

AR16

CODE: 16EE1004

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, October / November-2020

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to CE & ME branches)

Time: 3 Hours

Max Marks: 70

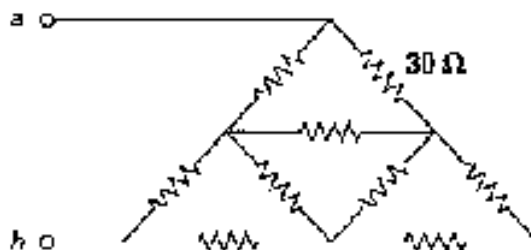
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a Explain the delta-star transformation for a resistive network? 6M
- b Find the equivalent resistance R_{ab} for the circuit shown below. All the resistor values are $30\ \Omega$ 8M



(OR)

2. a State and explain the Kirchhoff's laws as applied to electrical circuits. 6M
- b A circuit consists of three resistances of 12, 18 and 36 ohms respectively by joined in parallel and the combination is connected in series with a resistance of 12 ohms. The whole circuit is connected to 60V supply. Calculate current in each branch, total current drawn and power dissipated in each resistor 8M

UNIT-II

3. a Explain the working of a DC Generator 7M
 - b Explain characteristics of Shunt Generator. 7M
- (OR)**
4. a Derive the torque equation of DC motor. 7M
 - b A 250V, 4-pole, wave-wound series motor has 782 conductors on its armature. It has armature and series field resistance of $0.75\ \Omega$. The motor takes a current of 40A. Find its speed and gross torque developed if it has a flux per pole of 25mWb. 7M

UNIT-III

5. a Explain the terms in transformers i) regulation ii) efficiency 6M
b Explain the S.C Test on a single-phase transformer with suitable diagrams 8M

(OR)

6. a Explain the operation of 3- ϕ induction motor 7M
b A 3- ϕ induction motor at standstill has a rotor voltage of 120V between the slip rings on open-circuit. The rotor winding is star-connected and has reactance of 1Ω per phase at standstill and a resistance of 0.2Ω per phase. Find the rotor current per phase and power factor at start. 7M

UNIT-IV

7. a Derive the e.m.f equation of an alternator. 7M
b Explain how voltage regulation calculated using synchronous impedance method. 7M

(OR)

8. a Classify measuring instruments. Explain in detail about the principle of operation of electrical instruments. 8M
b What are advantages, disadvantages and applications of PMMC instrument. 6M

UNIT-V

9. a Explain the construction of PN junction diode 7M
b Explain the working of Full wave rectifier 7M

(OR)

10. Draw and explain input and output characteristics of CE configuration. 14M

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**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
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I B.Tech II Semester Supplementary Examinations, October / November-2020

**SWITCHING THEORY AND LOGIC DESIGN
(Electrical and Electronics Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a If $A = -57$ and $B = +38$, then represent A and B in 8-bit 2's complement. 6
Find (i) $A + B$ (ii) $A - B$ using 2's complement method.
- b Perform the following operations using r-1's complement 8
arithmetic:
i) $(+43)_{10} - (-53)_{10}$ ii) $(+346.56)_{10} - (+456.78)_{10}$
iii) $(+43)_8 - (-53)_8$ iv) $(+346)_8 - (+456)_8$
- (OR)
2. a Solve for X. 8
i) $(7287)_{10} = (X)_{16}$ ii) $(2B.A4)_{16} = (X)_4$ iii) $(48)_{10} = (120)_X$
- b Convert the following numbers. 6
i) $(4037)_{10}$ to base 8 ii) $(1435)_8$ to base 2 iii) $(1203)_4$ to decimal

UNIT-II

3. a Given the following Boolean expression: 14
 $F = \overline{x}yz + x\overline{y}z + \overline{w}xy + w\overline{x}y + wxy$
- i) Obtain the truth table of the function
- ii) Draw the logic diagram using the original Boolean expression.
- iii) Simplify the function to a minimum number of literals using Boolean algebra.
- iv) Obtain the truth table of the function from the simplified expression and show that it is the same as the one in part (i).

