

Code No: 133AB

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

ANALOG ELECTRONICS
(Common to ECE, ETM)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

- (25 Marks)
- 1.a) What are the types of distortion in amplifiers? [2]
 - b) Write the difference between cascade and cascode amplifiers? [3]
 - c) Define Gain Bandwidth Product. [2]
 - d) What are the elements in the hybrid π model? [3]
 - e) Distinguish between enhance mode and depletion mode of MOSFET. [2]
 - f) What is folded Cascode amplifier? [3]
 - g) What is meant by positive and negative feedback? [2]
 - h) What are the conditions for oscillation? [3]
 - i) Compare class A and class B amplifier. [2]
 - j) Define Q-Factor in tuned amplifiers. [3]

PART-B

- (50 Marks)
2. Draw the h-parameter equivalent circuit for a typical common emitter amplifier and derive expression for A_i , A_v , R_i and R_o . [10]

OR

- 3.a) For any transistor amplifier, Prove that $R_i = (h_i / 1 - h_r A_v)$
- b) Draw the circuit diagram of RC coupled amplifier. Explain the operation and its frequency response. [5+5]
4. Derive the expression for the CE short circuit gain A_i as a function of frequency using hybrid - π model. [10]

OR

- 5.a) In hybrid 'Pi' model of a transistor at high frequencies, show that the g_m is proportional to collector current.
- b) Mention important characteristics of CE amplifier. [5+5]
- 6.a) With the help of a neat diagram explain the operation of an n-channel enhancement type MOSFET.
- b) Explain how you set a Q point in a self-biased JFET. [5+5]

OR

- 7.a) Derive the relation between u and g_m of JFET amplifier.
- b) A JFET has a drain current of 6mA. If $I_{DSS} = 12\text{mA}$ and $V_p = 4\text{V}$ find:
 - i) V_{GS}
 - ii) For an n-channel amplifier FET $I_{DSS} = 5.8\text{mA}$, $V_p = -3\text{V}$ and $V_{GS} = -2\text{V}$ find I_D and g_m . [5+5]

8.a) An amplifier has a midband gain of 125 and a bandwidth of 250KHz. If 4% negative feedback is introduced, find the new bandwidth and gain.

b) Derive an expression for frequency of oscillations of a RC phase shift oscillators. [5+5]

OR
9.a) What are the advantages and disadvantages of the introduction of negative feedback in amplifiers? Explain.

b) Draw and explain the operation of Colpitt's oscillator. [5+5]

10. Draw the circuit diagram of class B push pull amplifier and explain its operation. Also prove that its conversion efficiency is 78.5%. [10]

OR
11.a) Explain the principle of operation of class-AB power amplifier with a neat sketch.

b) Discuss in detail about frequency response of tuned amplifiers. [5+5]

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Code No: 133BX

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

THERMODYNAMICS
(Common to ME, AE, MSNT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) What is reversible process? [2]
- b) What are exact and inexact differentials? [3]
- c) What is a steady flow process? [2]
- d) Why is the performance of a heat pump or a refrigerator not measured in terms of thermal efficiency, but in terms of COP? [3]
- e) Draw P-V diagram for water and a pure substance other than water. [2]
- f) What is the difference between critical point and triple point? [3]
- g) Define Dry bulb temperature and wet bulb temperature. [2]
- h) Define mole fraction and mass fraction. [3]
- i) Draw the P-V diagram of Lenoir cycle. [2]
- j) Draw the P-V and T-S plots of Otto cycle. [3]

PART-B

(50 Marks)

