5E1361

Roll No. _____ Total No of Pages: 2

5E1361

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Electrical Engineering
5EE3 –01 Electrical Materials

Time: 2 Hours **Maximum Marks: 65**
Min. Passing Marks: 23

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and one questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is the difference between crystalline and non-crystalline material?

Q.2 Write any two properties of electrical insulating materials.

Q.3 Explain super conductivity and its practical application.

Q.4 What do you mean by electron scattering?

Q.5 Why silicon (Si) is preferred over germanium (Ge) for semiconductor material?

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 What is the hall effect? Describe the relation between hall coefficient and carrier density.

Q.2 Name four types of atomic bonding observed in materials. Describe any two of them, giving examples.

Q.3 Distinguish clearly between soft and hard magnetic materials. Discuss their application.

Q.4 Explain conductivity of semiconductor and discuss their effect with rise in temperature.

Q.5 Explain the ohm's law for conductive of metals in detail.

Q.6 Write short note on piezoelectricity and resistivity of metals.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 What is the semi-conductor? Name the various semiconductor materials. What is the difference between N-type and P-type semiconductor and how they are produced?

Q.2 Explain what is meant by polarization in dielectrics? Discuss in brief electronic, ionic and molecular polarization in dielectrics.

Q.3 Explain the magnetic classification of the material. Explain the term magnetostriction as applied to ferromagnetic materials.

5E5041

Roll No. _____ Total No of Pages: 3

5E5041

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021

Electrical Engineering

5EE1A Power Electronics

EX, EE

Time: 2 Hours **Maximum Marks: 48**

Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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)

1. NIL 2. NIL

UNIT- I

Q.1 (a) With the help of a neat structural diagram and suitable wave forms, explain the operation of IGBT. [8]

(b) Describe the turn off process in a GTO with the help of an appropriate voltage and current wave forms. [8]

OR

Q.1 (a) Discuss with relevant waveforms class A and class D types of commutations employed for thyristors. [8]

(b) Draw and explain the switching behavior of power MOSFET. [8]

UNIT- II

Q.2 (a) What are the different methods of turning off an SCR? Explain all methods in detail. [8]

(b) What are dv/dt and di/dt ratings of SCRs? How these are protected in SCR? [8]

OR

Q.2 (a) Explain with the help of a neat circuit diagram, the use of pulse transformer in triggering circuits. [8]

(b) Draw RC full wave trigger circuit for one SCR. Describe the working with related voltage wave forms. [8]

UNIT- III

Q.3 (a) Describe the working of single phase fully controlled bridge converter for rectifying mode and inversion mode. [8]

(b) Explain the operation of single phase half controlled bridge converter for RL load with associated waveforms. [8]

OR

Q.3 (a) Explain the operation of a three phase fully controlled bridge converter for RL load. Draw the voltage and current waveforms for $\alpha = 70°$. [8]

(b) A single phase fully controlled bridge rectifier is given 230V, 50Hz supply. The firing angle is 45° and load is highly inductive. Determine - [8]

(i) Average output voltage

(ii) Power factor

UNIT- IV

Q.4 (a) For a 3 phase semi convertor operating from 3 phase ideal supply and delivering power to a purely resistive load, derive an equation for average output voltage if the triggering angle is α. [8]

(b) With the help of a circuit diagram and their associated waveforms, explain the extinction angle control scheme for improvement of power factor. [8]

OR

Q.4 (a) Explain in detail the sinusoidal pules- width modulation control scheme for power factor improvement. [8]

(b) Explain with associated waveforms, how power factor can be improved with symmetrical angle control scheme. [8]

UNIT- V

Q.5 (a) With the circuit diagram and output voltage waveforms, explain the time ratio control and current limit control used for a chopper. [8]

(b) Explain the working of a voltage commutated chopper. [8]

OR

Q.5 (a) Discuss the working of load commutated chopper with associated voltage and current waveforms. [8]

(b) Derive the expressions for I_{omax} and I_{omin} for class 'A' chopper. [8]

5E5044

Roll No. _____ Total No of Pages: 3

5E5044

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Electrical Engineering
5EE4A Database Management System
Common for EE, EX

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit**. All questions carry **equal** marks. 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)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Why would you choose a database system instead of simply storing data in operating system file? Define the Database concept in detail. [8]

(b) Define the following terms with suitable examples -

(i) Primary key [2]

(ii) Foreign key [2]

(iii) Super key [2]

(iv) Candidate key [2]

OR

Q.1 (a) Define the structure of Database Management System in detail. [8]

(b) What is Data Model? Explain E – R data model with suitable examples. [8]

UNIT- II

Q.2 (a) Describe different database scheme with suitable examples. [8]

(b) What do you understand by functional dependency? Explain it with suitable examples. [8]