(OR)

4. a Simplify the following Boolean expressions to a minimum number of literals 6
 i) $\bar{x}\bar{y} + xy + \bar{x}y$ ii) $(x + y) + (x + \bar{y})$ iii) $\bar{x}y + x\bar{y} + xy + \bar{x}\bar{y}$
 b Simplify the following Boolean expression and implement them in 8
 i) using only NAND gates ii) using only NOR gates
 $\bar{A}\bar{B} + \bar{A}BD + \bar{A}B\bar{D} + \bar{A}\bar{C}\bar{D} + \bar{A}B\bar{C}$

UNIT-III

5. a Simplify the Boolean function $F = \Pi M(1, 3, 6, 9, 11, 12, 14)$ using K – Map method and implement the same using only NOR gates. 8
 b Design a binary to gray code converter circuit? 6
 (OR)
 6. a Simplify the function $F(A, B, C, D) = \Sigma m(0, 2, 3, 5, 7, 8, 10, 11, 14, 15)$ using the following methods: i) Karnaugh map method. ii) Tabulation method. (6+8)

UNIT-IV

7. a Define a priority encoder and also design a 4 X 2 priority encoder circuit? 6
 b Implement a Four bit Adder-subtractor circuit and explain its operation. 8
 (OR)
 8. a Realize a 4 x 16 decoder using two 3 x 8 decoders. 6
 b Design 4-bit Carry look ahead adder and what is its advantage over carry ripple adder. 8

UNIT-V

9. a Design up-down Asynchronous counter for 3 bits using JK flip flops? 8
 b Draw the circuit for a 4-bit binary ripple counter using T flip-flops and explain its operation. 6
 (OR)
 10. a Draw and Explain the operation of universal shift register ? 8
 b Explain about JK flip-flop 6

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SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, October / November-2020

ELECTRONIC DEVICES

(Electronics & Communication Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT-I

- | | | |
|----|---|----|
| 1. | Explain CRT and CRO with neat sketches. | 14 |
| | (OR) | |
| 2. | With a suitable sketch, derive expression for path of electron directed to perpendicular electric and magnetic fields | 14 |

UNIT-II

- | | | | |
|----|---|--|---|
| 3. | a | Write in detail about Hall effect and its applications | 7 |
| | b | Why hole mobility is less compared to electron? | 4 |
| | c | What is Fermi level in conductors? | 3 |
| | | (OR) | |
| 4. | a | Explain in-trinsic semi conductor | 5 |
| | b | Explain ex-trinsic semi conductors | 9 |

UNIT-III

- | | | | |
|----|---|---|---|
| 5. | a | Explain V-I characteristics of a diode. | 5 |
| | b | Write short notes: | 9 |
| | | i) Varactor diode ii) Tunnel diode iii) Photo diode | |
| | | with necessary sketches. | |
| | | (OR) | |
| 6. | a | Derive the expression for transition capacitance of a PN diode. | 5 |
| | b | With neat sketches and necessary waveforms explain about the regulation characteristics of Zener diode. | 9 |

UNIT-IV

7. a With a neat diagram explain the various current components in an NPN bipolar junction transistor & hence derive general equation for collector current, I_C ? 7
- b Compare CB, CE and CC amplifiers in view of A_V , A_I , R_I & R_O . 7
- (OR)
8. Draw the h-parameter model of CE amplifier and derive A_V , A_I , R_I & R_O 14

UNIT-V

9. a Explain JFET V-I characteristics. 7
- b Give the construction details of JFET and explain its operation. 7
- (OR)
10. a Explain the working of MOSFET in i) Enhancement mode ii) Depletion mode. Draw the necessary diagrams and graphs. 8
- b Explain the operation of FET with its characteristics and explain the different regions in transfer characteristics. 6

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SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, October / November-2020

**DATA STRUCTURES
(Common to CSE, IT Branches)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Define recursion. Write a program to find the factorial of a given positive number using recursion. 7M
- b) Define Data Structure. Explain classification of data structures and operations on data structures. 7M

(OR)

2. a) Differentiate between linear, binary and multiple recursions. Write a recursive algorithm to print GCD of two numbers? 10M
- b) Evaluate the best, average and worst case time complexity of linear search. 4M

UNIT-II

3. a) Write an algorithm (or) c program to sort the given set of numbers based on their frequency. 7M
Sample Input: [10,20,30,20,10,50,30,40,50,50,20,20]
Sample Output: [40,10,30,50,20]
- b) Write an algorithm to read a matrix of m rows and n columns with the following operations 7M
i) sort the elements of a matrix in row wise
ii) print the sorted matrix in row wise.