- 2.a) Show that heat is a path function and not a property.
 - b) A new scale N of temperature is divided in such a way that the freezing point of ice is 100°N and the boiling point is 400°N . What is the temperature reading on this new scale when the temperature is 150°C ? At what temperature both the Celsius and the new scale reading would be the same? [5+5]
- OR**
- 3.a) What is a constant volume gas thermometer? Why is it preferred to a constant pressure gas thermometer?
 - b) A piston-cylinder device operates 1 kg of fluid at 20 atm. Pressure. The initial volume is 0.04 m^3 . The fluid is allowed to expand reversibly following a process $pV^{1.4} = \text{constant}$ so that the volume becomes double. The fluid is then cooled at a constant pressure until the piston comes back to the original position. Keeping the piston unaltered, heat is added reversibly to restore it to the initial pressure. Calculate the work done in the cycle. [5+5]
- 4.a) Prove that the COP of the reversible refrigerator operating between two given temperatures is the maximum.
 - b) Water is heated at a constant pressure of 0.7 MPa. The boiling point is 164.97°C . The initial temperature of water is 0°C . The latent heat of evaporation is 2066.3 kJ/kg. Find the increase of entropy of water if the final temperature is steam. [5+5]

5. A reversible heat engine operates between two reservoirs at temperatures of 600°C and 40°C . The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40°C and -20°C . The heat transfer to the engine is 2000 kJ and the network output of the combined engine-refrigerator plant is 360 kJ .

a) Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C .

b) Reconsider (i) given that the efficiency of the heat engine and the COP of the refrigerator are each 40% of their maximum possible value. [10]

- 6.a) Explain the free expansion process.

b) A rigid close tank of volume 3 m^3 contains 5 kg of wet steam at a pressure of 200 kPa . The tank is heated until the steam becomes dry saturated. Determine final pressure and heat transfer to the tank. [5+5]

OR

- 7.a) Write short notes on "Mollier diagram". Why do isobars on the Mollier Diagram diverge from one another?

b) A pressure cooker holding 2 kg of steam at 5 bar and 90% dry is being cooled slowly. What quantity of heat has to be extracted so as to reduce the steam quality down to 60% ? Also calculate the pressure and temperature of the steam that remains in the pressure cooker after the heat rejection. [5+5]

- 8.a) Discuss why does the enthalpy of air-vapour mixture remains constant during an adiabatic saturation process.

b) A mixture of hydrogen (H_2) and oxygen (O_2) is to be made so that the ratio of H_2 to O_2 is $2:1$ by volume respectively. Calculate i) the mass of O_2 required ii) volume of the container. [5+5]

OR

- 9.a) Explain Daltons law of partial pressures.

b) Air at 20°C , 40% RH is mixed adiabatically with air at 40°C , 40% RH in the ratio of 1 kg of former with 2 kg of the latter (on dry basis). Find the final condition of air. [5+5]

10. Explain the working of Bell coleman cycle and derive the expression for COP. [10]

OR

11. Explain the Diesel cycle with the help of P-V and T-S diagrams. Derive the expression for air standard efficiency mean effective pressure. [10]

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Code No: 133AG

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

DATA STRUCTURES THROUGH C++

(Common to CSE, IT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) Define inheritance and polymorphism.
- b) Describe omega and theta notations.
- c) Write the motivation of sparse matrices.
- d) Explain the ADT of stack.
- e) What is a binary tree?
- f) Explain about the ADT of priority queues.
- g) Define hash function.
- h) Explain about time complexity of merge sort.
- i) What is a binary search tree?
- j) Give an example of DFS.

[2]
[3]
[2]
[3]
[2]
[3]
[2]
[3]
[2]
[3]

PART-B

(50 Marks)

- 2.a) Explain constructors and destructors with examples.
- b) Write about linear data structures with examples.

[5+5]

OR

- 3.a) Explain about throwing an exception.
- b) What is recursion? Explain about data abstraction.

[5+5]

- 4.a) Explain array representation of stack.
- b) Describe circular lists and header nodes.

[5+5]

OR

- 5.a) Discuss in detail about ADT of queue.
- b) Briefly explain about applications of stack.

[5+5]

- 6.a) Explain about Insertion and deletion operations in max heap.
- b) What are properties of binary trees? Explain.

[5+5]

OR

- 7.a) Discuss about the ADT Binary Tree.
- b) What is a threaded binary tree? Explain.

