Asha M. Tarsadia Institute of Computer Science and Technology

Uka Tarsadia University

B.Tech. Computer Science and Engineering (CSE) / B.Tech. C.E. Software Engineering, B.Tech. CSE (Cloud Computing, Cyber security, Artificial Intelligence and Machine Learning) / B. Tech Computer Engineering / B. Tech Information Technology

Unit Test – 1

Subject Name: Basics of Electrical and Electronics Engineering

Maximum Marks: 30 **Date: 23/11/2022**

Timing: 09:00 AM to 10.30 AM

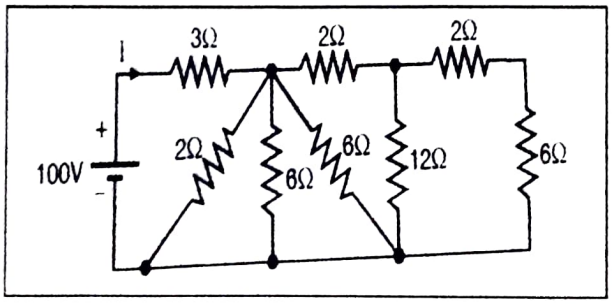
General Instructions:

1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions

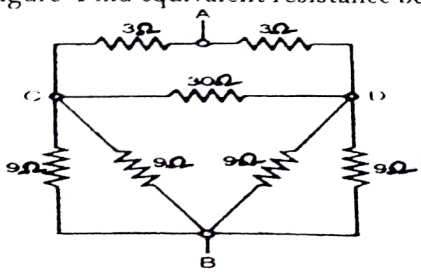
Q-1 **Answer the following in Brief (Any 2)** **(12)**

1 Explain effect of temperature on resistance of pure Metals, Alloys, Insulators and Semiconductors.'

2 Determine the Equivalent resistance and Total current I for the circuit shown in figure.



3 For the circuit shown in figure Find equivalent resistance between point A and B



Q-2 **Answer the following in Brief (Any 2)** **(12)**

1 Derive the expression of equivalent capacitor when group of capacitor connected in series and parallel.

2 A capacitor having capacitance of 8 uF is connected in series with a resistance a resistance of 2 MΩ across 200 volt d.c supply. Determine 1) The time constant. 2) The initial charging current. 3) Voltage across capacitor at t=0 sec. 4) Voltage across capacitor at t=4 sec. 5) Value of current at t=0 sec. 6) Value of current at t=4 sec, 7) The time taken by capacitor to raised up to 160 volt .

3 An iron ring of 60 cm mean circumference has a cross sectional area of 8 cm^2 and there is an air gap of 5mm width cut in the ring. The ring is wound with a coil of 1000 turns carrying of 2.5 A .The relative permeability of the iron is 750.
Find out 1) Reluctance of iron.2) Reluctance of air gap.3) Total Reluctance. 4) m.m.f.5) Total flux. .

Q-3 **Answer the following in Brief (Any 1)** (6)

1 Draw and explain generation of single phase AC waveform.

2 A coil of resistance 8 ohms and inductance 0.12 Henry is connected in series with a capacitor of 140 microfarads across 230v ,50Hz supply .Determine 1) Inductive reactance. 2) capacitive reactance.3) Impedance. 4) Total current. 5) Power factor. 6) Angle between current and resultant voltage. 7) Active power. 8) Reactive power. 9) Apparent power. 10) voltage Drop Across Resister. 11) Voltage drop across Inductor. 12) Voltage across capacitor. 13) phasor diagram.

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Unit Test – 1

Subject Name: (EN3008) Professional Communication

Maximum Marks: 30

Date: 23/11/2022
Timing: 01:30 pm to 03.00 pm

General Instructions:

1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions.

Q-1 (A) Do as Directed (Attempt all Questions) **(4)**

1 Enlist types of communication.
2 Define upward flow of communication.
3 What do you mean by extrapersonal communication?
4 Draw the diagram of Proxemics.

Q-1 (B) Answer the following in Brief (Any 3) **(6)**

1 Provide the meaning of Gesture and give suitable example.
2 What do you mean by technical communication? Provide examples.
3 Define Intra personal communication with example.
4 Differentiate between Verbal and Non verbal Communication.

Q-2 (A) 'Listening is the most important skills in communication'. Elaborate. **(10)**

OR

(A) Explain Emotional Outburst and Cultural Variations with reference to Interpersonal Barriers to communication.

(B) Discuss tips for effective listening.

OR

(B) Explain different types of barriers to listening.

Q-3 Answer the following (Any 2) **(10)**

1 Differentiate between Intensive and Extensive reading.
2 Provide the purposes of reading and explain the ways for improving comprehension skills.
3 **Read the following passage and answer the questions below.**
It is an indisputable fact that the world has gone too far with the innovation of new technologies such as mobile phones, the internet and so on, due to which people are able to tour the cosmos virtually sitting at one place using their smart devices or

other technological gadgets. Though mobile internet access is oftentimes hurried and short, it can still provide common internet features like alerts, weather data, emails, search engines, instant messages, and game and music downloading. Due to the easy access of smart phones, communication has been very effective and instant. People are able to convey their message all around the globe to their loved ones without spending hefty sums of money. Adults are always fond of such gadgets and they always welcome and adopt such new technology readily. Further, young people have been able to broaden their minds and improve their skills by doing research on the Internet. For instance, they use smart phones to look up any new word they come across. As we know that most of the universities have online teaching provisions and smart phones assist the students to complete their assignments on time.

