

Code : 13BS1002

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I B.Tech II Semester Regular / Supplementary Examinations, July, 2015

ENGINEERING MATHEMATICS – II

(Common to EEE & ECE)

Time : 3 Hours

Max. Marks : 70

PART-A

Answer all Questions

(10 x 1 = 10 Marks)

1. a) Write the Iteration formula for Newton Raphson method
- b) Write the normal equations to fit $y = ab^x$
- c) Find $\Delta^2(e^{2x})$
- d) State Newton's forward interpolation formula
- e) State the Picard's formula for solving the differential equation $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$.
- f) State the Milner's Predictor and corrector's formulae for solving first order differential equation
- g) Find $L[e^{-3t} \sin 3t]$
- h) Find $L^{-1}\left[\frac{1}{s^2 + 4}\right]$
- i) Eliminate f from $z = f(x^2 + y^2)$
- j) Solve the partial differential equation $(p + q)(z - px - qy) = 1$

PART-B

Answer one question from each unit

(5 x 12 = 60 Marks)

UNIT-I

2. a) Using Newton – Raphson method find a real root of the equation $3x - \cos x - 1 = 0$
- b) Fit a curve of the form $y = ax + b$ from the following data

x	1980	1985	1990	1995
y	5	15	25	35

(OR)

3. a) Using Regula Falsi method find a real root of the equation $x^3 + 2x - 5 = 0$
- b) Fit a curve of the form $y = ax^b$ to the data given below.

x	1	4	9	16	25
y	0.25	0.5	0.75	1	1.25

Code: 13BS1002

UNIT-II

4. a) Evaluate $\Delta(1 - ax)(1 - bx^2)(1 - cx^3)(1 - dx^4)$ by taking the length $h=1$
 b) From the following data

x	0	1	2	3	4	5	6
f(x)	1	0.5	0.2	0.1	0.0588	0.0385	0.027

Evaluate $\int_0^6 f(x) dx$ by Simpson's $\frac{3}{8}$ rule

(OR)

5. Calculate the approximate value of $\sin x$ for $x = 0.54$ and $x = 1.36$ using Newton forward and backward interpolation formula.

x	0.5	0.7	0.9	1.1	1.3	1.5
$\sin x$	0.4794	0.6442	0.7833	0.8912	0.9636	0.9975

UNIT-III

6. Using Runge Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0)=1$ at $x=0.2, 0.4$.

(OR)

7. a) Solve $\frac{dy}{dx} = y + e^{2x}$, $y(0) = 0$ by Picard's method and find $y(0.1)$.

- b) Solve $\frac{dy}{dx} = x + y$, $y(0) = 1$ by Modified Euler's method to find $y(0.2)$

UNIT-IV

8. a) Find $L\left(\frac{1 - \cos t}{t}\right)$

- b) Find the inverse Laplace transform of $\frac{e^{-fs}}{(s^2 + 1)(s^2 + 9)}$

(OR)

9. Solve the differential equation using Laplace transform $y'' - 2y' + y = e^t$ with $y(0) = 2, y'(0) = -1$

UNIT-V

10. a) Solve $z^2(p^2 x^2 + q^2) = 1$.

- b) Solve $(mz - ny)p + (nx - lz)q = ly - mx$

(OR)

11. Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with boundary conditions $u(x,0) = 3 \sin fx, u(0,t) = 0, u(1,t) = 0$ where $0 < x < 1, t > 0$

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I B. Tech II Semester Regular / Supplementary Examinations, July, 2015

**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to MECH and CIVIL Branches)**

Time: 3 hours

Max Marks: 70

PART- A

Answer all questions

[10 x 1=10M]

1.
 - a) Define Kirchhoff's current law?
 - b) What is the effective inductance of three inductors L_1 , L_2 , L_3 connected in parallel?
 - c) Write the emf equation of a DC generator?
 - d) What are the losses occur in DC motor?
 - e) What are the advantage of Direct method of DC motor testing?
 - f) Sketch the torque-current characteristics DC series Motor?
 - g) List the losses in a 1-phase transformer?
 - h) Define efficiency of transformer?
 - i) Define ripple factor of a half wave rectifier circuit?
 - j) Define alpha and beta of a transistor?