OR

Q.2 (a) Explain the following operation in relational algebra with examples –

(i) Project [2]

(ii) Union [2]

(iii) Cartesian product [2]

(iv) Set Intersection [2]

(b) Give formal definition and explain with examples, the following algebra operations -

(i) Division operation [2]

(ii) Natural Join [2]

(iii) Outer Join [2]

(iv) Grouping [2]

UNIT- III

Q.3 (a) Write a short note on –

(i) Trigger [3]

(ii) Embedded SQL [3]

(iii) Referential Integrity [3]

(b) Explain the concept of constraint in detail. [7]

OR

Q.3 (a) What do you mean by GL's form management and report writer? [8]

(b) Explain the component of JDBC architecture. Also explain the advantages of JDBC. [8]

UNIT- IV

Q.4 (a) What is hashing? Summarize the advantages and disadvantages of using "Hash" approach. [8]

(b) Is it possible in general to have two primary indices on the same relation for different search key? Explain your answer. [8]

OR

Q.4 Explain the distinction between open and closed hashing. Discuss the relative merit of each technique in Database Application. [16]

UNIT- V

Q.5 (a) What do you mean by Serializability in transaction processing? [8]

(b) What is log? How is it maintained? Discuss the salient features of deferred database modification and immediate database modification strategies in brief. [8]

OR

Q.5 Write a short note on -

(a) Deadlock [4]

(b) Lock based protocol [4]

(c) Transaction failure [4]

(d) Recovering system [4]

5E1362

Roll No. _____ Total No of Pages: 2

5E1362

B. Tech. V - Sem. (Main & Back) Exam., Feb.-March - 2021

PCC/PEC Electrical & Electronic Engineering

5EX4 – 02 Power System - I

Common for EE, EX

Time: 2 Hours **[To be converted as per scheme]**

Max. Marks: 82

Min. Marks: 29

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is the drawback in series connected capacitor?

Q.2 What are the advantages of high voltage transmission system?

Q.3 What is corona? Explain various factors which affect the corona losses.

Q.4 What is the advantage of per unit value over percent value?

Q.5 Differentiate shielding and non- shielding method of over voltage protection.

Q.6 What do you mean by Surge Impedance loading.

Q.7 What is need of fault analysis in power system?

Q.8 What are the basic requirement of a protection system?

Q.9 Why is D.C. used for high voltage transmission of electrical power?

Q.10 What is solar power generation and what are its advantages.

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 Draw and explain the structure of electrical power system indicating the voltage level in each transmission level.

Q.2 Draw the phasor diagram of a short transmission line and derive an expression for voltage regulation and transmission efficiency.

Q.3 Describe about the various method of neutral grounding in detail.

Q.4 What is meant by insulation co-ordination? Also draw volt-time curve.

Q.5 What are the symmetrical components? Explain clearly with the help of vector diagram the positive, negative and zero sequence quantities.

Q.6 Explain the conversion of wind energy into electric energy in a wind power plant, with help of diagram.

Q.7 Explain shunt compensation of transmission line in detail.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Derive the expression for calculating the internal and external flux linkage for a conductor carrying current. Use these expressions to derive the equation for the inductance of a single phase transmission line.

Q.2 Explain the operation of synchronous machine when connected to infinite bus. Also draw steady-state performance characteristic.

Q.3 What are the basic requirements of a surge diverter? Explain different type of surge diverter used for over voltage protection.

Q.4 Explain different types of distance protection. Compare and give their application in detail.

Q.5 Explain Line Commutated Converters (LCC) used in HVDC transmission system. Compare AC and DC transmission system also give their advantage and disadvantage.

5E1363

Roll No. _____ Total No of Pages: 4

5E1363

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Electrical Engineering
5EE4 – 03 Control System
Common for EE, EX

Time: 2 Hours **Maximum Marks: 82**

Min. Passing Marks: 29

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. Semi Log Paper 2. Graph Paper

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What major advantage does compensator design by frequency response have over root locus design?

Q.2 Why is the phase margin increased above that desired when designing a lag compensator?

Q.3 Why is a correction factor added to the phase margin required to meet the transient response?

Q.4 State advantages of the transfer function approach over the state – space approach.

Q.5 Write down the merits and demerits of phase lag lead compensation.

Q.6 Define gain margin and phase margin and their significance with respect to stability.

Q.7 Explain the concept of controllability and observability with example.

Q.8 Differentiate modern control theory versus conventional control theory.

Q.9 Define Rise time and settling time for second order control system.

Q.10 Define stability for a linear time invariant system. Explain the terms relative stability and absolute stability.

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 Determine the transfer function $\frac{C(s)}{R(s)}$ for the system whose block diagram is given in Fig.1.

