

**B.Tech. 2nd Semester (G-Scheme)  
(Common for All Branches) Examination, May-2023**

**BASIC ELECTRICAL ENGINEERING**

**Paper - ESC-EE-101-G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

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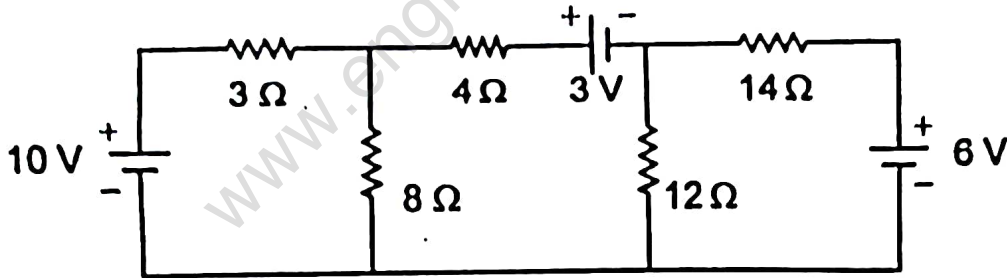
*Note : Attempt five questions in all, selecting one question from each unit. Question no.-1 is compulsory. All questions carry equal marks.*

1. (a) Define Thevenins theorem and give logical proof of it.
- (b) Differentiate between induction type ammeter and voltmeter.
- (c) Define the following terms w.r.t. AC circuits:
  - (i) Form Factor
  - (ii) Peak Factor
- (d) State and explain the losses in transformer.
- (e) Explain power factor and state its importance.
- (f) Define phase sequence and list out the advantages of three phase system as compared to single phase system.

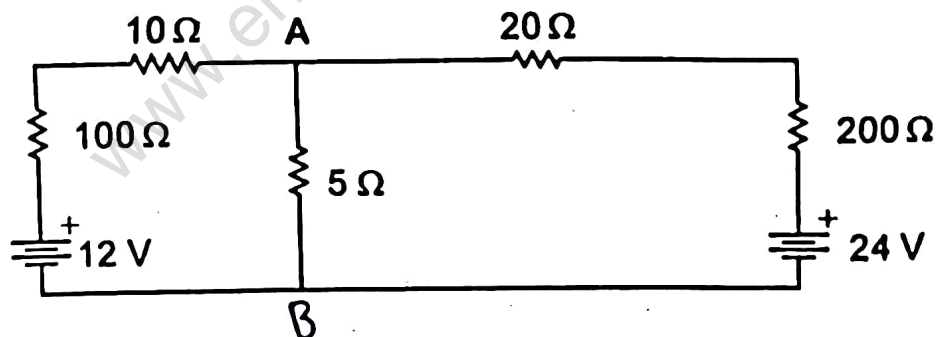
6×2.5=15

## Unit-I

2. (a) In the circuit shown below deduce the current flowing through different branches by using Loop Analysis. 7.5



- (b) Prove that the average power consumed in a pure inductive circuit is zero. Support the answer with suitable circuit diagram, phasor diagram and waveforms. 7.5
3. (a) In the fig. given below, evaluate the current in AB by using Norton's Theorem. 7.5



- (b) Justify that power consumed in an R-C series circuit is  $VI \cos \phi$ . Draw the waveform for voltage, current and power. 7.5

**Unit-II**

4. (a) Discuss the method to measure the power in a three phase circuit using two wattmeter method. 7.5
- (b) Explain the construction and working of autotransformer. 7.5
5. (a) Illustrate the relationship between the line and phase values of voltage and current in a three phase, star connected circuit with relevant phasor diagram and circuit diagram. 7.5
- (b) Elaborate the difference between balanced and unbalanced 3  $\Phi$  AC system. 7.5

**Unit-III**

6. Explain the construction and working of DC machines. Draw and explain the torque speed characteristics of DC motor. 15
7. (a) Explain the concept of back EMF and its significance. 7.5
- (b) List the advantages of rotating field over rotating armature used in alternators. 7.5

**Unit-IV**

8. (a) Explain the constructions and working principle of dynamometer type Wattmeter. 7.5
- (b) Explain the following: 7.5
- (a) MCB
- (b) MCCB
9. Write a detailed note on different Types of wires and cables. 15

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B. Tech. 2nd Semester (Common for All Branches)

(G-Scheme) Examination, May-2023

WORKSHOP TECHNOLOGY

Paper-ESC-ME-102-G

Time allowed : 3 hours]

[Maximum marks : 75

*Note : Attempt any five questions in all, selecting one question from each unit. Question No. 1 is compulsory. All questions carry equal marks.*