[5+5]

- 8.a) Write C++ program for heap sort technique.
- b) Give comparison of searching methods.

[5+5]

OR

- 9.a) Write C++ program for insertion sort technique.
- b) Analyze the time complexity of quick sort technique.

[5+5]

- 26 26 26 26 26 26 26 2
10. Explain the following:
a) Applications of graphs
b) Red-black tree.

[5+5]

OR

- 26 26 26 26 26 26 26 2
11. Explain the following:
a) Adjacency matrix
b) Insertion into an AVL search tree.

[5+5]

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Code No: 123AP

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CE, ME, AME, PTM)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks.

PART- A

(25 Marks)

- 1.a) Give the statement of KVL. [2]
- b) Explain about the properties of parallel connection. [3]
- c) What are the different parts of DC Motor? [2]
- d) Explain the principle of operation of DC Motor. [3]
- e) Give the applications of 3-phase induction motor. [2]
- f) What are the different factors that determine the efficiency of transformer? [3]
- g) Draw the physical structure of P-N Junction diode. [2]
- h) Write short notes on PNP transistor. [3]
- i) Define Sensitivity of a CRT. [2]
- j) Write short notes on magnetic deflection. [3]

PART-B

(50 Marks)

- 2.a) Explain the principle of operation of Moving coil instruments.
- b) Find the equivalent capacitance between a-b terminals of the circuit shown in figure 1. [6+4]

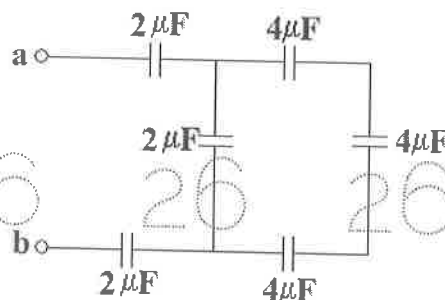


Figure: 1

OR

- 3.a) Explain the principle of operation of Moving iron instruments.
- b) Calculate the equivalent inductance across X-Y terminals of the circuit shown in figure 2. The mutual coupling between 6mH and 4mH inductance is 1mH. [6+4]

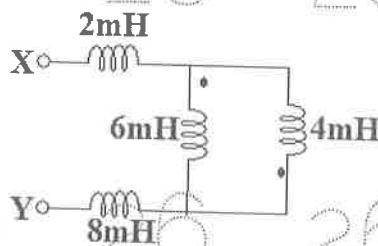


Figure: 2

- 4.a) With neat sketch, explain the principle of operation of DC Generator.
b) Explain different types of DC Motors with schematic arrangement. [6+4]

- OR
5.a) Derive the EMF equation of DC Generator.
b) Explain the working principle of three point starter in detail. [4+6]

- 6.a) Explain in detail about the synchronous impedance method to find out the voltage regulation of an alternator.
b) A transformer has negligible resistance and has an equivalent per unit reactance 0.1. Calculate the voltage regulation on full load and at 60° leading power factor angle. [6+4]

- OR
7.a) Draw the slip torque characteristics of Induction motor and explain.
b) A 10 KVA, 200/100 V, 50 Hz single phase transformer has full load copper loss = 200 W and core loss = 112.5 W. At what KVA and load power factor the transformer should be operated for maximum efficiency? [6+4]

- 8.a) Draw the V-I characteristics of P-N junction diode and explain.
b) Draw the circuit diagram of half wave rectifiers.
c) Explain different modes of operation of NPN transistor. [3+2+5]

- OR
9.a) Explain the operation of diode in different biasing conditions.
b) Explain the working of transistor as an amplifier. [5+5]

- 10.a) Explain about electrostatic deflection in Cathode Ray tube.
b) Describe how current and frequency is measured using CRO. [5+5]

- OR
11.a) Explain briefly about different parts of Cathode Ray tube and their roles.
b) Explain how the voltage measurement can be made using Cathode Ray Oscilloscope. [5+5]

Code No: 123AU

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, EIE, IT, MCT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

