

Total No. of Pages: 1
SECOND SEMESTER
MID SEMESTER EXAMINATION
AP-102: PHYSICS-II

Roll No... 1756
B.Tech. [All Groups]
March 2017

Time: 1.5 Hours

Max. Marks: 30

Note: Answer *ALL* questions.
Assume suitable missing data, if any.

- 1 [a] What is Compton effect? Derive an expression for the change in wavelength expected for a photon which is scattered through the angle ϕ by a particle of rest mass m_0 . Why is the Compton effect not observed for visible light? 5
- [b] An electron has a de Broglie wavelength of $2 \times 10^{-12} \text{ m}$. Find the phase and group velocities of its de Broglie waves. Rest mass energy of electron is 0.511 MeV. 5
- 2 [a] Consider a particle trapped in an infinite potential box of width a ,
$$V(x) = \begin{cases} 0, & 0 < x < a \\ \infty, & \text{otherwise} \end{cases}$$

Write the Schrodinger equation for this particle and hence get the expressions for the energy eigen values and energy eigen functions for the particle. Draw the probability densities for its first two wave functions. 5
- [b] The effective Q for the proton-proton cycle is 26.2 MeV. (i) Express this as energy per kilogram of hydrogen consumed, (ii) The power of the sun is $3.9 \times 10^{26} \text{ W}$. If its energy derives from the proton-proton cycle, at what rate is it losing hydrogen? (iii) At what rate is it losing mass? (iv) Account for the difference in the results for (ii) and (iii). 5
- 3 [a] Define binding energy of a nucleus. Sketch the binding energy per nucleon versus mass number curve. Mention important findings of the curve. 5
- [b] What is liquid drop model of a nucleus? Derive Von-Weizsacker semi empirical binding energy formula. Use the semi empirical binding energy formula to calculate the binding energy of ${}^{40}_{20}\text{Ca}$.
($a_v=14.1\text{MeV}$; $a_s=13.0\text{MeV}$; $a_c=0.595\text{MeV}$; $a_a=19.0\text{MeV}$; $a_p=33.5\text{MeV}$) 5

CO-102 PROGRAMMING FUNDAMENTALS

Time: 1 hr 30 min

Max. Marks : 30

Note : Answer all questions

Assume suitable missing data, if any.

Give suitable examples, wherever necessary

Q1. (a) Explain the difference between Algorithm, flowchart and computer program. Draw flowchart to print sum of 10 natural numbers. 4

(b) What is an array. How array are initialised. 2

Q2. (a) Explain different data modifiers/qualifiers in detail. What is the effect of these on size and value range of integer data type? 3

(b) Differentiate between formal, actual and dummy arguments. Give suitable examples. 3

Q3. (a) Find the errors, if any (where a is int array, x is char array, i, j are int,). Justify. 2

(i) int a[]

(ii) int i = 23p

(iii) int i = 23L

(iv) while(i<2){ ..}

(b) Write a program using recursion to print the n elements of a Fibonacci series. What is the depth of this process. Explain the difference between iterative and recursive program . 4

Q4. (a) Identify following tokens

(i) main

(ii) printf

(iii) 50L

(iv) "a"

2

(b) What is the difference between library function, user defined function, pre defined function. Explain the purpose of stdio.h file. 4

Q5. Write Short notes

(a) scanf()

(b) Assignment operators

(c) Control structures

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Roll No.....1756

**SECOND SEMESTER
MID-SEM EXAMINATION**

**B.TECH. (A group)
MARCH- 2017**

EN-102 INTRODUCTION TO ENVIRONMENTAL SCIENCE

Time: 1 Hour 30 minutes

Max. Marks: 25

*Note: All the questions are compulsory and carry equal marks
Assume suitable missing data if any*

1. ☒ a) Discuss the importance of environmental studies for public awareness.
☒ b) Discuss the structure of lithosphere.
2. ☒ a) What is eutrophication? What are the ways to overcome it? Explain.
b) Describe the status of mineral resources in India.
3. ☒ a) Discuss the role of modern agriculture in environmental degradation.
☒ b) Differentiate between renewable and non-renewable sources of energy.
4. ☒ a) What are the problems associated with over-utilisation of water resources? Explain.
☒ b) Discuss the environmental demerits of wind energy.
5. Write short notes on
 - ☒ a) World food problems
 - ☒ b) Desertification

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SECOND SEMESTER

Mid SEMESTER EXAMINATION

MA-102, Mathematics-II

Roll No.: 1756
B.Tech.