The mobile phone has been a lifesaver for a lot of people in case of an emergency. Likewise, the use of smart phones can be of vital importance in preventing crimes in society by providing information to the security forces in time. Nonetheless, for the young, the use of mobile phones can be like an addiction and they can misuse it. Young people are also prone to getting involved in undesirable activities on the Internet. This might have an adverse effect on their academic performance. Therefore, young people should always be monitored and made aware of its bad outcomes.

Also, a major contributor to its popularity is the availability of prepaid or pays as you go services from a phone shop or an online store. This allows subscribers to load text or airtime credits to their handsets by the use of their credit cards, debit cards or by buying a prepaid card from the network they subscribe to. This plan also doesn't commit a particular customer to a contract. If the prepaid card is not that appealing to you, then you can opt to subscribe using the pay by month plan.

Questions:

1. How has the world advanced?
2. What are the benefits of mobile phones for the young generation?
3. How can mobile phones be considered 'lifesavers'?
4. Mention any one demerit of mobile phones.
5. Write the synonym of 'Innovation'.

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Unit Test – 1

Subject Name: Programming with C

Maximum Marks: 30 **Date: 24/11/2022**
Timing: 09:00 AM to 10.30 AM

General Instructions:
1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Flowcharts with pencil/black ink pen only.
4. Attempt all the questions.

Q-1 **Answer the following in brief. (Any 2)** **6**

1 Write the definition of operator. Enlist and define types operator.
2 Explain the features of C programming in detail.
3 Write an algorithm and draw a flowchart to check whether the given number is positive, negative and zero.

Q-2 **Answer the following in brief. (Any 3)** **12**

1 Write an algorithm and show the output of the following code:

```
#include<stdio.h>
void main()
{
    int a[]={1,2,3,4,5};
    for(int i=0; i<4;i++)
    printf("%d=a[%d]\n", i, a[i]);
}
```

2 Write a C program to find factorial of a user-entered number.
3 Differentiate entry-controlled loop and exit-controlled loop.
4 Write a C program to print Fibonacci series of N numbers.

Q3 **Answer the following in brief. (Any 3)** **12**

1 Write a C program to print the following pattern:

A
12
BCD
3456
EFGHI

2 Explain else... if ladder with its syntax, flowchart and example.
3 Write a C program to print sum and average of user-entered elements of an array.
4 What is string? Explain any three string functions each with an example.

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Unit Test – 1

Subject Name: Linear Algebra

Maximum Marks: 30 **Date: 24/11/2022**

Timing: 01:30 PM to 03.00 PM

General Instructions:

1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions.

Que-1 Answer the following (Any ONE) **(06)**

(1) Show that the vectors; $v_1 = \left(\frac{2}{3}, \frac{-2}{3}, \frac{1}{3}\right)$, $v_2 = \left(\frac{2}{3}, \frac{1}{3}, \frac{-2}{3}\right)$ and $v_3 = \left(\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right)$ are Orthogonal vectors.

(2) Apply Gram-Schmidt process to transform the basis vectors into an orthogonal basis:
$u_1 = (1,\ 1,\ 0)$, $u_2 = (1,\ 2,\ 0)$, $u_3 = (0,\ 1,\ 2)$

(3) Which pairs are orthogonal among the vectors v_1, v_2, v_3, v_4?

$$v_1 = \begin{bmatrix} 1 \\ 2 \\ -2 \\ 1 \end{bmatrix}, v_2 = \begin{bmatrix} 4 \\ 0 \\ 4 \\ 0 \end{bmatrix}, v_3 = \begin{bmatrix} 1 \\ -1 \\ -1 \\ -1 \end{bmatrix}, v_4 = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

Que-2 Answer the following (Any Two) **(12)**

(1) The 2 by 2 matrices A and B that have entries $a_{ij} = i + j$ and $b_{ij} = (-1)^{i+j}$ .Multiply them to findA^T, B^T, AB and BA.

(2) Find the pivots and the solution for these four equations:
$2x + y = 0$
$x + 2y + z = 0$
$y + 2z + t = 0$
$z + 2t = 5$

(3) Using Gauss-Jordan method, find the inverse of the matrix: $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$.

(4) Do as directed:

(i) Find the rank of the following matrix: $A = \begin{bmatrix} 1 & 2 & 1 \\ -2 & -3 & 1 \\ 3 & 5 & 0 \end{bmatrix}$.

(ii) Compute the product: $\begin{bmatrix} 4 & 0 & 1 \\ 0 & 1 & 0 \\ 4 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}$.

Que-3 Answer the following (Any THREE) **(12)**

(1) Determine the basis for the null space of system of linear equations:

$$x_1 + x_2 - 2x_3 = 0$$
$$-2x_1 - 2x_2 + 4x_3 = 0$$
$$-x_1 - x_2 + 2x_3 = 0$$

(2) Do as directed:

(i) Determine the dimension of the plane: $3x - 2y + 5z = 0$.