- 1.a) Find the value of dc resistance of a Ge junction diode, if the temperature is 25°C and $I_0 = 20\mu\text{A}$ with an applied voltage of 0.1V. [2]
b) Briefly discuss the semiconductor photo diode. [3]
c) What are the limitations of zener voltage regulator circuit? [2]
d) Compare half wave rectifier and full wave rectifier. [3]
e) What is Early Effect? [2]
f) Given an NPN transistor for which $\alpha_N = 0.98$, $I_{CQ} = 2\text{mA}$. A common emitter connection is used and $V_{CC} = 12\text{V}$, $R_L = 4.0\text{K}\Omega$. What is the minimum base current required in order that the transistor enter its saturation region. [3]
g) Define thermal stability. [2]
h) Define Thermal Runaway and Thermal Resistance. [3]
i) What are applications of JFET and MOSFET devices? [2]
j) Explain how FET acts as a voltage regulator. [3]

PART-B

- 2.a) Derive the expression for contact difference of potential V_0 in an open circuited p-n junction. (50 Marks)
b) Explain Transition capacitance and Diffusion capacitances. [5+5]
OR
3.a) Explain the principle operation of varactor diode.
b) Write the differences between Tunnel Diode and PN Diode. [5+5]
4.a) Obtain the expression for ripple factor in the case of Half Wave Rectifier with π filter.
b) A diode whose internal resistance is 20Ω is to supply power to a 1000Ω load from a 110V (rms) source of supply. Calculate:
i) The peak load current
ii) The DC load current
iii) AC load current
iv) The DC diode voltage
v) The total input power to the circuit
vi) % regulation from no load to the given load. Assume Half wave rectifier. [5+5]

OR

- 5.a) Explain the working of a bridge rectifier with a neat circuit diagram and with relevant wave forms.
b) Compare C, L, L-section and π -section Filters in all respects. [5+5]

- 6.a) Explain the construction and working of BJT.
b) In a CB configuration current amplification factor is 0.90 and emitter current is 1mA. Determine base current. [8+2]

OR

- 7.a) Describe the V-I characteristics of a transistor in common collector configuration and explain.
b) What is the significance of negative resistance region? Explain how UJT exhibits this characteristics? [6+4]

- 8.a) Draw the fixed bias circuit and derive the expression for the stability factor S. What are the limitations of this circuit?

- b) In a voltage divider bias circuit, $V_{CC} = 20\text{ V}$ and $R_C = 1.5\text{ k}\Omega$, the Q point is $V_{CE} = 8\text{ V}$ and $I_C = 4\text{ mA}$. Stability factor $S = 12$ and $\beta = 50$. Find R_1 , R_2 and R_E . [5+5]

OR

9. Derive the expressions for all gains and Impedances of a CE Amplifier using h-parameters. [10]

- 10.a) Obtain the expression for the pinch off voltage V_P in the case of n-channel JFET.

- b) Draw the structure of p-channel MOSFET and qualitatively explain the static drain and gate characteristics of the device. [5+5]

OR

- 11.a) Derive an expression for voltage gain, Input Impedance and output impedance of CG amplifier at low frequencies.

- b) For the emitter follower with $R_S = 0.5\text{ K}\Omega$ and $R_L = 5\text{ K}\Omega$, calculate A_i , R_i , A_{VS} and R_o . Assume $h_{fe} = 50$, $h_{ie} = 1\text{ K}\Omega$, $h_{oe} = 25\text{ }\mu\text{A/V}$. [6+4]

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Code No: 113AP

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CE, ME, PTM)

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PART-B

(50 Marks)

- 2.a) Explain the principle of operation of Moving coil instruments.
- b) Find the equivalent capacitance between a-b terminals of the circuit shown in figure 1. [6+4]