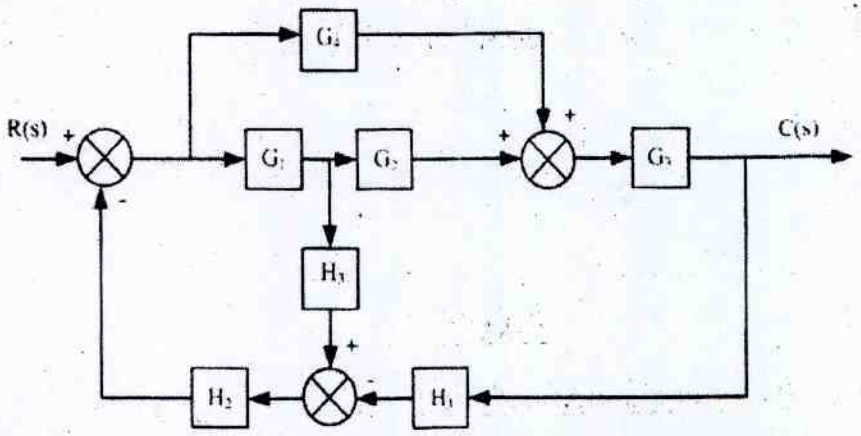

Figure 1

Q.2 A system is represented by the following set of equations. Construct the signal flow graph and find the closed loop transfer function.

$$x = x_1 + t_3.u,\ \dot{x}_1 = -q_1.x_1 + x_2 + t_2.u,\ \dot{x}_2 = -q_2.x_1 + t_1.u$$

Q.3 Determine the range of K such that feedback control system having characteristics equation $s(s^2 + s + 1)(s + 4) + K = 0$, will be stable.

Q.4 Construct the Nyquist plot for a unity feedback control system whose open loop transfer function is - $G(s)H(s) = \frac{K}{s(s^2+2s+2)}$. Find the maximum value of K for which the system is stable.

Q.5 Obtain Eigen values, Eigen vectors and state model in canonical form for a system described by –

$$\dot{x}(t) = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix} x(t) + \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix} u(t)$$

$$y(t) = [1 \quad 0 \quad 0]x(t)$$

Q.6 Find the state model of following Transfer Function-

$$\frac{y(s)}{u(s)} = \frac{1}{(s+1)(s+2)(s+3)}$$

Q.7 (a) Explain PID controllers in detail along with its block diagram.

(b) Write various effects of lead compensating network.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Sketch the root locus plot of a unity feedback system with an open loop transfer function of given Transfer Function $G(s) = \frac{K}{s(s+2)(s+4)}$ and determine the following –

(a) The range of values of K for which system has damped oscillatory response.

(b) What is the greatest value of K which can be used before continuous oscillations occur?

(c) Determine the frequency of continuous oscillations.

(d) Determine the value of K so that the dominant pair of complex poles of the system has a damping ratio of 0.5.

(e) Corresponding to value of K, determine the closed loop transfer function in factored form.

Q.2 Draw the bode plot for a system having $G(s) = \frac{3}{s(1+0.05s)(1+0.2s)}; H(s) = 1$

Determine –

(a) Gain crossover frequency and corresponding phase – margin.

(b) Phase crossover frequency and corresponding gain – margin.

(c) Stability of the closed loop system.

Q.3 Draw the mechanical network for the system shown in Fig. 2 and draw its electrical analogous circuit.

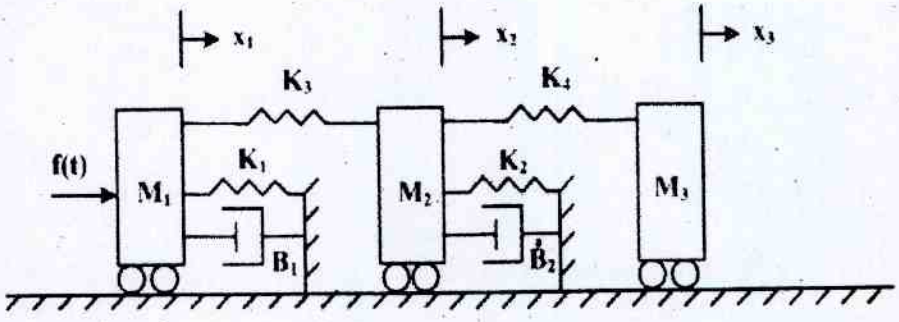

Figure 2

Q.4 The state equation of a system are given below. Determine if the system is completely controllable and observable.

$$\dot{x}(t) = \begin{bmatrix} -6 & 2 & -4 \\ -18 & 3 & -8 \\ -6 & 1 & -3 \end{bmatrix} x(t) + \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix} u(t)$$

$$y(t) = [1 \quad -1 \quad 2]x(t)$$

Q.5 The block diagram of a simple servo system is shown in given figure below. Find