March, 2017

Time: $1\frac{1}{2}$ Hours

Max. Marks: 25

Note: Attempt all questions and assume the missing values.

(1) State and prove Cayley-Hamilton Theorem.

(2) Investigate for what values of λ and μ the equations

$$x + y + z = 6; x + 2y + 3z = 10; x + 2y + \lambda z = \mu,$$

have

(a) an unique solution

(b) an infinite number of solutions

(c) no solution.

(3) Solve $(D^2 - 6D + 9)y = 6e^{3x} + 7e^{-2x} - \log 2 + 3^x$.

(4) Use the method of Variation of parameters solve $(D^2 + a^2)y = \sec ax$.

(5) Solve the simultaneous different equations

$$\frac{d^2x}{dt^2} - 3x - 3y = 0; \frac{d^2y}{dt^2} + x + y = 0.$$

$$D^2x - 3x - 3y = 0 \quad (D^2 + 3)y = 3x$$

$$D^2y + x + y = 0 \quad (D^2 + 1)y = -x$$

$$(D^2 + 3)(D^2 + 1)y = 3x - x = 2x$$

$$3x = 2x \Rightarrow x = 0$$

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SECOND SEM
MID SEMESTER EXAMINATION

Roll No: 1745
B.TECH(GROUP A)
MARCH 2017

CO-102 PROGRAMMING FUNDAMENTALS

Time: 1 hr 30 min

Max. Marks : 30

Note : Answer all questions
Assume suitable missing data, if any.
Give suitable examples, wherever necessary

Q1. (a) Explain the difference between Algorithm, flowchart and computer program. Draw flowchart to print sum of 10 natural numbers. 4

(b) What is an array. How array are initialised. 2

Q2. (a) Explain different data modifiers/qualifiers in detail. What is the effect of these on size and value range of integer data type? 3

(b) Differentiate between formal, actual and dummy arguments. Give suitable examples. 3

Q3. (a) Find the errors, if any (where a is int array, x is char array, i, j are int,). Justify. 2

(i) int a[]

(ii) int i = 23p

(iii) int i = 23L

(iv) while(i<2){ ..}

(b) Write a program using recursion to print the n elements of a Fibonacci series. What is the depth of this process. Explain the difference between iterative and recursive program . 4

Q4. (a) Identify following tokens 2

(i) main

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(iii) 50L

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(b) What is the difference between library function, user defined function, pre defined function. Explain the purpose of stdio.h file. 4

Q5. Write Short notes 6

(a) scanf()

(b) Assignment operators

(c) Control structures

Total No. of Pages: 03

B.Tech.(all branches)

MID SEMESTER EXAMINATION

EE-102: Basic Electrical Engineering

Time: 1 h 30 minutes

Max. Marks: 30

Roll No. 1756

IInd Semester

(March.-2017)

Note: All Questions are compulsory. Question no. 1 to 7 carry 2 marks each and Question 8 to 11 carry 4 marks each. Special material required-Graph Paper. Assume suitable missing data, if any.

1. Verify superposition theorem for $y = f(x) = 7x + 3$.
2. What will happen if Switch is closed in the following Fig. 1.