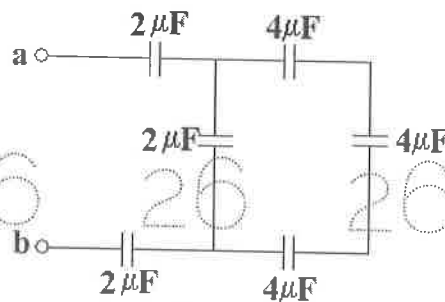


Figure: 1

OR

- 3.a) Explain the principle of operation of Moving iron instruments.
- b) Calculate the equivalent inductance across X-Y terminals of the circuit shown in figure 2. The mutual coupling between 6mH and 4mH inductance is 1mH . [6+4]

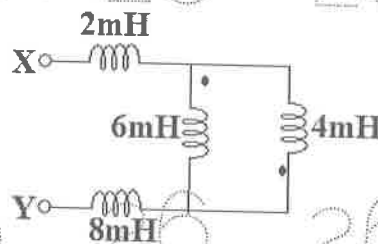


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- 8.a) Draw the V-I characteristics of P-N junction diode and explain.

- b) Draw the circuit diagram of half wave rectifiers.
c) Explain different modes of operation of NPN transistor. [3+2+5]

OR

- 9.a) Explain the operation of diode in different biasing conditions.

- b) Explain the working of transistor as an amplifier. [5+5]

- 10.a) Explain about electrostatic deflection in Cathode Ray tube.

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ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, EIE, IT, MCT)

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b) Briefly discuss the semiconductor photo diode. [3]
c) What are the limitations of zener voltage regulator circuit? [2]
d) Compare half wave rectifier and full wave rectifier. [3]
e) What is Early Effect? [2]
f) Given an NPN transistor for which $\alpha_N = 0.98$, $I_{CO} = 2\text{mA}$. A common emitter connection is used and $V_{CC} = 12\text{V}$, $R_L = 4.0\text{K}\Omega$. What is the minimum base current required in order that the transistor enter its saturation region. [3]
g) Define thermal stability. [2]
h) Define Thermal Runaway and Thermal Resistance. [2]
i) What are applications of JFET and MOSFET devices? [3]
j) Explain how FET acts as a voltage regulator. [2]

PART-B

- 2.a) Derive the expression for contact difference of potential V_0 in an open circuited p-n junction. (50 Marks) [5+5]
b) Explain Transition capacitance and Diffusion capacitances. [5+5]
OR
3.a) Explain the principle operation of varactor diode.
b) Write the differences between Tunnel Diode and PN Diode. [5+5]
4.a) Obtain the expression for ripple factor in the case of Half Wave Rectifier with π filter.
b) A diode whose internal resistance is 20Ω is to supply power to a 1000Ω load from a 110V (rms) source of supply. Calculate:
i) The peak load current
ii) The DC load current
iii) AC load current
iv) The DC diode voltage
v) The total input power to the circuit
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b) For the emitter follower with $R_S = 0.5\text{ K}\Omega$ and $R_L = 5\text{ K}\Omega$, calculate A_i , R_i , A_{VS} and R_o . Assume $h_{fe} = 50$, $h_{ie} = 1\text{ K}\Omega$, $h_{oe} = 25\text{ }\mu\text{A/V}$. [6+4]

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Code No: 53009

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, EIE, IT)

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ii) The DC load current
iii) AC load current
iv) The DC diode voltage
v) The total input power to the circuit
vi) % regulation from no load to the given load. Assume Half wave rectifier. [5+5]
OR
5.a) Explain the working of a bridge rectifier with a neat circuit diagram and with relevant wave forms.
b) Compare C, L, L-section and π -section Filters in all respects. [5+5]

- 6.a) Explain the construction and working of BJT.
b) In a CB configuration current amplification factor is 0.90 and emitter current is 1mA. Determine base current. [8+2]

OR

- 7.a) Describe the V-I characteristics of a transistor in common collector configuration and explain.
b) What is the significance of negative resistance region? Explain how UJT exhibits this characteristics? [6+4]