(ii) Write the standard matrix form of the transformation: $T(x, y, z) = (2x + y + z, \quad 3y, \quad x - 2z)$

(3) Find the dimension and basis for the four fundamental of subspaces for $A = \begin{bmatrix} 1 & 3 & 3 & 2 \\ 2 & 6 & 9 & 7 \\ -1 & -3 & 3 & 4 \end{bmatrix}$.

(4) Find the basis vector for row space and column space of

$$2x_1 + 3x_2 + 3x_3 = 2$$
$$5x_2 + 7x_3 = 2$$
$$6x_1 + 9x_2 + 8x_3 = 5$$

(5) Decide the dependence and independence of

(i) The vectors $(1, 3, 2), (2, 1, 3)$ and $(3, 2, 1)$.

(ii) The vectors $(1, -3, 2), (2, 1, -3)$ and $(-3, 2, 1)$.

(iii) The vectors $(2, 2, 1), (-4, 6, 5)$ and $(1, 0, 0)$.

ALL THE BEST

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Unit Test – 1

Subject Name: PY3007 - Physics

Maximum Marks: 30

Date: 25/11/2022
Timing: 01:30 PM to 03:00 PM

General Instructions:

1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions.

Q-1	**A**	**Answer the following in brief. (Any 5)**	**05**
	1	What is meant by LASER?	
	2	Define the terms: 1. Population Inversion 2. Absorption	
	3	Distinguish between Spontaneous and Stimulated emission	
	4	State the principle of Optical fiber.	
	5	Why do electrons not stay for longer time in excited state and start come down after absorption process?	
	6	What should be the proportion of gases in He-Ne Laser?	
Q-1	**B (a)**	**Answer the following in brief. (Any 4)**	**08**
	1	Write the formula of V – Number and state its physical signification.	
	2	Why do cladding and protective jacket is important in optical fiber?	
	3	Distinguish between Step Index and Graded Index optical fiber.	
	4	Write short note with neat and clean sketch of Nd – YAG Laser.	
	5	List out the characteristics of Laser.	
	6	An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.55. Determine the acceptance angle for the fiber in water has a refractive index 1.33.	
	B (b)	Explain working of CO_2 Laser with neat sketch with all necessary terms.	**03**
Q-2	**A**	**Answer the following in brief. ~~(Any 2)~~ Both**	**02**
	1	Define the terms: 1. Fermi Energy 2. Density of states	
	2	Distinguish between Intrinsic semiconductor and Extrinsic semiconductor	

Q-1	B (a)	**Answer the following in brief. (Any 3)**	12
	1	Derive the expression of Kronig and Penny model also check the conductivity conditions.	
	2	Derive the equation of Fermi – Dirac distribution function.	
	3	Explain the Hall effect with neat sketch also derive the equation of Hall Voltage (V_H).	
	4	Derive the equation of effective mass also with graph explain what is positive effective mass and negative effective mass.	

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Unit Test – 2

Subject Name: Basics of Electrical and Electronics Engineering

Maximum Marks: 30

Date: 29/12/2022
Timing: 09:00 AM to 10.30 AM

General Instructions:

1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions

Q-1 **Answer the following in Brief (Any 2)** **(12)**

1 Draw and explain V-I Characteristics of pn junction.

2 Draw and explain full wave bridge rectifire circuit.

3 A crystal diode is used for half wave rectification. If the applied voltage is 50 volt (rms) and load resistance RL = 800 ohm. Find (1) Vm (2) I_m (3) I_{rms} (4) I_{dc} (5) V_{dc} (6) PIV (7) P_{dc} (8) P_{ac} (9) efficiency of rectification (10) ripple factor 11) Output frequency

Q-2 **Answer the following in Brief (Any 2)** **(12)**

1 Draw and explain characteristics of common base transistor connection.

2 In common emitter circuit R_B=47 kΩ, R_C=330 Ω, V_{BB}=10 v, Vcc =20 v, V_{BE}=0.7 v, ß=200. Determine 1) I_B 2) I_C 3) V_{CE} 4) Q point 5) Draw the d.c load line.

3 Draw and explain working of pnp and npn Transistor.

Q-3 **Answer the following in Brief (Any 1)** **(6)**

1 Draw and explain the circuit diagram of series wiring.

2 Write a short note on MCB.

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Unit Test – 2

Subject Name: (EN3008) Professional Communication

Maximum Marks: 30 **Date: 29/12/2022**

Timing: 01:30 PM to 03.00 PM

General Instructions:

1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions

Q-1 Do as Directed **(10)**

1) A group of boys _____at the table. (Be+ sit)
2) Change the following sentences in to simple past tense: She is writing a report now.
3) Improve the sentence: Rita have playing badminton since morning.
4) Rewrite the following sentences choosing the correct verb form. A few of girls (have + do) their homework.
5) Make the sentence using given homophones. (pair, pear)
6) Identify tense of following sentences. This building had been destroyed by the fire.
7) Join the sentence: Dhuti tried hard to get it done. It was not possible for her.
8) Fill in the blank with proper article. Gita is reading _____ Geeta .
9) Change the voice: Ragini wrote a letter yesterday.
10) Make sentences using homonyms: (date, date)

Q-2 Answer the following (Any 2) **(10)**

1 Prepare 12 slides on the following subject: Science and inventions.
2 Discuss in detail outlining Presentation and Visual Aids.
3 Evaluate modes of presentations in detail providing its advantages and disadvantages of each.