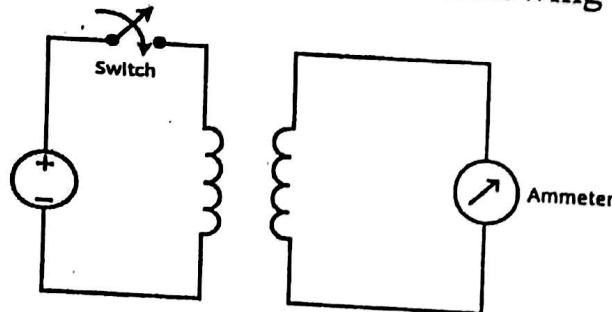


Fig. 1

3. Fig. 2 shows one node of an electric circuit, using KCL, find V_1 . Given $V_2 = 5e^{-2t}$, $V_3 = 2e^{-2t}$ and $i_1 = 2e^{-2t}$

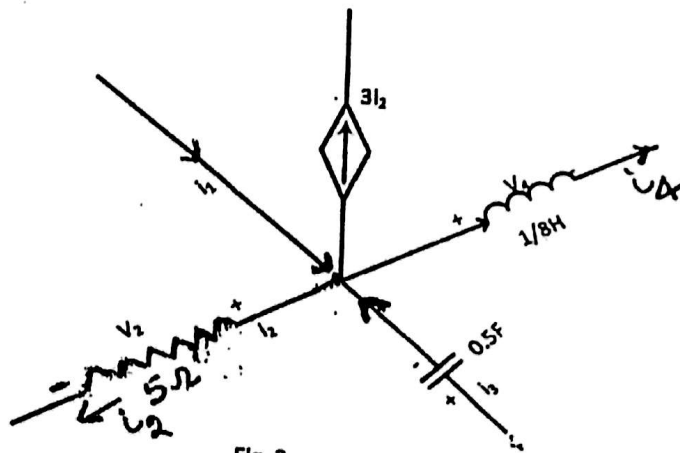


Fig. 2

4. An AC current of $(4+j3)$ A flows through a resistance of 10Ω . Find the real power consumed.

P.T.O.

5. Identify the series parallel combination in following Fig.3.

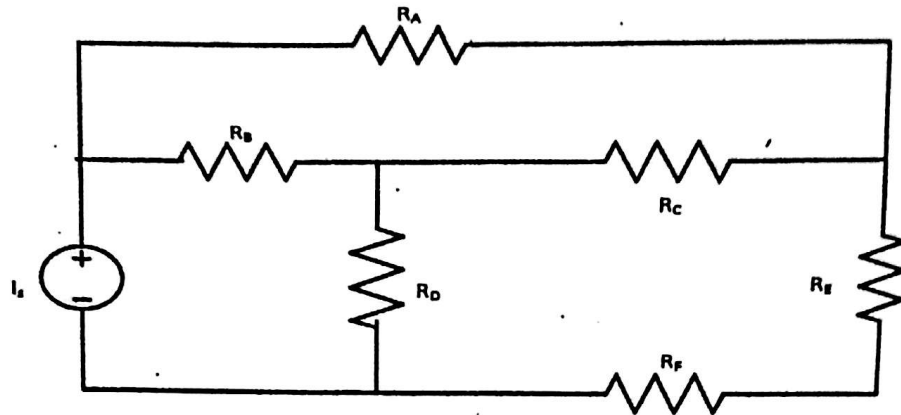


Fig. 3

6. Find average value of the waveform shown in Fig. 4.

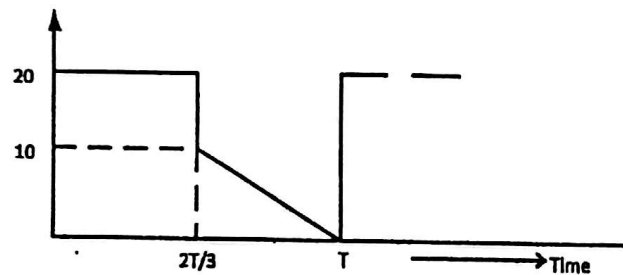


Fig. 4

7. The impedance of a circuit consists of 2Ω resistance and 4Ω reactance. What are its conductance and susceptance?
8. For the circuit Fig. 5, find the Thevenin's equivalent as seen by resistance R. Also find the value of R for maximum power dissipation in it and the value of this power. All resistances are in ohms.