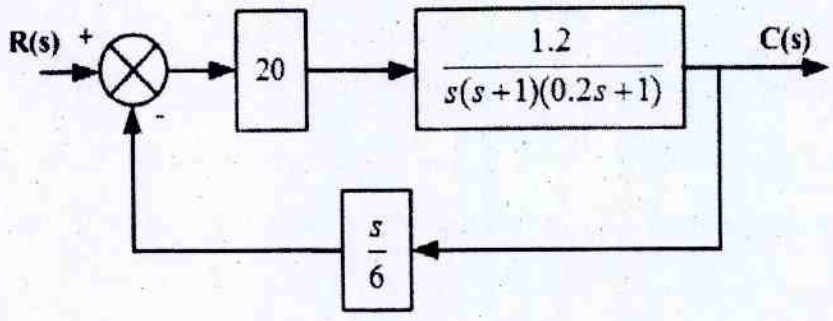

Figure 3

(a) The characteristics equation of the system
(b) Undamped frequency of oscillations
(c) Damped frequency of oscillations
(d) Damping ratio
(e) Damping factor
(f) Maximum overshoot
(g) First undershoot
(h) Time interval after which maximum and minimum occurs
(i) Settling time
(j) Number of cycles completed before the output is settled within 2% of final value (Consider unit step input)

5E5043

Roll No. _____ Total No of Pages: 3

5E5043

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Electrical & Electronics Engineering
5EX3A Control Systems
EE, EX

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Explain the term multi-variability in control system. What is its significance in system? [10]

(b) Verify the following statements -

(i) An automatic coffee maker is an example of open loop control system. [3]

(ii) Controlling of traffic by policeman is an example of closed loop system. [3]

OR

Q.1 (a) Explain the way for determination of transfer function by the following ways- [8]

(i) Block Diagram Reduction Technique

(ii) Signal Flow Method

(b) Explain the role of Laplace transformation function and Inverse Laplace transformation in control system. Also give their applications. [8]

UNIT- II

Q.2 Derive the expressions for steady state errors for various inputs (Unit – step; Unit ramp) and system (Type – 0; Type – 1) [16]

OR

Q.2 Distinguish between the construction & working of AC servomotor, synchronous and stepper motor. [16]

UNIT- III

Q.3 (a) The overall transfer function of a control system is given by – [10]

$$\frac{C(s)}{R(s)} = \frac{12}{s^2+1.4s+12}$$

The damping ratio will be 0.6. Obtain the rise time, peak time, maximum overshoot for unit step input.

(Assume no feedback is given)

(b) Explain the effect of adding poles and zeros on the root locus. [6]

OR

Q.3 (a) Explain the basic concepts of root locus and necessary conditions for root loci construction. [8]

(b) Brief the Routh-Hurwitz criteria along with its limitations. [8]

UNIT- IV

Q.4 (a) Write major steps for plotting root locus. [8]

(b) Investigate and write down the properties of polar and inverse polar plots. Also detail the importance of Bode plots. [8]

OR

Q.4 (a) Define the following terms – [8]

(i) Stability of a system

(ii) Gain and phase margin

(b) An open loop transfer function with unity feedback is – [8]

$$G(s) = \frac{k\left(s+\frac{2}{3}\right)}{s^2(s+6)}$$

Plot root locus and find the value of k for which all roots are equal. Also determine roots.

UNIT- V

Q.5 Write short notes on the following (Any two) - [8+8=16]

(a) Time Domain & Frequency Domain

(b) Lag Networks

(c) PID controllers

(d) Lag-lead Network

OR

Q.5 (a) Write a short note on design of closed loop systems by using compensation technique. [8]

(b) Explain proportional and integral type of controllers. Also write two applications of each. [8]

5E5045

Roll No. _____ Total No of Pages: 3

5E5045

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Electrical & Electronics Engineering
5EX5A Transmission & Distribution of Electrical Power
EE, EX

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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)

1. NIL 2. NIL

UNIT- I

Q.1 (a) What is meant by the term feeders, distribution and service mains? Why is the distribution of AC considered superior to that of DC? [8]

(b) Draw and explain the structure of electrical power system indicating the voltage level in each transmission levels. [8]

OR

Q.1 (a) Explain the radial and ring main distribution system in detail. [8]

(b) A 3 phase 4-wire system is used for lighting. Compare the amount of conductor material required with that needed for a 2-wire dc system with the same lamp voltage. Assume the same losses and balance load. The neutral is one half the cross section of one of the respective outers. [8]

UNIT- II

Q.2 (a) How do the vibration gets generated in conductor? How are they damped? [8]

(b) What are the various types of line support? Discuss the stability of each with reference to system voltage and span? [8]

