Department of Electronics and Communication Engineering, NIT Patna

Mid Semester Examination

Elements of Electronics Engineering

B.Tech, Semester –I

Max Marks: 30 **Time: 2:00 Hrs.**

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.

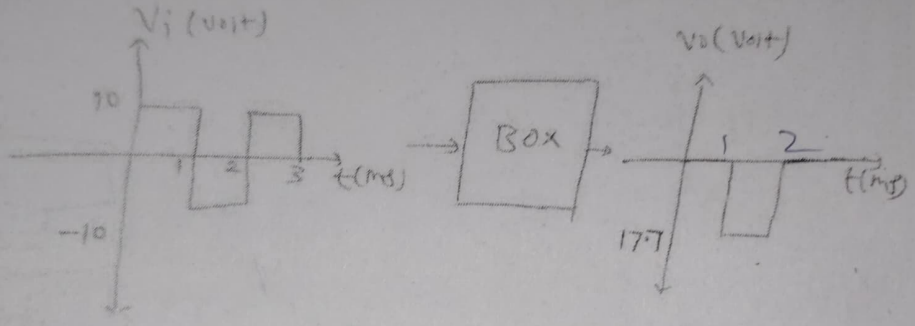


Fig. 1.

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:

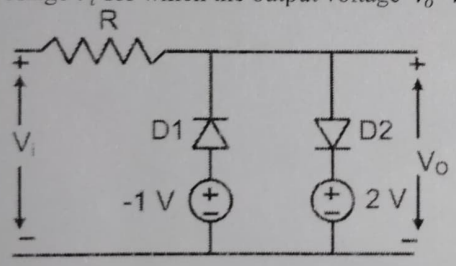
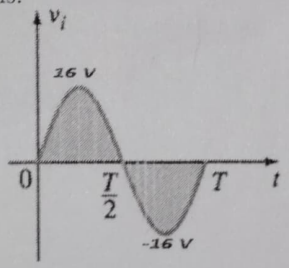


Fig. 2.



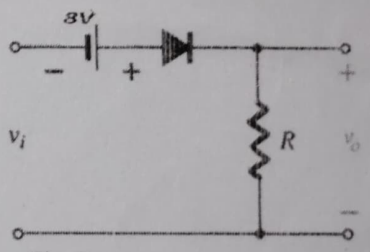


Fig. 3.

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.

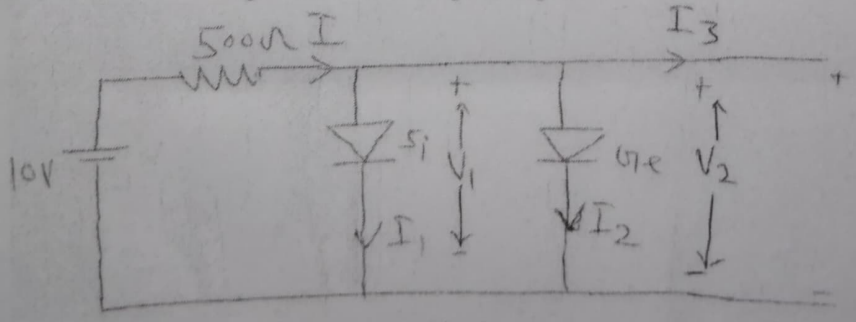


Fig. 4

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

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

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

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 TECHNOLGY PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Mid Semester Examination July - Dec 2024

B. Tech: **MST** **1st semester** Course Name: Intraduction to Computing
Course Code: **CS18101** Max. Marks: **30** Time: 2 Hours

Instructions:

1. Attempt all the questions.
2. Assume any suitable data, if necessary.
3. Answer all parts of the question at the same place.
4. **Marks will be deducted for unnecessary writing. Answer all the Questions in brief and precise.**

S.No.	Questions	Marks
1.	Which of the following are valid/invalid variable names and why? a. Plot#007 b. _NIT Patna c. NIT-Patna d. #NIT Patna e. 007 f. float	6*0.5=3
2.	Evaluate the following expressions. a. X= NIT/2 + NIT*4/NIT-NIT +TIN /3 (Assume NIT is 2.5, TIN is 2 and X is the floating point variable. b. Y= CET * MSE/2 +3/2 * MSE +2+ CSE (Assume CET is 4, MSE is 1 and CSE is 3.2 assume Y is the integer variable.	2
3.	Imagine you are employed at an organization, and your basic salary is entered via the keyboard. Your Dearness Allowance is 40% of your basic salary, your Transportation Allowance is 10%, and your House Rent Allowance is 20%. Write a C program to calculate your gross salary.	5
4.	Write a C program to compute the sum of the first **N** natural numbers, where **N** is an integer input by the user.	4
5.	Write a C program to calculate the factorial of a given number. The program should prompt the user to input a non-negative integer and then compute the factorial of that number. Factorial, denoted by **N!**, is the product of all positive integers from 1 to **N**, where **N** is the input number. By definition, the factorial of 0 is 1.	4

