Department of Electronics and Communication Engineering, NIT Patna
Mid Semester Examination
Elements of Electronics Engineering
B.Tech, Semester –I

Time: 2:00 Hrs.

Max Marks: 30

Note: All questions carry equal marks. Attempt any **six**. Assume any missing data appropriately.

1. (a) Explain the PIV, Breakdown mechanism, and type of Breakdown in the PN Junction diode.
   (b) What is the mean value of sine wave in half wave rectifier?
   (c) What will be the RMS value of full wave rectification however half wave rectification RMS value is given as 10A.

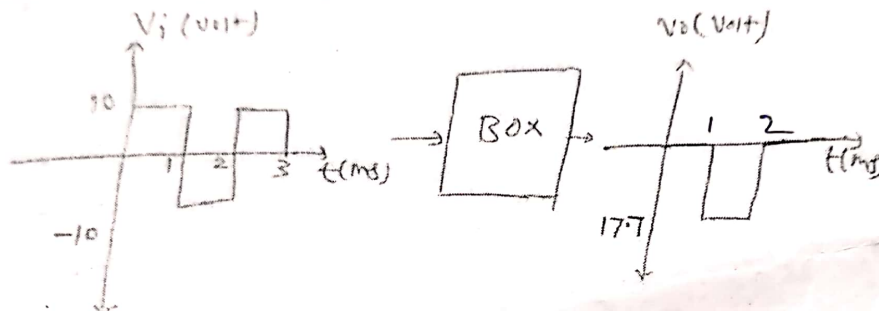2. Design the black box internal circuit to produce the given output waveform for input signal as given in Fig.1.

Fig. 1.

3. Two silicon diodes, with a forward voltage drop of 0.7 V, are used in the circuit shown in the fig. 2. The range of input voltage V_i for which the output voltage $V_o = V_i$, is:
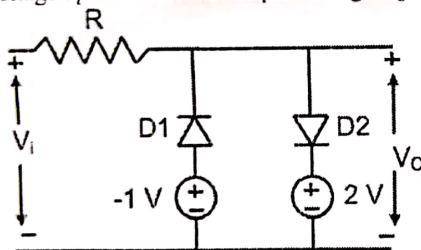
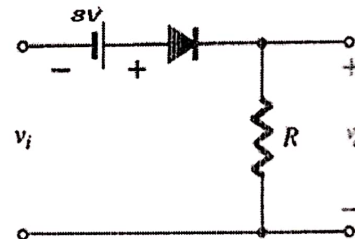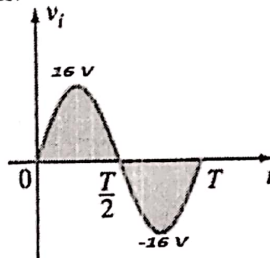Fig. 2.   Fig. 3.

4. Explain the working full-wave bridge rectifier and also calculate the average and rms values of the rectifier. Draw the output waveform for a sinusoidal input waveform.

5. Find the output and draw the waveform of the circuit shown in Fig. 3 for the given sinusoidal input. Assume a diode drop of 0.7 V.

6. Calculate the current I, I_1, I_2, I_3, and Voltage V_1 and V_2 in the given Fig.4.
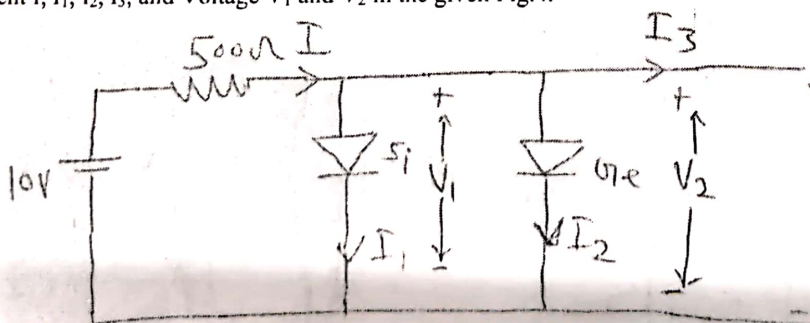
Fig. 4

7. (a) Explain the working of clipper with suitable example.
   (b) Explain the working of clamper with suitable example.