OR

Q.2 (a) A transmission line has a span of 15m between level supports. The cross section area of conductor is 1.25cm^2 and weighs 100kg/100m. The breaking stress is 4220 kg/cm^2. Calculate the factor of safety if the 50g of the line is 3.5m. Assume a maximum wind pressure of 100kg/m. [8]

(b) Write short notes on-

(i) String Chart [4]

(ii) Factors affecting the sag in overhead line [4]

UNIT- III

Q.3 (a) Write short notes on-

(i) Proximity effect [4]

(ii) Transposition of conductors [4]

(b) Calculate the capacitance of single phase overhead line consisting of a pair of parallel wire 12mm in diameter and spaced uniformily 2.5m apart. If the line is 30km long & its one end is connected to 50 kV, 50 Hz system, what will be the charging current when the other end is open-circuited? [8]

OR

Q.3 (a) Derive the formula to calculate the capacitance of double circuit line. Also the conductors are of equal diameter and spaced hexagonal. [8]

(b) Stating from first principle, derive an expression for sending end voltage and current of a long transmission line in terms of the line parameters & receiving end voltage & current. [8]

UNIT- IV

Q.4 (a) Derive the expression for the voltage induced in communication lines due to current in power lines. [8]

(b) A certain 3-phase equilateral transmission line has a total corona loss of 50kW at 103kV & loss of 95 kW at 105.9 kV. What is the disruptive critical voltage between lines? What is the corona loss at 110 kV? [8]

OR

Q.4 (a) Write and explain the expression for power loss due to corona. What factor affected the corona losses? [8]

(b) Draw the equivalent circuit of a long transmission line. Derive the fundamentals and the following relationship sending end & receiving end voltages and currents.

$V_S = AV_R + BI_R$ & $I_S = CV_R + DI_R$ [8]

UNIT- V

Q.5 (a) Derive the formula for the electric stress in a single core cable. Where is maximum stress? Where is it minimum? [8]

(b) With a neat diagram explain constructional feature of various types of cable. [8]

OR

Q.5 (a) Explain the different types of insulators used in power system? [8]

(b) A 3-phase overhead transmission line is being supported by three disc insulators. The potential across top unit and middle unit are 9kV and 11kV respectively. Calculate- [8]

(i) The ratio of capacitance between pin and earth to the self-capacitance of each unit.

(ii) The line Voltage

(iii) String efficiency

5E1364

Roll No. _____ Total No of Pages: 2

5E1364

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Electrical Engineering
5EE4 – 04 Microprocessor
Common for EE, EX

Time: 2 Hours **Maximum Marks: 82**

Min. Passing Marks: 29

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Why is memory interfacing required? [2]

Q.2 What are the difference between LED display and LCD display? [2]

Q.3 What are Addressing Modes for a Microcontroller? [2]

Q.4 How to program 8051 Timers? [2]

Q.5 What are the type of ADC? [2]

Q.6 List the 8051 interrupts with its priority. [2]

Q.7 What are the types of sensors used for interfacing? [2]

Q.8 Define stack register. [2]

Q.9 Define machine cycle. [2]

Q.10 State how baud rate is calculated for serial data transfer in Mode 1. [2]

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 How does the de-multiplexing of Address Bus & Data Bus take place in 8085 microprocessor? [8]

Q.2 (a) Draw the Pin diagram of 8085 microprocessor. [4]

(b) How many address lines are required to address of 32KB memory? Explain it. [4]

Q.3 Explain in detail about the architecture of 8051 microcontroller with a neat diagram. [8]

Q.4 Explain about Arithmetic and Control instruction set in 8051. [8]

Q.5 How are D/A and A/D Interfaces used? Explain. [8]

Q.6 Describe the different modes of operation of timers/counters in 8051 with its associated register. [8]

Q.7 How does one interface a 16×2 LCD display using 8051 microcontroller? [8]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 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. [15]

Q.2 Write a program for generation of unipolar square waveform of 1 kHz frequency using Timer 0 of 8051 in mode 0. Consider the system frequency as 12 MHz. [15]

Q.3 How input/output Pins and Ports help in a circuit of a Microcontroller? [15]

Q.4 What are Sensor interfacing and External memory interfacing? Explain. [15]

Q.5 Write the available special function registers in 8051. Explain each register with its format and functions. [15]

5E1365

Roll No. _____ Total No of Pages: 3

5E1365

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021

Electrical Engineering

5EE4 – 05 Electrical Machine Design

Time: 2 Hours **Maximum Marks: 82**

Min. Passing Marks: 29

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. Semi Log Paper 2. Graph Paper

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Write the properties of insulating materials.

Q.2 What are the rules for selecting rotor slots of squirrel cage machine?

Q.3 What is the objective, scope and course outcome of the electrical machine design?

Q.4 Explain in brief the various methods of cooling of transformer.

Q.5 Give the comparison between the induction motor and synchronous motor.

Q.6 Discuss the effect of Short Circuit Ratio (SCR) on machine performance.