Q-3 Answer the following (Any 2) **(10)**

1 As a Manager of the Soulfit computers Ltd., you conducted an inspection of your building for Covid compatible organization. Write a Memo report to be submitted to a Branch manager about your findings and suggestions.
2 Write a letter to the Purchase Manager of IDBI Bank, Surat responding to any inquiry for LAN Solutions.
3 Create your own resume including all the necessary details of your skills and achievements.
4 Write an Essay on: Computers and Education.

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Unit Test – 2

Subject Name: Programming with C

Maximum Marks: 30 **Date: 30/12/2022**
Timing: 09:00 AM to 10.30 AM

General Instructions:
1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions.

Q-1		**Answer the following in brief. (Any 3)**	**6**
	1	define global variable, local and static variable with example.	
	2	Explain function recursion with example.	
	3	WAP to count simple interest using function.	
	4	Differentiate the method call by value and call by reference with example.	
Q-2		**Answer the following in brief. (Any 4)**	**12**
	1	How to print the addressof variable using pointer ? explain with example.	
	2	Write an example of pointer to pointer with program.	
	3	Write a c program of traversing an array using pointer.	
	4	What is pointer variable? what is its purpose?	
	5	Write a c program to read character string using pointer.	
Q-3		**Answer the following in brief. (Any 4)**	**12**
	1	Define structure syntax. Why we need of structure?	
	2	WAP to create structure of book with book title, author name, publication, and price. Read data of n books and display them.	
	3	Define a structure student_record to contain name, branch, and total marks obtained and read data for 5 students in a class and print them.	
	4	What is file? Why we need file management system?	
	5	Write different types of file operating mode in c with detail.	

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Unit Test – 2

Subject Name: Linear Algebra

Maximum Marks: 30

Date: 29/12/2022
Timing: 01:30 PM to 03.00 PM

General Instructions:

1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions.

Que-1 Answer the following (Any ONE) **(06)**

(1) Write the minor and co-factors of the element of the determinant, $A = \begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$.

(2) Find the inverse of the matrix, $A = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 0 & 3 \\ 2 & -3 & 0 \end{bmatrix}$.

(3) Solve the equations by using Cramer's rule: $3x - 2y + z = 2$
$x + 3y - 2z = 2$
$2x - y + z = 2$

Que-2 Answer the following (Any Two) **(12)**

(1) Find Eigen value of $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ also find the Eigen value of (i) $A^2 - 2A + I$ (ii) $A^3 + I$ (iii) $Adj\ A$

(2) Find diagonalizable of the matrix: $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$

(3) Do as directed:

(i) Solve the linear differential equation by using Eigen value and Eigenvector:

$$\frac{dx}{dt} = x - 3y$$

$$\frac{dy}{dt} = 2y$$

(ii) If $A = \begin{bmatrix} 2 & 3+4i \\ 3-4i & 4 \end{bmatrix}$ complex matrix then prove that the matrix A is Hermitian matrix.

(4) Do as directed:

(i) If $T = \begin{bmatrix} b & 2 \\ -1 & 3 \end{bmatrix}$, $A = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$ and $B = \begin{bmatrix} 5 \\ 8 \end{bmatrix}$ then find the value of b.

(ii) Find the new vector formed for the vector $\begin{bmatrix} -3 \\ 2 \end{bmatrix}$ with the help of the transformation matrix $\begin{bmatrix} 3 & -1 \\ 4 & -5 \end{bmatrix}$.

(iii) Find the Eigen value of $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$.

Que-3 Answer the following (Any THREE) **(12)**

(1) Find the maximum and minimum values of $f(x) = x^3 - 18x^2 + 96x$

(2) Do as directed:

(i) Test the positive definiteness of the matrix, $A = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 0 & 3 \\ 2 & -3 & 0 \end{bmatrix}$.

(ii) Convert the companion matrix into minimal polynomial, $A = \begin{bmatrix} 0 & 0 & 0 & 2 \\ 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 8 \\ 0 & 0 & 1 & -7 \end{bmatrix}$.

(3) Find Singular value decomposition (SVD) of the matrix, $A = \begin{bmatrix} 5 & 3 \\ 1 & 3 \end{bmatrix}$.

(4) Solve the following by using Finite Element Method:

(i) $\frac{dy}{dx} = x^3 - xy + x$ and $y(0) = 2$

(ii) $\frac{dy}{dx} = x^3 y - 4y$ and $y(1) = 0$

(5) Convert the polynomial into companion matrix:

(i) $p(x) = x^3 - 5x^2 + 4x - 3$

(ii) $p(x) = x^3 + 3x^2 + 2x + 4$

(iii) $p(x) = x^4 - x^3 - 2x^2 + 3$

ALL THE BEST

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Unit Test – 2

Subject Name: PY3007 - Physics

Maximum Marks: 30

Date: 31/12/2022
Timing: 09:00 AM to 10:30 AM

General Instructions:
1. Take appropriate assumptions whenever necessary.
2. Figures on the right indicate full marks allocated to the questions.
3. Draw Diagrams/Figures with pencil/black ink pen only.
4. Attempt all the questions.

