1st sem
— Mid sem

Q1. For the circuit shown in Fig.1 find (i) the output voltage (ii) the voltage drops across series resistance (iii) the current through Zener diode.   5 marks
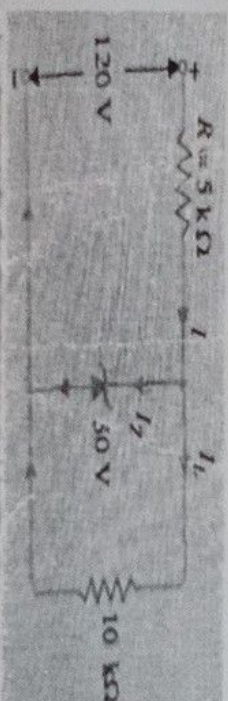
Q2. Discuss the all Breakdown mechanism in p-n diode.   5 marks

Q3. Solve the numerical   (3+3+4) marks

(a) Determine the diode current at 27°C for a Silicon diode with reverse Saturation current $I_s = 50$ nano-amp and applied forward bias of 0.7V.

(b) A silicon p - n junction at a temperature of 20oC has a reverse saturation current of 10 pico-Am(pA). Find the reverse saturation current at 40oC for the same bias.

c) Assuming an operating temperature T = 300 K and corresponding VT = 26 mV, what is the change in semiconductor silicon diode forward voltage VD to produce a 10: 1 change in diode current ID?

Q4. Draw Full wave Bridge Rectifier circuits and find the all performance parameters.   5 marks
Q5. Discuss Different types of Clippers Circuits.   5 marks

Course: B. Tech/DD   Dept: EE
FM: 30   Time: 2 hrs

PH16101 ENGINEERING PHYSICS

1. Explain the concepts of Gradient, Divergence and Curl [3]

2. Write down the divergence theorem and the Stokes's theorem. How are they used in electromagnetics? [3]

3. Derive an expression for the energy density stored in electrostatic fields. [3]

4. A charge of 6×10^{-8} C is 84 cm from a charge of -8×10^{-8} C. What force will these charges exert on a charge of 0.21 µC placed half way between them? Take medium as air. [3]

5. Derive the dielectric – dielectric boundary conditions and from there arrive at the Snell's law of refraction for electric fields. [6]

   OR

   A one-dimensional electric potential is given as $V(x) = x^2 - 4x$ kiloVolts. Plot the potential and find its minimum. It is known that an oscillating charge radiates away its energy as electromagnetic waves of the same frequency as its frequency of oscillation. If a point mass of charge $Q = 10$ C and $m = 0.002$ milligram is initially placed at $x = 6$ find the frequency and the total energy of the electromagnetic waves it would radiate away before eventually coming to rest. [6]

6. Derive the Maxwell's corrections to Ampere's law and explain the concept of displacement current. [3]

7. Prove that the conduction current in the leads of a capacitor is equal to the displacement current between the plates of the capacitor. [3]

8. Write down the Maxwell's equations in differential form and integral form and explain their physical significance. [3]

9. Taking free space as medium, prove that light is an electromagnetic wave. Discuss the implication of the result. [3]

   OR

   Under electrostatic conditions show that the electric field is zero inside a conductor and is normal to its surface outside the conductor. [3]

Name and Roll Number: _____   Max mark: 30

"This question paper comprises a total of six questions, and all are compulsory"

