminishing marginal utility.
4. Differentiate between consumer surplus and producer surplus.
5. What are the four pillars of electricity market design?
6. Define Locational Marginal Pricing (LMP).
7. What is Available Transfer Capability (ATC)?
8. What is Co-optimization in ancillary services?
9. Explain the HHI index used to identify market power.
10. What is the role of transmission pricing in power markets?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×4=20)

1. Explain the need for restructuring the power industry. What are the components and expected benefits of this process?
2. In a competitive electricity market, explain how locational marginal pricing (LMP) works and how it helps manage congestion.
3. Calculate the ATC for a transmission line given: $TTC = 200\text{MW}$, $TRM = 30\text{MW}$ and $CBM = 40\text{MW}$. Explain its significance.
4. Discuss the difference between Cournot and Bertrand models in the context of electricity markets. Which better represents generator behaviour.
5. What is the transmission congestion management and why is it crucial in deregulated power system?
6. Define market power in electricity markets. What indices are used to measure it? How can regulators mitigate its impact?
7. Explain how co-optimization of energy and ancillary services is performed in deregulated electricity markets. Why is this approach more efficient than sequential scheduling?

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions.

(3×10=30)

1. What are the major economic principles that influence consumer and supplier behaviour in electricity markets?
2. How do ancillary services support power system operation in deregulated electricity markets?
3. Design a basic model to manage transmission congestion using re-dispatch and curtailment. Explain the economic impact.
4. What is the role of regulatory authorities in a deregulated power market? How do they ensure fair competition and protect consumers?
5. How does the concept of market equilibrium work in the context of electricity markets, and what causes dead-weight loss? Provide a graphical interpretation.

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	5E1361 B.Tech. V-Sem. (Re Back) Examination, November/December - 2025 ESC Electrical Engg. 5EE3-01 Electrical Materials	

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Instructions to Candidates:

Attempt all Five questions from Part A, Four questions out of six questions from Part B and Two questions out of three questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory.

(5×2=10)

1. What are crystalline defects?
2. Define dielectric constant.
3. Differentiate between soft and hard magnetic materials.
4. Define relaxation time of electrons.
5. What is the energy gap in semiconductors?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Four questions.

(4×10=40)

1. Explain various types of bonding in solids and their effects on electrical properties.
2. Describe the internal field in solids and liquids and its effect on dielectric behavior.
3. Discuss the classification of magnetic materials and explain Curie-Weiss law.
4. Explain superconductivity and discuss types and properties of superconducting materials.

5. Discuss Ohm's law, relaxation time, and the effect of electron scattering on resistivity.
6. Discuss classification of semiconductors and their conductivity variations with temperature.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Two questions.

(2×15=30)

1. Explain Hall Effect and derive the expression for hall coefficient.
 2. What do you mean by superconductors. Explain the types of superconductors with their applications.
 3. What are the classification of semiconductor material explaining N-Type Semiconductor with suitable example.
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5E1363

B.Tech. V-Sem. (Mercy Back) Examination, November/December - 2025
Electrical and Electronics Engg.
5EX4-03 Control System
EE, EX

Time : 3 Hours

Maximum Marks : 120
Min. Passing Marks:42**Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Four questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205).*

PART-A

(Answer should be given up to 25 words only)

All questions are Compulsory.

(10×2=20)

1. Give the advantages and disadvantage of open loop system.
2. What is steady state response?
3. How the system is classified on the basis of damping?
4. Define the gain-cross over frequency.
5. Write Masons Gain formula.
6. What is observability?
7. Define State Transition matrix.
8. List the frequency domain methods to find the stability of the system.
9. What is a lag lead compensator?
10. State Routh's criterion for stability.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×8=40)

1. Explain Input test Signals:
 - i) Step function
 - ii) Ramp Function
 - iii) Parabolic function
 - iv) Impulse function
2. Define the open loop and closed loop systems. Draw the block diagram representation of open loop and closed loop system by assuming suitable example.
3. Write short notes on
 - a) Initial and Final value theorem
 - b) Explain regulator problem and tracking problem in details.
4. Construct the state model for a system by the differential eq.
$$\ddot{y} + 5\dot{y} + 7y = 8u$$
5. What is controller. Explain the P, PD, PI and PID controller in details.
6. Draw the Phase lead compensator and explain.
7. Define the following:
 - i) Series Compensation,
 - ii) Parallel compensation
 - iii) Series-parallel Compensation

PART - C

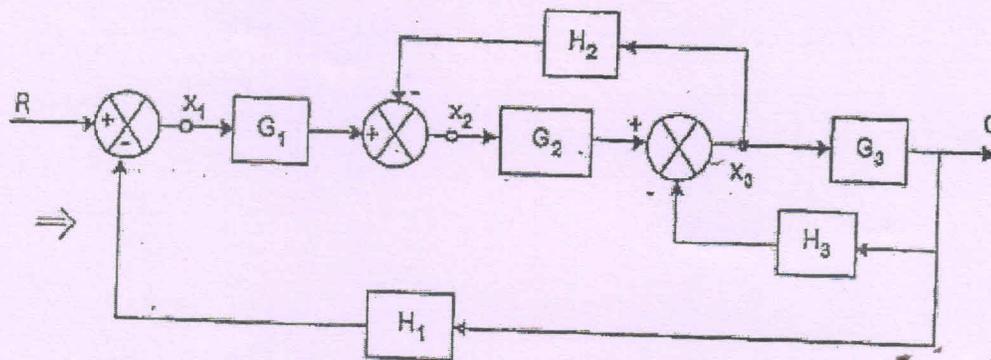
(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Four questions.