Q.7 Write the comparison between the PMSM and BLDC motor.

Q.8 List the advantages of using a digital computer for the design of electrical machines.

Q.9 What are the limitation in design of electrical machines?

Q.10 Define the voltage regulation of the transformer.

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 Write a short note on the following modern machines –

(a) SRM

(b) BLDC

Q.2 Estimate the per unit regulation at full load and 0.8 power factor aging for a 300 kVA, 50Hz, 6600/400V, 3 phase, delta/star, core type transformer. The data given as:

H.V. Winding –

Outside diameter = 0.36 m, inside diameter = 0.29 m, area of conductor = 5.4 mm^2.

L. V. Winding –

Outside diameter = 0.26 m, inside diameter = 0.22 m, area of conductor = 170 mm^2.

Length of coils = 0.5 m, voltage per turn = 8 V,

Resistivity = 0.21 Ω/ m/ mm^2.

Q.3 Derive the kVA output equation of transformer. Also derive the various expression for estimation of no-load current.

Q.4 What are the major consideration of electrical machine design? Also explain the synthesis method design approach of computer aided design.

Q.5 Determine the main dimensions for a 1000 kVA, 50 Hz, 3 phase, 375 r. p. m. alternator. The average air gap flux density is 0.55 Wb/m^2 and the ampere conductors per meter are 28000.

Use rectangular poles and assume a suitable value for ratio of core length to pole pitch in order that bolted on pole construction is used for which the maximum permissible peripheral speed is 50 m/s. The runaway speed is 1.8 times the synchronous speed.

Q.6 Explain the choice of specific electrical and magnetic loading. Also explain the thermal consideration of the electrical machine design.

Q.7 Derive the expression for output equation of Induction Motor.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Write the simplified steps for determination of main dimension for core, window and yoke. Also draw the various flow chart for computer aided design of transformer for core design, window dimension and yoke.

Q.2 Estimate the stator core dimensions, number of stator slots and number of stator conductor per slot for a 100kW, 3300V, 50Hz, 12 pole star connected slip ring induction motor. Assume-

Efficiency = 0.9, power factor = 0.9 and winding factor = 0.96

Choose main dimensions to give best power factor. The slot loading should not exceed 500 ampere conductor.

Q.3 Explain the temperature rise of transformer. Also explain design of transformer tank with tubes.

Q.4 Determine a suitable number of slot and conductor per slot for the stator winding of a 3 phase 3300V, 50Hz, 300 r. p. m. alternator. The diameter is 2.3 m and the axial length of core is 0.35 m. The maximum flux density in the air gap should be approximately 0.9 Wb/m^2. Assume sinusoidal flux distribution. Use single layer winding and star connection for stator.

Q.5 Draw and explain the various steps to design a circle diagram. Also write the necessity of circle diagram.

5E5042

Roll No. _____ Total No of Pages: 2

5E5042

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Electrical Engineering
5EE2A Microprocessors & Computer Architecture

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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)*

1. NIL 2. NIL

UNIT- I

Q.1 (a) How address lines are multiplexed? Explain in detail with the help of latching circuit diagram. [8]

(b) What are the various interrupts available with 8085? Distinguish between maskable and non-maskable interrupts. [8]

OR

Q.1 (a) Draw a pin diagram of 8085 microprocessor and explain its various pins. [8]

(b) Explain the various types of buses used in 8085 microprocessor. [8]

UNIT- II

Q.2 (a) Explain the following instructions using suitable example. [8]

(i) XCHG
(ii) XTHL
(iii) STAXB
(iv) LHLD

(b) Write an assembly language program to add two 16-bit numbers 22A3 H and 1060 H using ADC instruction. [8]

OR

Q.2 (a) Write an assembly language program for finding 2's complement of given 8-bit number. [8]

(b) Explain the use of rotate instruction with the help of suitable examples. [8]

UNIT- III

Q.3 (a) Explain the features of programming ports 8155, 8255, 8259 and 8253. [8]

(b) Explain the interfacing of 8257 to 8085 microprocessor. [8]

OR

Q.3 (a) Draw the block diagram of 8279 and explain the function of each block. Also describe its command word format. [8]

(b) Explain 8253 chip with the help of block diagram. Also name various modes of operation in 8253. [8]

UNIT- IV

Q.4 (a) Explain the following instructions using suitable, examples – [8]

(i) MUL
(ii) JG
(iii) NEG
(iv) DIV

(b) What are the various addressing modes of 8086? Differentiate between 8085 and 8086. [8]

OR

Q.4 (a) Explain various instruction formats application to the 8086 instruction set. Briefly describe addressing modes of 8086. [8]

(b) Draw a pin diagram and explain various pins of 8086 microprocessor in minimum and maximum modes. [8]