1. Demonstrate the application of source transformation by simplifying the given network (shown below) into an equivalent network with a voltage source and series resistance between terminals **M** and **N**.   (5)
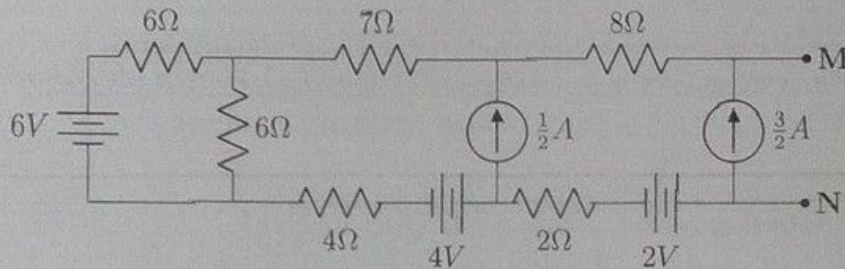
2. Determine currents i_1, i_2 and i_3 for the circuit given below.   (5)
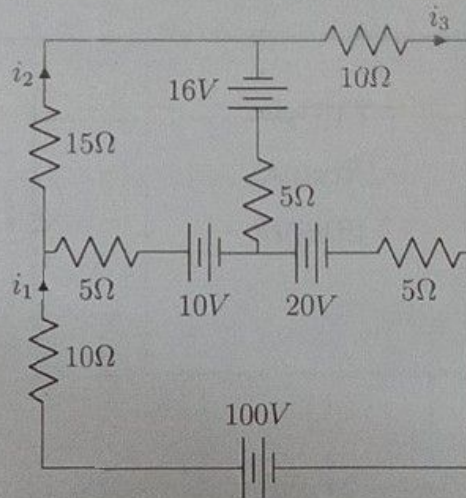
3. Obtain the equivalent resistance between terminal **A** and **B**.   (5)
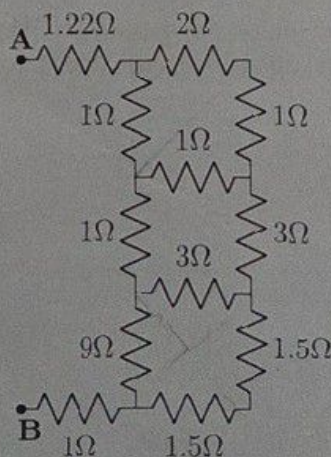
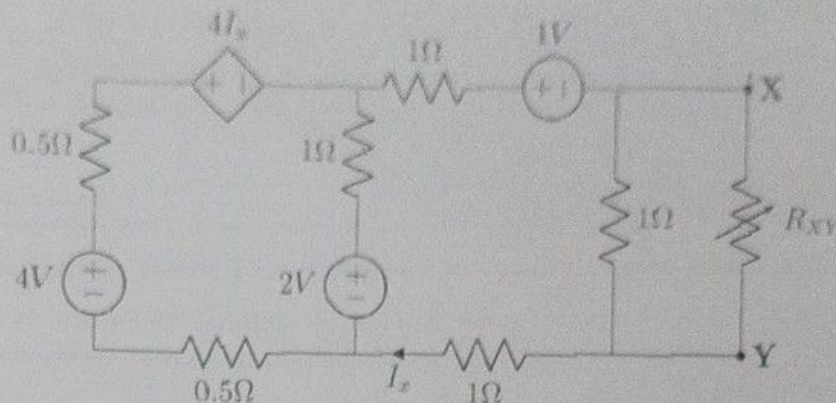4. Find the load resistance (R_{XY}) for maximum power transfer between terminals X and Y, and also evaluate the power transferred. (5)

5. For the network shown below, the table provides the voltage response across an element (V_R) along with the corresponding input voltage (V_S) and input current (I_S) for several observations Based on the given data, determine the applied voltage (V_S) for the 3rd observation. (5)

Observation No.	V_S (V)	I_S (A)	V_R (V)
1	10	2	10
2	2	5	6
3	?	1.15	20
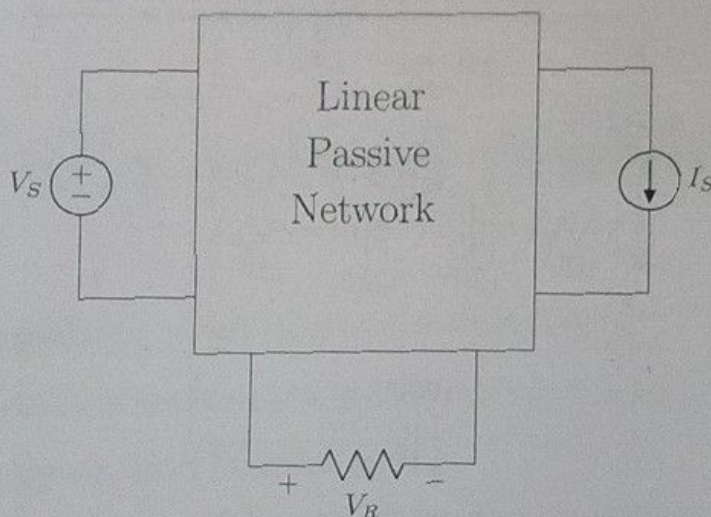
6. Derive the admittance and current triangles for a parallel RLC circuit and discuss all possible cases. What happens when the inductive and capacitive susceptances are equal? (5)

Subject: Introduction to Computing   **Subject Code: CS16105**
Max. Marks: 30   **Time: 2 Hours**
Semester: 1

Instructions:
1. *Attempt all questions.*
2. *Assume any suitable data, if necessary.*
3. *Answer all parts of question at the same place.*

Q.No	Questions	Marks	CO	BL
1. a.	What is CPU? Explain three major components of CPU.	5	CO1	L1, L2
b.	Explain the role of system bus in computers.	5	CO1	
2. a.	Choose the correct answer(s) of the questions from the options given below. Each question is of equal marks. Marks will be awarded if and only if you choose all the correct answers of the question.		CO5	L3
i.	The C is .... level programming language. a. High b. Low c. Both of the above d. None of the Above	1		
ii.	How many keywords present in C language? a. 32 b. 34 c. 62 d. 64	1		
iii.	Each statement in a C program should end with. a. Semicolon b. Colon c. Period d. Any of the above	1		