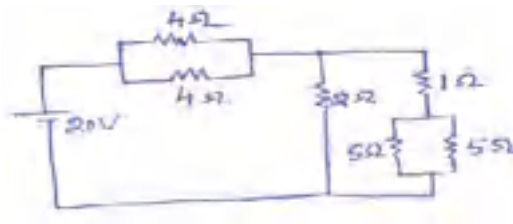
PART-B

Answer one question from each unit

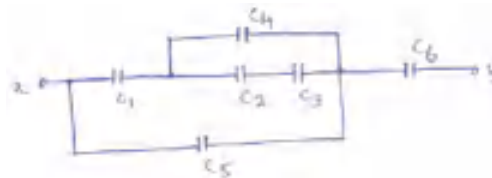
[5x12=60M]

UNIT-I

2.
 - a) Find the voltage drop across $1\ \Omega$ resistor and the power through $2\ \Omega$ resistor? **8M**

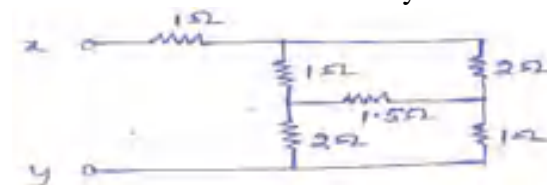


- b) Find the total capacitance across the terminal x-y shown in figure below. **4M**

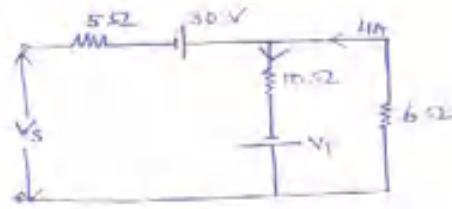


(OR)

3.
 - a) Find the total resistance across the terminal x-y shown in figure below. **6M**



- b) Find the current in $10\ \Omega$ resistor and the voltage V_1 , V_s shown in figure below? **6M**

**UNIT-II**

4. a) Explain in detail about the operating characteristics of DC series and shunt generator? **8M**
 b) A 250 V compound generator has following specifications: armature resistance = $0.4\ \Omega$, series field resistance = $0.2\ \Omega$, shunt field resistance = $125\ \Omega$. If the generator supplies 10 kW at rated voltage, then find the emf generated in the armature when the machine is connected to
 i) long shunt ii) short shunt
 Neglect the contact drop and armature reaction in the machine. **4M**
(OR)
5. a) Explain in detail about the construction and principle of DC generator with a neat sketch? **6M**
 b) Discuss in detail about Swinburne's method of DC motor testing. Mention its advantage and disadvantages? **6M**

UNIT-III

6. a) Derive the expression of efficiency and voltage regulation of 1-phase transformer? **8M**
 b) Discuss various applications of induction motor? **4M**
(OR)
7. a) Derive the torque equation for an induction motor and discuss its characteristics? **6M**
 b) Derive the emf equation of an alternator? **6M**

UNIT-IV

8. a) Discuss in detail about various types of indicating instruments with their features and applications? **6M**
 b) Explain the construction and principle of PMMC instrument? **6M**
(OR)
9. a) List merits and demerits of moving coil instrument? **6M**
 b) Explain the principle and construction of repulsion type moving iron instrument? **6M**

UNIT-V

10. a) Explain the basic principle of PN junction diode with a neat sketch and discuss its volt-ampere characteristics? **6M**
 b) Draw a neat circuit diagram of full wave rectifier circuit and explain its principle of operation and wave form. **6M**
(OR)
11. a) With a neat sketch explain the operation of bridge rectifier circuit? **6M**
 b) Sketch the V-I characteristics of SCR. Explain in detail about various regions of operation? **6M**

Time: 3 hours**Max Marks: 70****PART- A****Answer all questions****[10 x 1=10M]**

1.
 - a) What is recursion?
 - b) Differentiate linear and non-linear data structures.
 - c) Mention applications of stack.
 - d) What are the advantages of circular queue?
 - e) Specify the time complexities of merge sort and selection sort.
 - f) What are the advantages of binary search over linear search?
 - g) What is a tree data structure?
 - h) What is the property of a binary search tree?
 - i) What is BFS?
 - j) Differentiate cycle and path in a graph.

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

2. Write and explain the concept of algorithm with a suitable example. [12M]
(OR)
3.
 - a) Write a recursive algorithm to find the factorial of a given number. [6M]
 - b) What is data structure? Discuss in detail about various linear data structures. [6M]

UNIT – II

4.
 - a) What is a queue? Explain various operations performed on it. [6M]
 - b) Write a program to implement stack using array. [6M]
(OR)
5. Write a C program to implement following operations on a doubly linked list [12M]
 - i. Insertion
 - ii. Deletion

UNIT – III

6. a) Write a C program for binary search. [4M]
b) Write an algorithm for selection sort and explain it with an example. [8M]
(OR)
7. Write a program for implementing quick sort and trace it with an example. [12M]

UNIT – IV

8. a) Differentiate tree and binary tree. [3M]
b) Discuss in detail about various tree traversal techniques. [9M]
(OR)
9. Explain the concept of binary search tree. Write a program to implement insert operation on a binary search tree. [12M]

UNIT – V

10. a) Explain in detail about the concept of minimum spanning tree. [6M]
b) Write and explain DFS algorithm. [6M]
(OR)
11. a) By means of suitable example, explain how to find shortest path in a graph. [6M]
b) Describe how to represent a graph using adjacency list. [6M]