Q-1	A	**Answer the following in brief. (Any 2)**	03
	1	Find the mean, median, variance and average deviation for the following data: 57, 64, 43, 67, 49, 59, 44, 47, 61, 59	
	2	Fit the data in the line curve using least square method: (0,2), (2,0), (3,2), (5,3)	
	3	Explain the noise ratio and noise figure.	
Q-1	B	**Answer the following in brief. (Any 2)**	04
	1	Enlist the types of errors and explain Gross error.	
	2	Estimate the spring modulus k from the force F (N) and the elongation x (m), where (F, x) = (1, 0.3), (2, 0.7), (4, 1.3), (6, 1.9), (10, 3.2), (20, 6.3).	
	3	Explain the shot noise.	
	4	Find the absolute, relative and percentage (%) errors. The true value is 125.68 mm and the measured value is 119.66 mm.	
Q-2	A	**Answer the following in brief. (Any 2)**	04
	1	State the equation of wave? Introduce all symbols of it.	
	2	A wave travelling along a string is described by, $y(x,t)=0.005\sin(80.0x-3.0t)$, in which the numerical constants are in SI units (0.005 m, 80.0 rad m^{-1} and 3.0 rad s^{-1}). Calculate :(a) the amplitude (b) the wavelength	
	3	Define wavelength and wave number.	
Q-2	B	**Answer the following in brief. (Any 2)**	03
	1	Enlist the differences between longitudinal wave and transverse wave.	
	2	Explain principle of superposition of waves.	
	3	Explain reflection of wave.	

Q-3		**Answer the following in brief. (Any 2)**	05
	1	State both Maxwell's equations and Derive any one of them.	
	2	Discuss the Hertz's discovery of electromagnetic waves experiment with neat diagrams	
	3	Derive the integral form of Maxwell's equations.	
Q-4	A	**Answer the following in brief.**	06
	1	Interpret the de Broglie's hypothesis.	
	2	Justify why electron cannot exist in the nucleus.	
	3	Write the mathematical expression for the Photoelectric effect.	
Q-4	B	**Answer the following in brief. (Any 2)**	05
	1	Derive the time-independent Schrodinger's wave equation.	
	2	Describe in detail the Compton effect in brief.	
	3	What is Photoelectric effect? Also, describe any TWO important conclusions derived from the Photoelectric effect.	
	4	Explain with neat sketch the electron beam pass through single slit experiment as the application of Heisenberg uncertainty principal	

UKA TARSADIA UNIVERSITY

B.Tech (Computer Engineering)/B.Tech (Information Technology)/B.Tech CE (Software Engineering)/B.Tech CSE/B.Tech CSE (AI&ML)/B.Tech CSE (Cloud Computing)/B.Tech CSE (Cyber Security) (Semester 1)

MT3021(2021-22)/MT3021(2022-23)

Linear Algebra

Date :02/01/2023 **Time :**9:30AM- 12:30PM

Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 A) Answer the following in brief (Any 1) [2]

I) Find orthogonal projection 'b' on 'a' for the vectors $\bar{a} = (1,0,0)$ and $\bar{b} = (-6,2,1)$

II) Show that the vectors $u_1 = \left(\frac{1}{4},\frac{1}{4},\frac{1}{4}\right), u_2 = \left(\frac{-1}{3},\frac{1}{3},0\right)$ and $u_3 = \left(\frac{1}{2},\frac{1}{2},-1\right)$ are orthogonal vectors.

Q 1 B) Answer the following (Any 1) [4]

I) Find the least square solution of the linear system AX=b is given by

$$2x_1 + x_2 = 3$$
$$-x_1 + x_2 = 1$$
$$-x_1 + 2x_2 = -3$$

Also find orthogonal projection of 'b' on the column space of A.

II) Use Gram-Schmidt orthonormalization process to transform the basis vectors $u_1 = (1,1,0), u_2 = (1,2,0)$ and $u_3 = (0,1,2)$ into an orthonormal basis.

Q 2 A) Answer the following. [2]

I) Define upper triangular matrix with an example.

II) If $A=\begin{bmatrix}1 & -3 & 9\\ 4 & 8 & 7\\ 2 & -6 & 5\end{bmatrix}$, then find A^T.

Q 2 B) Answer the following. (Any 2) [10]

I) Solve the following system of linear equations by using Gauss-Elimination Method.

$$2x_1 + x_2 + x_3 = 5$$
$$4x_1 - 6x_2 = -2$$
$$-2x_1 + 7x_2 + 2x_3 = 9$$

II) Using Gauss-Jordan method, find the Inverse of the following matrix.

$$A=\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$$

III) Find the Rank of the following matrix.

$$\begin{bmatrix}5 & 3 & 0\\ 1 & 2 & -4\\ -2 & -4 & 8\end{bmatrix}$$

Q 3 A) Answer the following. [2]

I) Write the standard matrix form of $T(x,y) = (3x + 4y, -2x - 5y)$

II) Write the dimension of a plane ?