2.b.	What are the output of the following C code snippets?		CO6	L3

i.	`int main() {`
	`int x = 10;`
	`printf("%d", x+++ + ++x);`
	`return 0;`
	`}`
		2		

ii.	`int main() {`
	`for(int i = 0; i < 3; i++)`
	`{ printf("%d ", i);`
	`if(i==1) break; }`
	`printf("out of the loop");`
	`return 0;`
	`}`
		2		

2.c.	What are the different types of relational operators in C programming language?	3		L1
3.a.	Write a C program that takes an integer input from the user and print the message that the entered number is EVEN or ODD using *SWITCH*. ***Or*** Describe the function of a program counter and instruction register. Explain the role of registers in CPU operation.	5	CO5 CO6 CO1	L3
b.	Write a program in C to that takes an integer input from the user and count the number of digits in number entered by the user and also print the sum of its digits.	5	CO5 CO6	

(30)

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NATIONAL INSTITUTE OF TECHNOLOGY PATNA
MID SEMESTER EXAMINATION, JULY-DECEMBER 2024

Program: UG & DD   Semester: 1ˢᵗ   Department: HSS

Course Code: HS12101 (B), HS111101, HS16101 (B), HS19101

Branch: ME & M&AE and EE & CE&T.

Course Name: Communicative English

Full Marks: 22.5   Duration of Examination: **2 Hours**

Instructions:
- Answer all questions.
- Marks for each section has been allotted separately.

Section A

Short Answer Questions (6 Marks).

1. Describe the process of communication and its key elements. Give examples.

               (2 marks)

2. Explain the concept of non-verbal communication and its significance. Give examples

               (2 marks)

3. Discuss the role of active listening in effective communication.   **(2 marks)**

Section B

Long Answer Questions (6 Marks).

4. Analyze the barriers to effective communication and give examples.   **(3 marks)**
5. Describe the different types of listening modes and their applications.   **(3 marks)**

Section C

Read the following dialogue and answer the questions that follow   **(4 marks)**

Ravi: Hey, did you hear about the new project we're working on?

Neha: No, I haven't. What's it about?

Ravi: It's a collaboration with our sister company in the UK. We're developing a new software application for their clients ①

Neha: That sounds exciting! When do we start working on it?

Ravi: We have a meeting scheduled next week to discuss the project details and timelines. The client wants us to deliver the first phase by the end of this quarter ②

Neha: Wow, that's a tight deadline. Do we have enough resources to handle this project along with our existing workload?

Ravi: I've already spoken to the HR manager about hiring a few more developers. We're also planning to outsource some of the testing work to our QA team in India ③

Neha: I see. Well, let's hope everything goes smoothly. Keep me posted on the project updates, okay?

Ravi: Sure, no problem. I'll share the meeting notes with you after the discussion next week.

Neha: Great, thanks! I'm looking forward to working on this project.

Questions:
a) What is the new project about? (1 mark)
b) What is the deadline for the first phase of the project? (1 mark)
c) How is the company planning to handle the additional workload? (1 mark)
d) What will Ravi do after the meeting next week? (1 mark)

Section D

Read the Passage and answer the questions that follow

(6.5 Marks)

In the bustling city of New York, the Avengers were gearing up for their next big mission. However, there was a problem: they were having a communication crisis! Iron Man, Captain America, and Thor were all in the same room, but instead of discussing their strategy, they were arguing about who was the best superhero.

Iron Man boasted, "I have the coolest gadgets and the best suit! No one can match my technology!"

Captain America replied, "But it's not just about technology! It's about leadership and doing what's right. I stand for justice and honor!"

Thor, swinging his mighty hammer, chimed in, "You both have your strengths, but can you summon lightning? I can! That makes me the most powerful!"

As the argument heated up, Black Widow entered the room and raised her hands. "Friends, this isn't helping! We need to focus on the mission, not who's the best superhero. We have a villain to stop, and we can't do it if we're fighting among ourselves."

Realizing the truth in Black Widow's words, the Avengers paused. They began to communicate more effectively, sharing their strengths and ideas instead of competing. Iron Man suggested using his tech to track the villain, Captain America proposed a tactical plan, and Thor offered to create a distraction with his lightning.

Through open communication and teamwork, the Avengers successfully combined their skills and defeated the villain, saving the day once again. They learned that effective communication is not just about talking but also about listening and working together towards a common goal.

a) What was the main problem the Avengers faced in the passage?   (1.5 marks)
b) Who intervened to help resolve the argument, and what did they say?   (1 mark)
c) What did the Avengers learn about communication by the end of the passage?

(2 marks)
d) Why is effective communication important for teamwork?
(2 marks)