- 8.a) Draw the fixed bias circuit and derive the expression for the stability factor S. What are the limitations of this circuit?
b) In a voltage divider bias circuit, $V_{CC} = 20\text{ V}$ and $R_C = 1.5\text{ k}\Omega$, the Q point is $V_{CE} = 8\text{ V}$ and $I_C = 4\text{ mA}$. Stability factor $S = 12$ and $\beta = 50$. Find R_1 , R_2 and R_E . [5+5]

OR

9. Derive the expressions for all gains and Impedances of a CE Amplifier using h-parameters. [10]

- 10.a) Obtain the expression for the pinch off voltage V_P in the case of n-channel JFET.
b) Draw the structure of p-channel MOSFET and qualitatively explain the static drain and gate characteristics of the device. [5+5]

OR

- 11.a) Derive an expression for voltage gain, Input Impedance and output impedance of CG amplifier at low frequencies.
b) For the emitter follower with $R_S = 0.5\text{ K}\Omega$ and $R_L = 5\text{ K}\Omega$, calculate A_i , R_i , A_{VS} and R_o . Assume $h_{fe} = 50$, $h_{ie} = 1\text{ K}\Omega$, $h_{oe} = 25\text{ }\mu\text{A/V}$. [6+4]

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Code No: 53015

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CE, ME, AME)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

- 1.a) Determine the current supplied by each battery in the circuit shown in figure 1 by using Kirchhoff's laws.

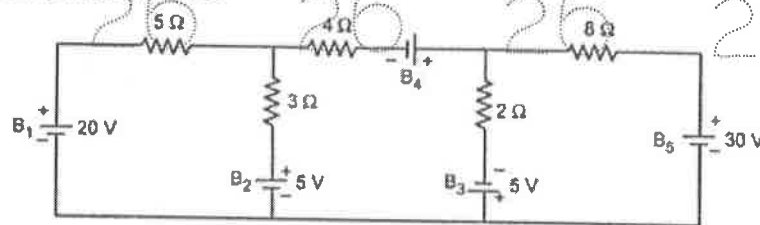


Figure: 1

- b) Find the voltage to be applied across AB in order to drive a current of 5A into the circuit by using star- delta transformation shown in figure 2. [7+8]

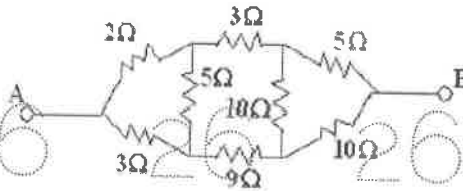


Figure: 2

- 2.a) Explain the process of building up of voltage in a dc shunt generator. What is its significance?
- b) What is meant by back emf? Derive the torque equation of a DC Motor. [8+7]
3. Open circuit and short circuit tests on a 5KVA, 220/400V, 50 Hz, single-phase transformer gave the following results:
OC test 220V, 2A, 100W (lv side)
SC test 40V, 11.4 A, 200W (hv side)
Determine the efficiency and approximate regulation of the transformer at full load 0.9 power factor lagging. [15]
- 4.a) The power input to the rotor of a 440V, 50Hz, 6 pole, 3 phase Induction motor is 100kW. The rotor electromotive force is observed to make 120 cycles per minute, calculate (i) the slip (ii) the rotor speed (iii) the rotor copper loss per phase
- b) Explain the principle of operation of Alternators. [8+7]

5. Classify and explain about the working of PMMC instruments in detailed. [15]

6.a) Discuss the diode characteristics and its applications.

b) Obtain the expression for ripple factor in the case of Full Wave Bridge Rectifier Circuit. [7+8]

7.a) Explain about PNP and NPN Junction transistor. Discuss their characteristics and applications.

b) Write short notes on: (i) Transistor as an amplifier, (ii) SCR characteristics and applications. [7+8]

8.a) Derive an expression for the vertical deflection on the screen of a cathode ray tube in terms of length of plates, separation distance, accelerating voltage, deflecting voltage and distance of screen from the origin.

b) Draw and explain the constructional of CRT. [8+7]

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