Q 3 B) Answer the following. (Any 2) [10]

I) Determine the basis for the null space of the following matrix.

$$x_1 - 3x_2 + x_3 = 0$$
$$2x_1 - 6x_2 + 2x_3 = 0$$
$$3x_1 - 9x_2 + 3x_3 = 0$$

II) Determine the basis for the row and column space of the following matrix.

$$A = \begin{bmatrix} 1 & 4 & 5 & 2 \\ 2 & 1 & 3 & 0 \\ -1 & 3 & 2 & 2 \end{bmatrix}$$

III) Determine the dimension of the plane $3x - 2y + 5z = 0$

SECTION - 2

Q 4 A) Answer the following in brief (Any 1) [2]

I) Find the determinant of $\begin{vmatrix} 1 & 2 & 3 \\ 4 & -3 & 0 \\ -5 & 1 & 3 \end{vmatrix}$

II) Find Minor and cofactor of $\begin{vmatrix} 1 & 4 \\ 3 & -1 \end{vmatrix}$

Q 4 B) Answer the following (Any 1) [4]

I) Find the **Inverse** of the matrix $\begin{bmatrix} 1 & 2 & 1 \\ 1 & 0 & 3 \\ 2 & -3 & 0 \end{bmatrix}$

II) Solve the following system of linear equations by using **CRAMER'S RULE.**

$$2x - y + 3z = 1$$
$$x + y + z = 2$$
$$x - y + z = 4$$

Q 5 A) Answer the following. [2]

I) If $\lambda = 2,3,4$ then find Eigen value of A^{-1}.

II) What is the Eigen value of a triangular matrix?

Q 5 B) Answer the following. (Any 2) [10]

I) Find the Eigen value and Eigen vector of the matrix $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

II) Find the Eigen value of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ and also find Eigen values of

i) $A^3 + I$ ii) A^{-1} iii) adj A iv) $A^2 - 2A + 2$

III) Solve the following differential equation by using Eigen value and Eigen vector.

$$\frac{dx}{dt} = 4x - y \qquad \frac{dy}{dt} = 2x + y$$

Q 6 A) Answer the following. [2]

I) Test of Positive Definiteness of the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

II) Write the companion matrix of the polynomial $P(x) = x^3 + 3x^2 + 2x + 4$

Q 6 B) Answer the following. (Any 2) [10]

I) Find the minimum and maximum values of the function $f(x) = x^3 - 18x^2 + 96x$

II) Find the Singular Value Decomposition of the matrix $A = \begin{bmatrix} 5 & 3 \\ 1 & 3 \end{bmatrix}$

III) Solve : $\frac{dy}{dx} = x^2 - y$ and $y(0) = 1$ by using Finite Element Method.

UKA TARSADIA UNIVERSITY

B.Tech (Computer Engineering)/B.Tech (Information Technology)/B.Tech CE (Software Engineering)/B.Tech CSE/B.Tech CSE (AI&ML)/B.Tech CSE (Cloud Computing)/B.Tech CSE (Cyber Security) (Semester 1)
IT3006(2021-22)/IT3006(2022-23)
Programming with C

Date :04/01/2023 **Time** :9:30AM- 12:30PM
Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 A) Define keyword and describe three types of keywords available in C language. [6]

OR

Q 1 A) Explain symbolic constant with an example.

Q 2 A) Answer the following in brief. (Any 1) **[2]**

I) Write an output of the following C code:

```
int i=1;
switch(i-2)
{
case 1: printf("Integer");
case -1: printf("Float");
}
```

II) Write an output of the following C code:

```
int x=1;
while(x==1)
{
x = x - 1;
printf("%d\n", x);
}
```

Q 2 B) Answer the following in detail. (Any 2) **[10]**

I) Explain for loop with its syntax, flowchart and an example.

II) Write a C code to print all the even numbers between 1 to 500 using while loop.

III) Write a C code to print following pattern:

```
1 2 3 4 5
2 3 4 5
3 4 5
4 5
5
```

Q 3 A) Answer the following in brief. (Any 1) **[2]**

I) Differentiate getchar() and gets() functions.

II) Describe memory layout of a string.

Q 3 B) Answer the following in detail. (Any 2) **[10]**

I) Write a C program to accept a string and find the number of vowels in it.

II) Write a C program to arrange array of N elements into descending order.

III) Write a C program to print sum and average of all elements of an array.

SECTION - 2

Q 4 A) Explain the elements of the function. [6]

OR

Q 4 A) Explain multiple return values concept with an example.

Q 5 A) Answer the following in brief. (Any 1) **[2]**

I) Enlist the advantages of pointer in C language.

II) Explain '&' operator.

Q 5 B) Answer the following in detail. (Any 2) **[10]**

I) Write a C program to perform swapping of two elements using pointers.

II) Explain memory representation of a pointer variable.

III) Explain the concept of pointers with character strings.

Q 6 A) Answer the following in brief. (Any 1) **[2]**

I) Describe why structure is called a heterogenous data type.

II) How structure is different from an array?

Q 6 B) Answer the following in detail. (Any 2) **[10]**

I) Write a C program to read a line from a text file and print it on terminal.

II) Explain fopen() function with respect to each file mode.

III) Define a structure type student that would contain student name, student id and branch. Using this structure write a C program to read information of one student and display on terminal.

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B.Tech (Computer Engineering)/B.Tech (Information Technology)/B.Tech CE (Software Engineering)/B.Tech CSE/B.Tech CSE (AI&ML)/B.Tech CSE (Cloud Computing)/B.Tech CSE (Cyber Security) (Semester 1)
PY3007(2021-22)/PY3007(2022-23)
Physics

Date :06/01/2023 **Time :**9:30AM- 12:30PM
Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 A) Answer the following. [1]

I) Enlist the sources of noise.