UNIT- V

Q.5 (a) Write short notes on – [8]

(i) Virtual memory
(ii) Cache memory

(b) Define PAL and PLA using suitable diagram. [8]

OR

Q.5 (a) Differentiate between – [8]

(i) Flash and Cache memory
(ii) Static and Dynamic memory

(b) Explain different types of micro operations. [8]

5E1366

Roll No. _____ Total No of Pages: 2

5E1366

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021

Electrical Engineering

5EE5 –11 Restructured Power System

Time: 2 Hours **Maximum Marks: 65**

Min. Passing Marks: 23

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and one questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is meant by ATC and write its importance? [2]

Q.2 List the types of ancillary services. [2]

Q.3 What are the reasons for restructuring of power industry? [2]

Q.4 Explain four pillars of market design. [2]

Q.5 What is meant by composite pricing paradigm? [2]

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain consumer behavior and supplier behavior in reconstructed power system. [10]

Q.2 Explain comparison of various market models in reconstructed power system. [10]

Q.3 Explain importance of congestion management. [10]

Q.4 Explain Co-optimization of energy and reserve services. [10]

Q.5 Explain to calculate ATC using DC power flow analysis. [10]

Q.6 Explain to calculate ATC using AC power flow analysis. [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 Explain briefly rolled in transmission pricing. [15]

Q.2 Explain with neat diagram different entities involved in deregulation. [15]

Q.3 (i) Explain different methods of loss allocation in transmission pricing. [8]

(ii) Explain black start capability in ancillary service. [7]

5E5046

Roll No. _____ Total No of Pages: 4

5E5046

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021

Electrical Engineering

5EE6.1A Optimization Techniques

Time: 2 Hours **Maximum Marks: 48**

Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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)

1. Graph paper 2. NIL

UNIT- I

Q.1 (a) Describe engineering applications of optimization. [8]

(b) The standard weight of a special purpose brick is 5kg and it contains two basic ingredients B_1 and B_2. B_1 costs ₹5 per kg and B_2 costs ₹8 per kg. Strength considerations require the brick to contain at least 2kg of B_2 and not more than 4kg of B_1. Formulate the problem to find the minimum cost under the given constraints if B_1 costs ₹5 per kg and B_2 cost ₹8 per kg. [8]

OR

Q.1 (a) Give various classifications of optimization problems. [8]

(b) A refinery uses two different crude oils (light crude oil costs $ 60 per barrel and heavy crude oil costs $ 50 per barrel) to produce gasoline, heating oil, jet fuel and lube oil. The yield of these per barrel of each type is given in the following table - [8]

	Gasoline	Heating oil	Jet Fuel	Lube oil
Light crude oil	0.4	0.2	0.3	0.1
Heavy crude oil	0.3	0.45	0.1	0.05

The demand is 8 million barrels of gasoline, 6 million barrels of heating oil, 7 million barrels of jet fuel and 3 million barrels of lube oil. Determine the amounts of light crude and heavy crude to be purchased for the total cost to be minimum. Formulate the L.P.P.

UNIT- II

Q.2 (a) Determine the maximum and the minimum values of the function - [8]

$f(x) = 12x^5 - 45x^4 + 40x^3 + 5$ in $[-1, 3]$

(b) Find the volume of the greatest parallelepiped that can be inscribed in the ellipsoid - [8]

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

OR

Q.2 (a) Find the stationary points of $u = x^2 - y^2$ and determine their nature. [8]

(b) Solve the following - [8]

Minimize $f(x) = x_1 x_2 x_3$

Subject to $g \equiv \{x_1 + x_2 + x_3 - 1\} = 0$

UNIT- III

Q.3 (a) Solve the following L.P.P using simplex method - [8]

Maximize $Z = 6x_1+10x_2+ 8x_3$

S.t. $2x_1+3x_2 \leq 80$

$2x_2+5x_3 \leq 100$

$3x_1+2x_2+ 4x_3 \leq 150$

and $x_1, x_2, x_3 \geq 0.$

(b) Solve the given L.P.P. graphically - [8]

Minimize $Z = 3x_1+ 9x_2$

S.t. $x_1+ x_2 \geq 800$

$7x_1-10x_2 \leq 0$

$3x_1- x_2 \geq 0$

and $x_1 \geq 0,\ x_2 \geq 0$

OR

Q.3 Solve the given L.P.P - [16]

Minimize $Z = 2x_1+ 9x_2+ x_3$

S.t. $x_1+ 4x_2 + 2x_3 \geq 5$

$3x_1+ x_2 + 2x_3 \geq 4$

and $x_1, x_2, x_3 \geq 0$

by solving its dual and hence find the optimal solution of its primal.