(4×15=60)

1. Sketch the root locus for the system shown below. $G(s).H(s) = \frac{k}{s(s+2)(s+3)}$. (15)

2. Sketch the Bode plot and check the stability, unity feedback. $G(s)=50/s(s+1)(1+0.5s)$. (15)
3. Write a short note on (3×5=15)
- Diagonalization of transfer function
 - Solution of state equations
 - Short notes on M circle
4. Second order control system has a unity feedback and open loop. $G(s) = \frac{500}{s(s+15)}$ (15)
- Draw a block diagram for the closed loop system.
 - Characteristic equation of closed loop.
 - What are the value of natural frequency and damping ratio?
 - Find the value of % maximum overshoot (M_p) and time 'tp' Settling time 'ts'.
5. a) Define the open loop and closed loop systems. Draw the block diagram representation of open loop and closed loop system by assuming suitable example. (5)
- b) for the given system find C/R using reduction method. (10)



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5E1364**B.Tech. V-Sem. (Back) Examination, November/December - 2025****Electrical & Electronics Engg.****5EX4-04 Microprocessor****EE,EX****Time : 3 Hours****Maximum Marks : 120****Min. Passing Marks:42****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Four questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A**(Answer should be given up to 25 words only)****All questions are Compulsory.****(10×2=20)**

1. Differentiate between 16-bit and 32-bit microcontrollers.
2. What does the term embedded system mean?
3. Draw the pin configuration of the 8051 microprocessors.
4. Give the names of 8051 interrupts and arrange them according to priority.
5. What is the difference between timers and counters? Also, illustrate the TCON register diagram of 8051.
6. Explain how an ADC (Analog to Digital converter) is interfaced with the 8051 microprocessors.
7. List the advantages of using subroutines.
8. What are the types of sensors used for interfacing?
9. Define machine cycle.
10. Explain how the baud rate is calculated for serial data transfer in Mode 1.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×8=40)

1. Explain in detail about the architecture of 8051 microcontroller with a neat diagram.
2. Describe how DAC and ADC interfaces are utilized in microprocessor systems.
3. Discuss briefly the difference between synchronous and Asynchronous communication.
4. Illustrate and describe the interfacing circuit and functional pins of LCD.
5. How does one interface a 16X2 LCD display using 8051 microcontrollers?
6. Give PSW of 8051 and describe the use of each bit in PSW.
7. Write short note on overview of 8051 family.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Four questions.

(4×15=60)

1. Explain how microprocessors and microcontrollers differ from computer-based controllers. Also, describe sensor interfacing and external memory interfacing.
2. Draw the diagram to interface a stepper motor with 8051 microcontroller and explain. Write an 8051-assembly language program to run the stepper motor in both forward and reverse direction with delay.
3. How input/output pins and ports help in a circuit of a Microcontroller?
4. Draw the pin diagram of programmable peripheral interface chip 8255 and explain its various operational modes.
5. Write an assembly language program to perform traffic light control operation.

5E1365

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5E1365**B.Tech. V-Sem. (Re Back) Examination, December - 2025****Electrical Engg.****5EE4-05 Electrical Machine Design****Time : 3 Hours****Maximum Marks : 120****Min. Passing Marks:42****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Four questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A**(Answer should be given up to 25 words only)****All questions are Compulsory.****(10×2=20)**

1. List the factors to be considered in electrical machine design.
2. Explain the different methods of cooling oil type transformers.
3. Explain the term short circuit current of an induction motor.
4. Explain the use of damper winding in synchronous machine.
5. What conducting materials are commonly employed in electrical machines?
6. Define the short circuit ratio of synchronous machine and no-load current of a transformer.
7. Differentiate between brushless DC motor and switched reluctance motor.
8. What are the advantages and disadvantages of synthesis method of computer aided design?
9. Define voltage regulation of a transformers and explain in brief temperature rise in transformers.
10. Which type of rotor is generally used for high speed alternators? Define heat flow.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×8=40)

1. Discuss the selection criteria for core materials in transformer design. Explain the properties required for ideal core material.
2. Obtain the kVA output equation for a three-phase transformer. Define window space factor.
3. Explain the synthesis method of computer aided design with neat flow-chart. Also write its advantages and disadvantages.
4. Write short notes on:
 - a) Permanent magnet synchronous machine
 - b) Analysis method of computer aided design with its advantages. (4+4=8)
5. A $3-\phi$ induction motor has 54 slots with 8 conductors per slot and 72 rotor slots with 4 conductors per slot. Find the number of stator and rotor turns. Find voltage across the rotor slip-rings, When the rotor is open circuited at rest. Both stator and rotor are star connected and a voltage of 400 volts is applied across the stator terminals.
6. Define space factor and rating of a machines. Explain the choice of specific magnetic loading with factors which influence the performance of the machine.
7. Explain the steps for the design of wound rotor of an induction motor.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Four questions.

(4×15=60)

1. Describe the complete procedure for design of armature of a DC machine. Discuss the selection of main dimensions, number of poles, armature slots, armature conductors, and armature winding arrangements.
2. Explain the procedure to draw circle diagram of an induction motor. What are the various information which can be obtained from a circle diagram?
3. Explain about the shape of pole face of a synchronous machine. Also explain the design of turbo-alternators with design of damper winding.
4. What are the various steps of determination of main dimensions for core, yoke and window of a transformer? Explain design of low-voltage and high-voltage winding of a transformer.
5. Determine the main dimensions of a 12MVA, 13.8 kV, 50Hz, 1500 rpm, three-phase star connected alternator. The following data are provided
Average gap density=0.60 tesla,
Ampere conductors per meter = 42000,
Peripheral speed =80m/second.
Also find the maximum flux, the number of stator slots, if one conductor per slot is used, number of turns per phase.