Q 1 B) Answer the following in brief(Any two) [4]

I) Find out the absolute, relative and percentage (%) errors, where the true and measured values are 252.14 mm and 249.02 mm respectively.

II) Explain the systematic errors.

III) Find the standard deviation: 2, 3, 3, 8, 10, 10

Q 1 C) Answer the following in detail(Any one) [4]

I) Estimate the spring modulus k from the force F (N) and the elongation x (m), where (F, x) = (1, 0.3), (2, 0.7), (4, 1.3), (6, 1.9), (10, 3.2), (20, 6.3).

II) Find the mean, median, variance and average deviation for the following data:
57, 64, 43, 67, 49, 59, 44, 47, 61, 59

Q 2 A) Answer the following. [1]

I) What is the reciprocal of resistance and what is its unit?

Q 2 B) Answer the following in brief(Any two) [4]

I) Differentiate between classical free electron theory and quantum free electron theory.

II) Explain the optical response in brief.

III) Explain the term 'density of states'.

Q 2 C) Answer the following in detail(Any one) [4]

I) Discuss the Hall effect and derive the necessary equations.

II) Discuss the Fermi level in intrinsic semiconductors with necessary equations.

Q 3 A) Answer the following [2]

I) What is full form LASER?

II) What is the principle of optical fibre?

Q 3 B) Answer the following in brief(Any one) [2]

I) What are the characteristics of laser?

II) what are the advantages of an optical fibre?

Q 3 C) Answer the following in detail(Any two) [8]

I) Derive the ratio of spontaneous and stimulated emission rates.

II) Write short note on Co2 laser (without vibration modes).

III) Explain single mode optical fibre and multimode optical fibre.

SECTION - 2

Q 4 A) Answer the following. [1]

I) Define wave.

Q 4 B) Answer the following in brief(Any two) [4]

I) Enlist types of waves with at least one example.

II) Write is the equation of wave? Introduce all symbols of it.

III) Enlist classification of sound wave based on frequency.

Q 4 C) Answer the following in detail(Any one) [4]

I) Explain principle of superposition of waves.

II) A steel wire 0.72m long has a mass of 5.0×10^{-3} kg. If the wire is under a tension of 60 N, what is the speed of transverse wave on the wire?

Q 5 A) Answer the following. [1]

I) Write the Maxwell's equation that indicates non-existence of magnetic monopoles.

Q 5 B) Answer the following in brief(Any two) [4]

I) Derive the Faraday's law and Gauss's law in the differential form.

II) Describe the radiation pressure in brief.

III) Interpret the Ampere's law and how Maxwell modified it.

Q 5 C) Answer the following in detail(Any one) [4]

I) Describe the wave equation by applying the Maxwell's equations.

II) Interpret the concept of a plane electromagnegic wave. Derive the second order differential equation of an electromagnetic wave by using Maxwell's equations.

Q 6 A) Answer the following [2]

I) For a wavefunction Ψ, $d\Psi/dx$ must be zero. True or False?

II) The de Broglie wavelength of a moving particle is proportional to the speed of the particle. True or False?

Q 6 B) Answer the following in brief(Any one) [2]

I) Describe the Compton effect in brief.

II) Explain the de Broglie's hypothesis in brief.

Q 6 C) Answer the following in detail(Any two) [8]

I) Write a short note on: (i) momentum operator (ii) energy operator

II) An electron has a speed of 400 m/s with an accuracy of 0.004%. Calculate the certainty with which we can locate the position of the electron.

III) Interpret the concept of time-independent Schrodinger's wave equation and derive it.

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B.Tech (Computer Engineering)/B.Tech (Information Technology)/B.Tech CE (Software Engineering)/B.Tech CSE/B.Tech CSE (AI&ML)/B.Tech CSE (Cloud Computing)/B.Tech CSE (Cyber Security) (Semester 1)

EL3002(2021-22)/EL3002(2022-23)

Basics of Electrical and Electronics Engineering

Date :09/01/2023 **Time :**9:30AM- 12:30PM

Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 Answer the following (Any 1) [6]

I) What is average value? Explain analytical and graphical method to obtain average value.

II) A coil of 10 ohm resistance and 0.1 H inductance is connected in series across 200 v, 50 Hz supply. calculate: (1) Inductive reactance (2) Impedance (3) Total current (4) power factor (5) phase angle between resultant voltage and current (6) voltage across resister (7) voltage across inductor (8) draw the vector diagram.

Q 2 Answer the following in detail. (Any 2) [12]

I) Derive the expression of voltage when capacitor is charging.

II) State and explain laws of electromagnetic induction and also state the rule which determine the direction of the induced emf .