UNIT- IV

Q.4 (a) Minimize $f(x) = 2x_1^2 + 2x_1x_2 + x_2^2 + x_1 - x_2$, starting from $X_1 = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$, using steepest discent method. [8]

(b) Show that the Newton's method finds the minimum of a quadratic function in one step only. [8]

OR

Q.4 (a) Minimize $z = f(X) = 2x_1^2 + 2x_1x_2 + x_2^2 + x_1 - x_2$, starting from $P_0(X_0) = (0,0)$ by univariate method. [8]

(b) Minimize the function - [8]

$f(x_1, x_2) = 6x_1^2 + 2x_2^2 - 6x_1x_2 - x_1 - 2x_2$

using Powell's method of conjugate directions.

UNIT- V

Q.5 (a) Minimize $z = f(X) = x_1^2 + 2x_2^2$

subject to $2x_1 + 5x_2 - 10 \leq 0$

using exterior panelty method and find solutions for $r = 1$, 10 and $r = \infty$, outside the feasible region where-

$2x_1 + 5x_2 - 10 \geq 0$ [8]

(b) Write a short note on cutting plane method. [8]

OR

Q.5 (a) Find the dimensions of a rectangular prism type box, that has the largest volume when the sum of its length, width and height is limited to a maximum value of 60 inches and its length is restricted to a maximum value of 36 inches. [8]

(b) Write a short note on complex method. [8]

5E5047

Roll No. _____ Total No of Pages: 3

5E5047

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Electrical Engineering
5EE6.2A Principle of Communication Systems
EE, EX

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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)

1. NIL 2. NIL

UNIT- I

Q.1 (a) What is white noise? Explain different types of noises generated in communication system. [8]

(b) A mixer stage has a noise figure of 20 dB and this is preceded by an amplifier that has a noise figure of 9 dB and available power gain of 15 dB. Calculate the overall noise figure referred to input. [8]

OR

Q.1 (a) Calculate the overall noise figure and equivalent noise temperature of cascaded amplifiers. [8]

(b) Calculate the noise voltage at the input of a television RF amplifier, using a device that has a 200 ohm equivalent noise resistance and a 300 ohm input resistor. The bandwidth of an amplifier is 6 MHz and the temperature is 17°C? [8]

UNIT- II

Q.2 (a) Draw the block diagram of phasing/Third method of generation of SSB–SC signals and detection of SSB–SC signals and briefly explain it. Also write the applications of SSB–SC. [8]

(b) Explain the function and operation of envelope detector. [8]

OR

Q.2 (a) Derive the relation between output power of an AM transmitter and the depth of a modulation. Also show graph for values of the modulation index from zero to maximum. [8]

(b) An AM signal is given by $X_c(t) = [30 + 9\cos 200\pi t + 12\cos 3000\pi t]\cos 2\pi \times 10^5 t$. Determine the Carrier power and total Sideband power. [8]

UNIT- III

Q.3 (a) Explain the functions of frequency discriminator and working of PLL demodulator. [8]

(b) A signal $x(t) = 5\cos 20\pi \times 10^3 t$ angle modulates a carrier signal $A_c\cos\omega_c t$. Determine the modulation index and the bandwidth of the signal for –

(i) FM system with k_f = 12 kHz/Volt

(ii) PM system with 1.0 rad/Volt [8]

OR

Q.3 (a) Define the noise performance of FM system. Describe the need of pre-emphasis and de-emphasis in analog communication. [8]

(b) An FM radio link has a frequency deviation of 30 kHz. The modulating frequency is 3 kHz. Calculate the B. W. needed for the link. What will be the B.W. if frequency deviation is reduced to 15 kHz? [8]

UNIT- IV

Q.4 (a) Derive an expression for the destination S/N ratio for DSB–SC and SSB–SC system and discuss the Threshold effect. [8]

(b) Show that narrowband FM offers no improvement in SNR over AM. [8]

OR

Q.4 (a) Draw the block diagram of Super hetrodyne receiver and explain the function of –

(i) RF Amplifier

(ii) Mixer

(iii) IF amplifier [8]

(b) Consider an FM broadcast system with parameter $\Delta f = 75$ kHz and $B = 15$ kHz. Assuming $S_x = 0.5$, find the output SNR and calculate the improvement (in dB) over the baseband system. [8]

UNIT- V

Q.5 (a) State the low pass sampling theorem and explain its significance. What is Aliasing and Aperture effect? [8]

(b) Draw the waveforms PWM and PPM and explain the method of generation of PWM and PPM using PLL. [8]

OR

Q.5 (a) Discuss the advantages and disadvantages of Pulse modulation as compared to continuous wave modulation. With neat sketches of waveforms, discuss the demodulation of PDM/PWM and PPM. [8]

(b) Calculate the minimum sampling rate based on the low – pass uniform sampling theorem of given signal. [8]

$m(t) = 10 \cos 2000 \pi t \cos 8000 \pi t$