6	What would be the output of the following programs	6*2=12

a.
```
main()
{
 int x, y=30;
 x= (y>5 ? (y<=10? 100 : 200):
500);
 printf("%d", y);
}
```

b.
```
main()
{
 int x=5;
 (!x!=1? printf("NIT"):printf("patna"))
}
```

c.
```
main()
{
 int x = 4, y=0 , z;
 while (x>=0) {
   if( x==y)
     break;
   else
     printf(" \n %d and %d ",x
,y);
     x=x-1;
     y=y+1;
   }
 }
```

d.
```
int main()
{
   int x = 20, *y, *z;
  // Assume address of x is 500 and
  // integer is 4 byte size
  y = &x;
  z = y;
  *y++;
  *z++;
  x++;
  pintf("x = %d, y = %d, z = %d \n", x, y,
z);
 }
```

e.
```
main()
{
  int i = 6, *j, k;
  j = &i;
  printf("%d\n", i * *j * i + *j);
}
```

f.
```
main() {
 int i = 0;
  while (i < 10) {
  if (i == 4) {
   i++;
   continue;
  }
  printf("%d\n", i);
  i++;
 } }
```

*** END ***

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 : Oct 2024

MA18101 : Engineering Mathematics I

Branch: Material Science & Engineering (1^{st}-Semester) **Maximum Marks:** 30
Time: 02.00 hours

Answer all questions

1. For what value of λ, the equations

$$\begin{aligned} x+y+z &= 1 \\ x+2y+4z &= \lambda \\ x+4y+10z &= \lambda^2 \end{aligned}$$

have a solution. Solve them completely in each case. [5 Marks]

2. Reduce the matrix $A = \begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 1 & 3 & 1 \\ 0 & 2 & -2 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$ to Reduced Row Echelon Form(RREF), and find its rank. [5 Marks]

3. Find the inverse of the matrix, using Gauss-Jordan method: $\begin{bmatrix} 1 & 0 & 0 & 0 \\ a & 1 & 0 & 0 \\ a^2 & a & 1 & 0 \\ a^3 & a^2 & a & 1 \end{bmatrix}$. [5 Marks]

4. Find the determinant of the following matrix, $\begin{bmatrix} 3 & 0 & 0 & 1 \\ 0 & 2 & 0 & 5 \\ 6 & -7 & 1 & 0 \\ 3 & 2 & 0 & 6 \end{bmatrix}$. [5 Marks]

5. Show that following vectors in the polynomial space $P_2[x]$ are linearly independent, $p_1(x) = x^2 - 2x + 3$, $p_2(x) = 2x^2 + x + 8$ and $p_3(x) = x^2 + 8x + 7$. [5 Marks]

6. Determine a basis and dimension of $\mathbb{W} = \{[x, y, z, w]^t \in \mathbb{R}^4 \mid x + y - z + w = 0\}$. Also extend the basis to form the basis for $\mathbb{R}^4$.

*****ALL THE BEST*****

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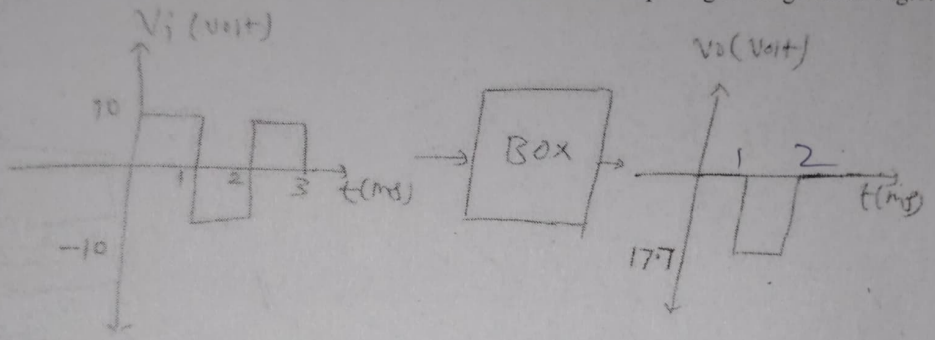

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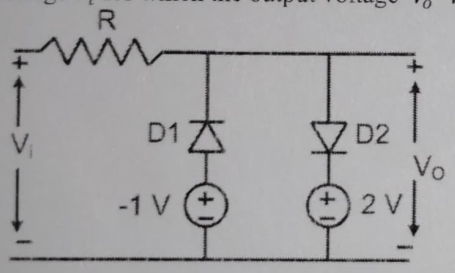

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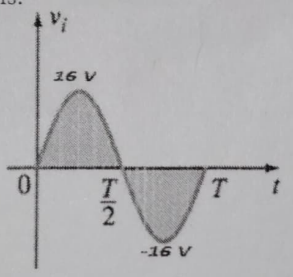

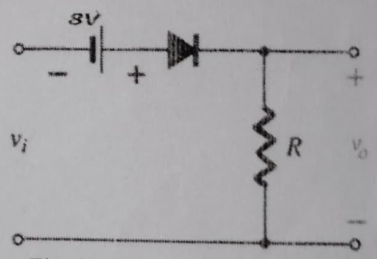

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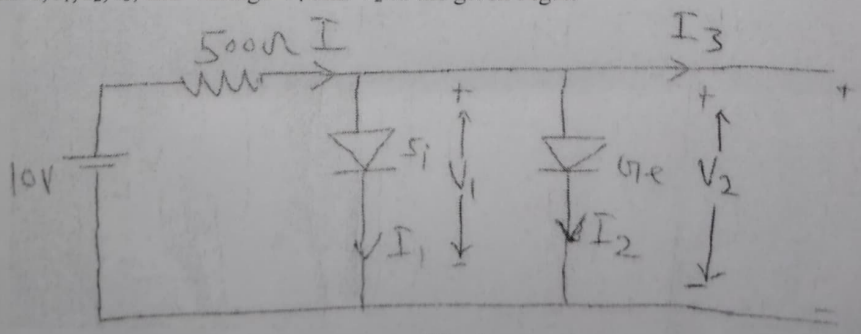

Fig. 4

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