1. Explain the following : 2½×6=15
- (a) Sources of Accident
  - (b) Hot and Cold Working Processes
  - (c) Steps in Casting Process
  - (d) Gating System
  - (e) Principle of Arc Welding
  - (f) Soldering and Brazing

**Unit-I**

2. Explain the concept of plant layout. Also explain the different types of plant layout. 15
3. What do you mean by accident ? Discuss different types of accidents. What are the safety measures to reduce accident ? 15

**Unit-II**

4. Explain various sheet metal operations in details. 15

5. Discuss in details the hot cold working processes. 15

### Unit-III

6. What do you mean casting ? Explain different patterns and pattern allowances. 15
7. Explain the principle of resistance welding. Also explain the various welding defects. 15

### Unit-IV

8. Explain the principle of resistance welding. Also explain the various welding defects. 15
9. Explain :  $3 \times 5 = 15$
- (a) Gas Welding
  - (b) TIG
  - (c) MIG

**B.Tech. 2nd Semester (G-Scheme)**

**(Common for All Branches) Examination, May-2023**

**CHEMISTRY - I**

**Paper - BSC-CH-101-G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

**Note : Question no. 1 is compulsory and attempt four questions by selecting one from each Section.**

1. (a) Is presence of chiral carbon, essential condition for a compound to be optically active? Explain giving a suitable example. 2.5
- (b) Give merits of Zeolite process. 2.5
- (c) How actual nuclear charge differs from effective nuclear charge? 2.5
- (d) State Aufbau and Pauli's exclusion principle for filling of electrons. 2.5
- (e) What is Tautomerism? Give an example. 2.5
- (f) Why tetramethylsilane (TMS) is chosen as reference for measuring Chemical shift in NMR spectroscopy? 2.5

6×2.5=15

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**[P.T.O.]**

**Section-I**

2. (a) With the help of M.O. diagram, explain the magnetic behavior, bond order and stability of NO molecule. 7
- (b) Discuss the Pi-molecular orbital diagram of butadiene. 4
- (c) Explain the role of doping in increasing the conduction in solids. 4
3. (a) Define ionisation energy. Explain the variation of I.E. along period and group. 7
- (b) What is polarisability? How it is helpful in explaining covalent character of a bond? 4
- (c) Write the mathematical expression for Schrodinger wave equation. Define Eigen function and Eigen value. 4

**Section-II**

4. (a) Differentiate the following: 8
- (i) Enantiomers and Diastereomers
- (ii)  $SN^1$  and  $SN^2$  reactions
- (b) What are Addition reactions? Classify them and explain the types. 7
5. Write a short note on the following: 15
- (i) Synthesis of Paracetamol
- (ii) Conformations of Butane
- (iii) Reduction of carbonyl compounds



**Section-III**

6. (a) What is corrosion? Explain all the factors that affect the phenomenon of corrosion. 12
- (b) Define critical volume, critical pressure and critical temperature. 3
7. (a) Explain the following terms: 8
- (i) Differential aeration corrosion
- (ii) Galvanic corrosion
- (b) Why  $\text{CaCO}_3$  is used as standard to measure the hardness of water? Explain EDTA method to measure the hardness. 7

**Section-IV**

8. (a) Discuss the principles and applications of UV-Visible spectroscopy. 7
- (b) Explain the following terms: 8
- (i) Spin-spin coupling
- (ii) Equivalent and non-equivalent protons
9. Write short note on the following: 15
- (i) Flame photometry
- (ii) Shielding and Deshielding of protons
- (iii) Types of vibrations in IR spectroscopy

**B. Tech. 2nd Semester (G-Scheme)**  
**(Common for All Branches Except CSE, ECE,**  
**CSE-AI & MLE, Data Science, CSE-ITCSE, IT, CS &**  
**IT, CS & T and EEE)**

**Examination, May-2023**

**PROGRAMMING FOR PROBLEM SOLVING**

**Paper Code : ESC-CSE-102-G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

*Note: Attempt any five questions in all, selecting at least one question from each unit. Question no. 1 is compulsory. All questions carry equal marks.*

1. (a) Explain the arithmetic operations on number system.
- (b) Differentiate between syntax and logical error.
- (c) Explain Algorithm with suitable example.
- (d) Define Pseudo code with example.
- (e) Explain various conditional statements.
- (f) Define functions and why functions are used in the program.