(OR)

4. a) Write an algorithm for binary search. 7M
- b) Write an algorithm for quick sort along with its time complexities? 7M

UNIT-III

5. a) Explain about Queue and its operations. Write the procedure for each operation. 10M
- b) Write the functional difference between stack and queue. 4M

(OR)

6. a) State the data structure which is required to check whether an expression contains balanced parenthesis or not? Explain with an example. 10M
- b) Write an algorithm to check whether a given string is palindrome or not using stack. 4M

UNIT-IV

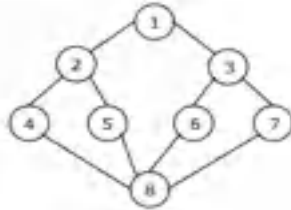
7. a) Write an algorithm to display the node values using single linked list 7M
- b) Write an algorithm to count number of nodes in a given linked list. 7M

(OR)

8. a) A node can be deleted from various positions in a single linked list. Perform the following operations with a pictorial representation and explanation. 10M
- i) delete beginning node of the linked list.
 - ii) delete a node from a specific position.
 - iii) delete the end node of the linked list.
- b) How to swap two different nodes in a single linked list without swapping data. 4M

UNIT-V

9. a) Construct a binary search tree by inserting following nodes in sequence: 7M
68, 85, 23, 38, 44, 80, 30, 108, 26, 5, 92, 60.
Write in-order, pre-order and post-order traversal of the above generated Binary search tree
- b) Write the DFS traversal for the following graph? 7M



(OR)

10. a) Construct a binary tree from the following traversal orders: 7M
Preorder: A B C D E F G
Inorder: C B D A F E G
- b) Define a Graph. Explain various graph representations. 7M

2 of 2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI (AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, October / November-2020
ENGINEERING MATHEMATICS-II
(Common to EEE & ECE)

Time: 3 Hours

Max Marks: 70

PART-A**ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) If the first approximation x_0 for $f(x) = 0$ then the next approximation x_1 by Newton-Raphson method is given by.
- b) If $y = a + bx$ represents a straight line then the normal equations are given by least squares method.
- c) Relation between ∇ and E^{-1} .
- d) The value of $\Delta^3(1+x)(1-3x)(1+5x)$ if $h = 1$.
- e) States that Trapezoidal rule.
- f) If $y_0 = 1, h = 0.2, f(x_0, y_0) = 1$ then by Euler's method, the value of y_1 is given by.
- g) Laplace transform of unit step function.
- h) $L^{-1}\left\{\frac{1}{(s-2)^2+9}\right\}$
- i) Write the first order partial differential equation by eliminating a, b from $z = ax + by + ab$.
- j) The solution of the partial differential equation $z = px + qy - 2\sqrt{pq}$ is given by.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Using the method of false position, find the root of $x^3 - x - 4 = 0$.
- b) Find the positive root of the equation $x e^x - \cos x = 0$ by Newton-Raphson method.

(OR)

3. a) Find a positive root of the equation $3x = \cos x + 1$ by Iteration method.
- b) Fit a second degree parabola of the form $y = a + bx + cx^2$ to the following data by the method of least squares.

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

UNIT-II

4. a) Find $\sin 40^\circ$ by Newton forward interpolation, Given that $\sin 45^\circ = 0.7071, \sin 50^\circ = 0.7660, \sin 55^\circ = 0.8192, \sin 60^\circ = 0.8660$.
- b) Using Lagrange's interpolation formula to find $y(10)$ from the following data

x	5	6	9	11
y	12	13	14	16

(OR)

5. a) Use the Gauss forward interpolation formula to find $f(3.3)$ from the following table.

x	1	2	3	4	5
$f(x)$	15.30	15.10	15.00	14.50	14.00

- b) Using Simpson's $\frac{3}{8}$ rule, evaluate $\int_0^1 \frac{1}{1+x^2} dx$ by dividing the range into 6 equal parts.

UNIT-III

6. a) Using Taylor's series method to find y at the point $x = 0.1$, given that $y^1 = x^2 + y^2, y(0) = 1$.
- b) Using Modified Euler's method, find the solution of the initial value problem $y^1 = x - y, y(0) = 1$, at $x = 0.1$. Take the step length $h = 0.1$ and carryout three modifications.

(OR)

7. a) Find the first four successive approximate solutions at $x = 0.5$ by Picard's method for the differential equation $y^1 = x + y, y(0) = 1$.
- b) Find the value of y at $x = 0.1$ by R-K method for the differential equation $y^1 = x^2 - y, y(0) = 1$.

UNIT-IV

8. a) Find the Laplace transform of $t \int_0^t \frac{e^{-t} \sin \tau}{\tau} dt$
- b) Find the inverse Laplace transform of $\frac{5s+3}{(s-1)(s^2+2s+5)}$

(OR)

9. a) Find the value of $\int_0^\infty e^{-t} \left(\frac{\cos at - \cos bt}{t} \right) dt$ by Laplace transform technique.
- b) Solve by the method of Laplace transforms, the equation $y^{111} + 2y^{11} - y^1 - 2y = 0$, $y(0) = y^1(0) = 0, y^{11}(0) = 6$.