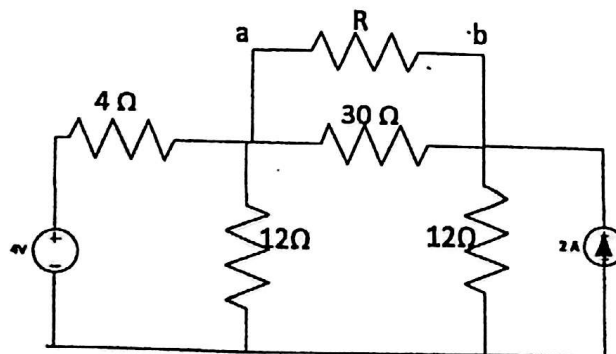


Fig. 5

$V = IR$
 $V = 2 \times 12$
 $V = 24$

9. For the circuit of Fig. 6 find V_1 , V_2 , I_2 , I_3 and I_1 in polar form and draw the phasor diagram to the scale using a graph paper given that $i_L = \sqrt{2} \cos 2t$. Take i_L as reference for phasor diagram.

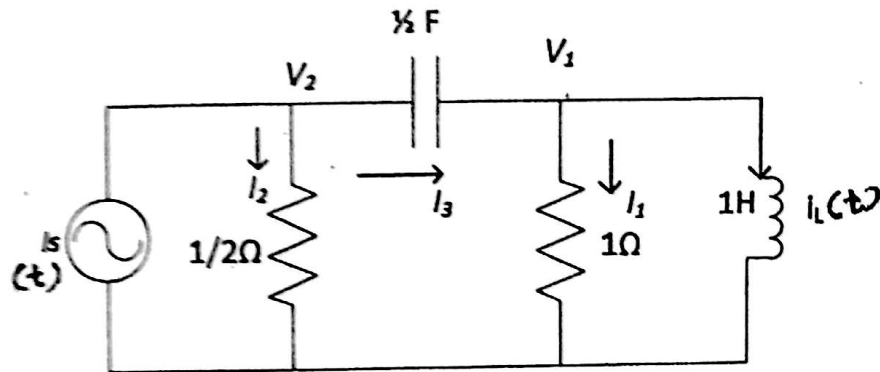


Fig. 6

10. Derive an expression for star to delta transformation for resistances.
11. Using nodal analysis find current in R_L of 5Ω , for the network shown in fig. 7.

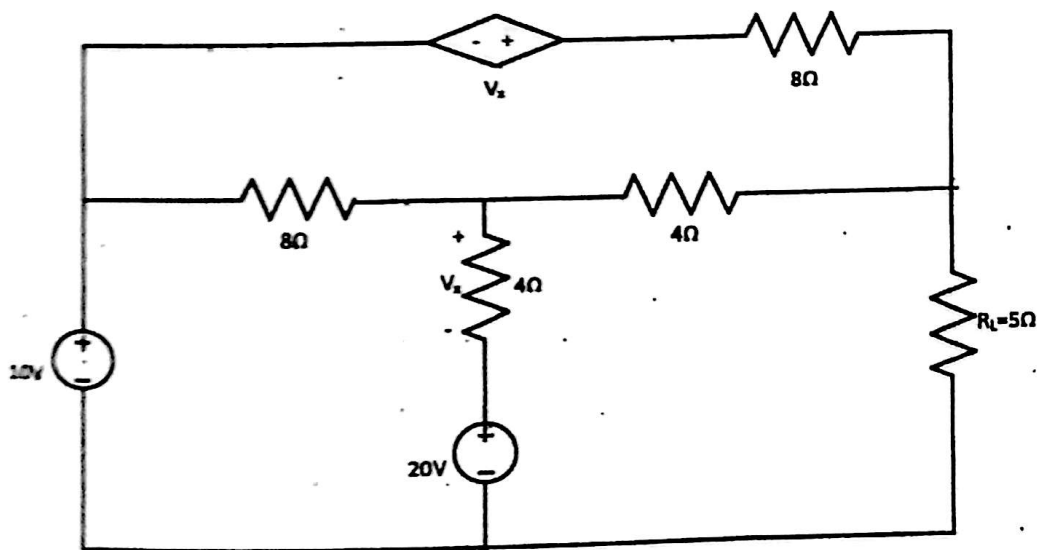


Fig. 7