$6 \times 2.5 = 15$

**Unit-I**

2. (a) Convert  $(765)_{10}$  into  $( )_2$ ,  $( )_8$ ,  $( )_{16}$  5
- (b) Convert  $(1010101)_2$  into  $( )_8$  5
- (c) Convert  $(CA5)_{16}$  into  $( )_2$  5
3. Define Computer and discuss its functional units in detail with neat and clean diagram. 15

**Unit-II**

4. (a) What is a flowchart? Draw a flowchart to check the number is positive or negative. 8
- (b) Write an algorithm to check the number is even or odd. 7
5. (a) Header files 4
- (b) Keywords and variables 4
- (c) Arithmetic expressions and its precedence 7

**Unit-III**

6. (a) What are conditional statements? Write a program to calculate the roots of a quadratic equation. 8
- (b) Write a program to find the number is prime or not. 7

7. (a) Differentiate between if and if-else using example. 7
- (b) Write a program to check the string is palindrome or not. 8

#### Unit-IV

8. What is function ? Differentiate between call by value and call by reference by using suitable example. 15
9. (a) What is Recursion ? Write a program for Fibonacci series using recursion ? 7
- (b) Write a program to find the factorial of a number. 8

B.Tech. (M.E.) 2nd Semester  
(G-Scheme) Examination, May-2023

MATH - II

Paper - B.Sc.-MATH-102-G

Multivariable Calculus, Differential Equations and  
Complex Analysis

Time allowed : 3 hours]

[Maximum marks : 75

*Note : Question no. 1 is compulsory. Attempt total five questions with selecting one question from each unit.*

*All questions carry equal marks.*

1. (a) Show that,  $\frac{d}{dx} [x^{-n} J_n(x)] = -x^{-n} J_{n+1}(x)$ .
- (b) Solve:  $(2x^3 - xy^2 - 2y + 3)dx - (x^2y + 2x)dy = 0$ .
- (c) Solve:  $\frac{d^2y}{dx^2} + y = 0$ .
- (d) Split up into real and imaginary parts  $e^{e^z}$ .
- (e) State the necessary and sufficient conditions for a function to be analytic.
- (f) Define Mobius transformations. 6×2.5

## Unit-I

2. (a) Evaluate  $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dz \, dy \, dx$ .
- (b) Evaluate by changing the order of integration

$$\int_0^{\infty} \int_0^x x \cdot e^{-\frac{x^2}{y}} \cdot dy \, dx.$$

3. (a) If  $\vec{F} = (3x^2 + 6y)\hat{i} - 14yz\hat{j} + 20xz^2\hat{k}$ , evaluate the line integral  $\int_C \vec{F} \cdot d\vec{r}$  from  $(0, 0, 0)$  to  $(1, 1, 1)$  along the path  $x = t, y = t^2, z = t^3$ .

- (b) Using divergence theorem for  $\vec{F} = (x^2 + yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$ , find  $\int \vec{F} \cdot d\vec{S}$  taken over the rectangular parallelepiped  $0 \leq x \leq a, 0 \leq y \leq b, 0 \leq z \leq c$ .

## Unit - II

4. (a) Solve the equation,

$$\left[ y \left( 1 + \frac{1}{x} \right) + \cos y \right] dx + (x + \log x - x \sin y) dy = 0.$$

- (b) Solve:  $\frac{dy}{dx} + \frac{1}{x}y = 3x^2y^3$ .

5. (a) Find the power series solution of

$$(1 - x^2) \frac{d^2 y}{dx^2} + 2y = 0, \text{ where } y(0) = 4 \text{ and } y'(0) = 5.$$

- (b) Solve:

$$(1 + x)^2 \frac{d^2 y}{dx^2} + (1 + x) \frac{dy}{dx} + y = 4 \cos \log(1 + x).$$

### Unit-III

6. (a) If  $\tan(\theta + i\phi) = \tan \alpha + i \sec \alpha$ , Show that

(i)  $e^{2\phi} = \pm \cot \alpha / 2$

(ii)  $2\theta = (n + 1/2)\pi + \alpha$

- (b) Prove that the functions defined by

$$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}, \quad z \neq 0 \text{ and } f(0) = 0$$

is continuous and the Cauchy-Riemann equations are satisfied at the origin, yet  $f'(0)$  does not exist.

7. (a) Determine the analytic function whose real part is  $e^x [x \cos y - y \sin y]$ .
- (b) Prove that every Mobius transformation maps circles or straight lines into circles or straight lines.

### Unit-IV

8. (a) Evaluate  $\oint \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz,$

the where C is the circle  $|z| = 3$ .

- (b) Find the Laurent's series expansion of

$$\frac{z^2 - 2}{z^2 + 5z + 6} \text{ in the region}$$

(i)  $2 < |z| < 3$

(ii)  $|z| > 3$

9. (a) Evaluate the integral  $\int_0^\pi \frac{\cos \theta}{3 + \sin \theta} d\theta,$  by contour integration.

(b)  $\oint_C \frac{4 - 3z}{z(z-1)(z-2)} dz$  where, C is the circle  $|z| = \frac{3}{2}$ .