UNIT-V

10. a) Form the Partial differential equation by eliminating the arbitrary functions f and g from the relation $z = yf(x) + xg(y)$.
- b) Solve $p \tan x + q \tan y = \tan z$.

(OR)

11. a) Solve $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$.
- b) Solve $2xz_x - 3yz_y = 0$ by the method of separation of variables.

AR13

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I B.Tech II Semester Supplementary Examinations, October / November-2020

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to CE & ME)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Define Ohms law.
b) Define electric potential.
c) Write down the torque equation of a D.C motor.
d) List out the types of D.C. motors.
e) What do you mean by ideal transformer?
f) Define slip.
g) What are the requirements of indicating instruments?
h) What are the different types of PMMI instruments?
i) Define ripple factor.
j) Draw the energy band diagram of a PN junction diode.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) With the help of a suitable example, state and explain Kirchhoff's laws. 6M
b) Derive the star – delta transformation of a resistive network. 6M

(OR)

3. Determine the resistance between XY for the circuit shown on Fig.1 12M

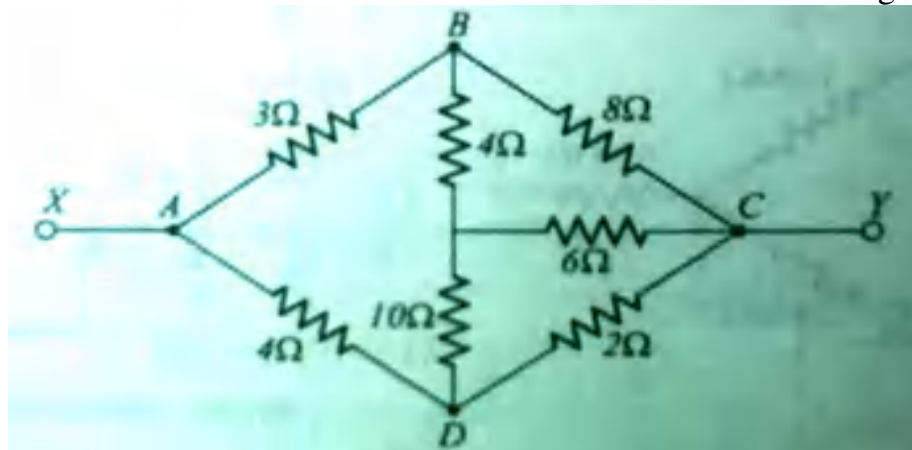


Fig. 1

4. a) State the different types of DC generators along with a neat sketch and state the applications of each type of DC generator. 6M
- b) Determine the value of torque in kg-m developed by the armature of a 6 pole; wave wound motor having 492 conductors, 30mWb flux per pole when the total armature current is 40A. 6M

(OR)

5. a) Draw a neat sketch and explain about 3 point starter. 7M
- b) A 440V D.C shunt generator has $R_a = 0.25\Omega$ and $R_{sh} = 220\Omega$ while delivering a load current of 50A, it has a terminal voltage of 440V. Determine the generated EMF and power developed. 5M

UNIT-III

6. a) Explain the procedure of OC and SC tests on a single phase transformer with a neat sketch. 8M
- b) A 3 phase, 50Hz, 8 pole alternator has a star connected winding with 120 slots and 8 conductors per slot. The flux per pole is 0.05Wb. Determine the phase and line voltages. Assume the winding to be full pitch. 4M

(OR)

7. a) Explain the synchronous impedance method for calculating the regulation of a 3 phase alternator. 7M
- b) A 12 pole, 3 phase alternator is coupled to an engine running at 500 r.p.m. It supplies an induction motor which has full load speed of 1440 r.p.m. Find the % slip and the number of poles of the motor. (Assume the necessary data required). 5M

UNIT-IV

8. a) Derive the equation for deflection in spring controlled PMMC instrument. 6M
 - b) Derive the torque equation of Moving Iron instrument. 6M
- (OR)**
9. a) How is the current range of a PMMC instrument extended with the help of shunts? 6M
 - b) A 2mA meter with an internal resistance of 100Ω is to be converted to 0-150 mA ammeter. Calculate the value of shunt resistance required. 6M

UNIT-V

10. Draw the circuit diagram of a full wave rectifier. Explain the operation of the circuit with relevant waveforms. 12M

(OR)

11. a) Give the constructional details of SCR? 6M
- b) Define (i) Holding current (ii) Latching current (iii) forward breakdown voltage (iv) reverse breakdown voltage. 6M