National Institute of Technology Patna
Department of Computer Science and Engineering
Mid Sem Examination – August – December 2024

Course Name: Programming in C   Course Code: CS14102 / CS17101

Time Allowed: 2 Hours   Total Marks: 30

Department: CSE / Mathematics and Computing   Semester: 1ˢᵗ

Instructions:
- This Question Paper contains two sections. CSE3 & Mathematics and Computing should attempt Section I only. CSE1 and CSE2 students should attempt section II only
- Assume missing data if any.

Section I
(For CSE3 & Mathematics and Computing Students only)

Q1. [3+2+5=10 Points][CO1,3,4][BL3]
  a. Write a C program that utilizes a two-dimensional array. The program should prompt the user to input p number of rows, with each row containing q elements. After receiving the input, the program should display the elements in the output.
  b. Write the C program to swap number using the third variable.
  c. Write a C program that accepts three integers from the user and determines which of these integers is the largest. The program should implement input validation to ensure that only valid integer values are accepted. Draw The flow chart for the same.

Q2. [5+5=10 Points][CO3][BL2]
  a. How switch statement can be effectively used to represent and handle different months of the years by assigning unique integer value to each month. Write the C program for the same.
  b. Write any program using **break** and **continue** statement? Explain when you will use break and continue statements according to your program.

Q3. [5 Points][CO3][BL3] Suppose in your college institute library charges the fine for every book returned late. For the first five days the fine is one rupee, for 6 to 10 days fine is two rupees and above 10 days fine is 10 rupees. Suppose if you return book after 30 days your membership will be cancelled. Write a C program to accept the number of days the member is late to return the book and display the fine or the appropriate message.

Q4. [1x5=5 Points][CO2,3][BL3] Will the following code snippet compile, if so, what will be output. Explain your answer in all cases:

```
a.  main()
    { int a=100, b, c;
    if(a>=200)
    b=30;
    c=20;
    printf("%d %d",b,c); }
```

```
b.  main()
    { int a=10, b=20;
    if(a==b)
    printf("%d %d",a,b);
    }
```

```
c.  main()
    { int x=10; float y=10.0;
    if(x==y)
    printf("x and y are equal ");
    else
    printf("x and y are not equal"); }
```

```
d.  main()
    { int x=66;
    char y='B';
    if(x==y)
    printf(" x is equal to y");
    else
    printf(" x is not equal to y); }
```

```
e.  main()
    { int i=4,j=-1,k=0,w,x,y,z;
    w=i || j || k
    x= i && j && k
    y= i && j || k
    z= i || j && k
    printf("w=%d, x=%d, y=%d, z=%d" ,w,x,y,z); }
```

Please turn over for Section II

Program: B.Tech CE & DD/MCA-DS/M&T/M&C   **Semester:** 1st
Course Code: Communicative English   **Course Name:** HS13101/ HS17101/HS18101/MCA460104
Branch: B.Tech CE & DD/MCA-DS/M&T/M&C   **Duration of Examination:** 2 Hours
Full Marks: 22.5

Instructions: Answer all the questions in your own words.   Faculty-Dr. Zeeshan Ali

1. Analyse the various barriers to communication within organisational settings. How do they affect decision-making and leadership? Evaluate which barriers are most damaging and propose solutions to overcome them. (7.5 marks)   CO1

2. Evaluate how effective and poor listening affect leadership, team collaboration, and organisational success. In a scenario where a leader is a poor listener, what are the long-term impacts on team morale, project results, and innovation? Suggest strategies to foster active listening in an organisation. (7.5 marks)   CO4

3. Prepare a précis of the passage given below.   (7.5 marks)   CO7

'The world is experiencing rapid urbanisation, with more than half of the global population now living in cities.' This trend is expected to continue, with urban areas projected to house 68% of the world's population by 2050. While urbanisation brings economic opportunities, innovation, and improved living standards for many, it also presents significant challenges, particularly in terms of infrastructure, sustainability, and quality of life.

One of the most pressing issues associated with rapid urbanisation is the strain on infrastructure. Cities often struggle to provide adequate housing, transportation, sanitation, and energy services for their growing populations. This results in overcrowding, traffic congestion, pollution, and inadequate access to basic services like clean water and healthcare. In many developing countries, the growth of informal settlements, or slums, further exacerbates these challenges, as governments are often unable to keep pace with the demands of urban growth.

Sustainability is another critical concern. Urban areas are major contributors to climate change, producing over 70% of global carbon dioxide emissions. As cities expand, they consume vast amounts of resources and generate significant waste. Managing this environmental impact requires innovative solutions, such as the adoption of renewable energy sources, efficient public transportation systems, and sustainable urban planning practices that reduce energy consumption and waste.

Quality of life in cities is also at risk. While urban areas offer better access to jobs and services, they can also lead to social isolation, inequality, and health issues. The fast pace of urban life, coupled with pollution and limited green spaces, can negatively affect mental and physical health. Moreover, the gap between rich and poor is often more pronounced in urban settings, leading to increased social tensions.

To address these challenges, governments, urban planners, and citizens must collaborate on creating more inclusive, resilient, and sustainable cities. Smart cities, which use technology to improve efficiency and quality of life, represent a promising solution to many urban challenges. However, achieving sustainable urbanisation requires not only technological innovation but also political will and community engagement.

National Institute of Technology Patna

Mid Semester Examination Sep. 2024

Time allotted: 2 Hours

Full Marks: 30

Subject: Engineering Physics

Subject code: PH18101/17101

The figures in the margin indicates full marks

Attempt all questions

All questions carry equal marks

1. (a) Deduce the equation of motion of a forced harmonic oscillator and obtain its solution for amplitude and phase. Discuss the case when the driving force is very large than the natural frequency of the oscillator.　　　[4+4]
   (b) Show that the equation y=3sinkt+2coskt represents S.H.M.　[2]

2. (a) Explain the mechanism of electric polarisation in a dielectric medium. [3]
   (b) What are three electric vectors? Establish a relation between them and explain the three electric vectors.　　　　　[1+4+2]

3. (a) What is a Del operator? Describe gradient, divergence and curl of a vector. [2+6]
   (b) Show that the vector field $\vec{A} = \frac{-2z^2y}{x^3}\hat{\imath} + \frac{z^2}{x^2}\hat{\jmath} + \frac{2yz}{x^2}\hat{k}$ is irrational. [2]

National Institute of Technology Patna
Department of Mathematics
Mid Semester Examination : September 2024

Course Name: *Calculus*

Program: B.Tech-M.Tech Dual degree (Mathematics & Computing Technology)

Duration: 2 Hrs

Course Code: MA17101

Full Marks: $3 \times 10 = 30$

Answer Any ~~four~~ three Questions

1. (a) State the Archimedean property of real numbers.
   Prove that if y be a positive real number then there exists a natural number m such that $0 < 1/2^m < y$.

   (b) Prove that the set of rational numbers is dense in the real line. Hence prove that the set of irrational numbers is also dense in the real line.

2. (a) Let $A \subset \mathbb{R}$ in the real line. Show that its derived set A^d consisting of all limit points of A is a closed set in $\mathbb{R}$.

   (b) Let $E \subset \mathbb{R}$ in the real line. Prove that the closure $\bar{E}$ os E is the smallest closed set containing E.

3. (a) Prove that a set A is closed in the real line if its complement is open.

   (b) Give the definition of a Cauchy series in $\mathbb{R}$. Prove that a sequence $\{x_n\}$ in $\mathbb{R}$ is convergent if it is a Cauchy sequence in the real line.

4. (a) State and prove the Bolzano-Weierstrass Theorem for sequence of real numbers.

   (b) If $s_1 = \sqrt{2}$ and

   $$s_{n+1} = \sqrt{2 + \sqrt{s_n}}, \quad (n = 1, 2, 3, ...).$$

   Prove that $\{s_n\}$ is convergent.

***** All the Best *****