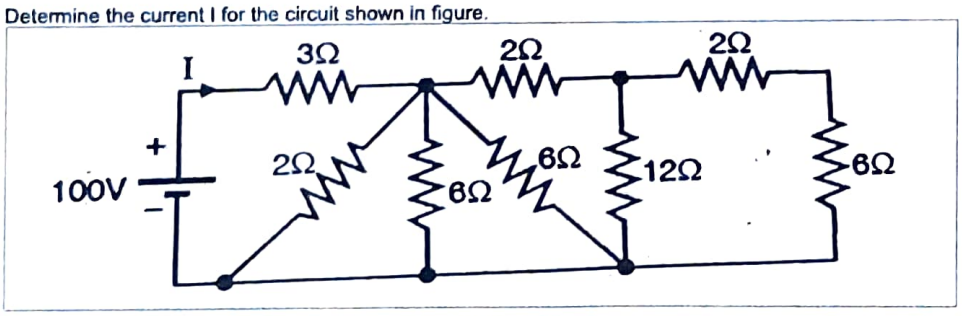
III) Write a short note on magnetic hysteresis.

Q 3 Answer the following in detail. (Any 2) [12]

I) Explain comparision between series and parallel circuits.

II) What is Network or circuit? Explain concept of open and short circuit also write the relation between voltage, current and resistance.

III) Determine the current I for the circuit shown in figure.



SECTION - 2

Q 4 Answer the following (Any 1) [6]

I) Which are the different types of wiring? Draw the circuit diagram of Parallel wiring and explain in detail.

II) Write a short note on Fuse. Draw the circuit diagram of main and control board wiring.

Q 5 Answer the following in detail. (Any 2) [12]

I) Draw and explain common base transistor connection. What is current amplification factor? Derive the expression for collector current.

II) Explain factor effecting performance of transistor amplifier.

III) Determine Vcb in common emitter configuration of transisitor circuit. The transistor is of silicon and has beta =150, Vbb =5 V, Vcc = 10 V, Rc =100 ohm and Rb =10 kilo ohm.

Q 6 Answer the following in detail. (Any 2) [12]

I) Draw and explain centre tap full wave rectifier. Derive the equation of efficiency of full wave rectifier.

II) Draw and explain Light Emitting Diode (LED).

III) A full wave center tapped rectifier has an alternating supply voltage is 24 v (rms) and load resistance is 480 ohm. Find (1) Im (2) Irms (3) Idc (4) Vdc (5) Vrms (6) Pac (7) Pac (8) efficiency of rectification (9) ripple factor.

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B. Arch/B. Des./B.A (English)/B.A (JMC)/B.C.A (Hons)/B.I.D/B.Sc. (Biotechnology)/B.Sc. (Chemistry)/B.Sc. (IT)/B.Sc. (Microbiology)/B.Tech (Automobile)/B.Tech (CE)/B.Tech (Chemical)/B.Tech (Civil)/B.Tech (Computer Engineering)/B.Tech (EC)/B.Tech (Electrical)/B.Tech (ICT)/B.Tech (Information Technology)/B.Tech (IT)/B.Tech (Mechanical)/B.Tech (Mechatronics)/B.Tech CE (Software Engineering)/B.Tech CSE/B.Tech CSE (AI&ML)/B.Tech CSE (Cloud Computing)/B.Tech CSE (Cyber Security)/BCA/BCA (Honors)/BPT/D.A.A./Integrated M.Sc. (Biotechnology)/Integrated M.Sc. (Chemistry)/Integrated M.Sc. (IT)/Integrated M.Sc. (Mathematics)/Integrated M.Sc. (Microbiology)/Integrated M.Sc. (Physics)/MCA (Integrated) (Semester 1)

EN0002(2021-22)/EN3008(2019-20)/EN3008(2020-21)/EN3008(2021-22)/EN3008(2022-23)

ENGLISH COMMUNICATION/Professional Communication

Date :11/01/2023

Time :9:30AM- 12:30PM

Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 A) Answer the following. [4]

I) What is meant by Communication?

II) Define upward flow of communication.

III) What is the difference between Professional Communication and Communication in general?

IV) State the levels of communication.

Q 1 B) Answer the following in brief. (Any 3) [6]

I) What is blocked categories in cotext to barriers to communication?Give one example.

II) Define Kinesics and provide an example.

III) State the reason why non verbal communication is important

IV) "Oral communication is more effective than written communication." is this statement correct? Why?

Q 2 Answer the following. [10]

A) Mention traits of a good listener and discuss any two with example.

OR

A) Explain limited vocabulary and emotional outburst as barriers to communication.

B) Describe a situation in your personal life where poor listening skills created a problem, then analyse, what went wrong in terms of listening and how?

OR

B) Explain the following terms with reference to communication barriers and give one example for each.
1. Know it all attitude
2. Informational overload

Q 3 Answer the following in detail. (Any 2) [10]

I) Compare and contrast between types of reading skills 1) skimming & Scanning 2) Intensive & extensive

II) Discuss in detail important points for improving comprehension skills.

III) Read the following passage and answer the questions:

The coyote is a relative of the dog, wolf and jackal. Like its relatives, it is a predator and mostly eats other mammals. It will, however, eat a wide variety of foods, including insects, fruits and vegetables. Coyotes are found throughout most of North America, from Mexico and Central America to Canada and Alaska. The color of its coat depends on where it lives. Mountain coyotes are darker than those living in the desert. Like the wolf, coyotes live in groups, or packs. The pack is usually smaller in number than a wolf pack. All members of the pack are usually related. The pack will often divide into pairs to hunt. Female coyotes have a litter of pups once a year. A litter has an average of six pups. Over half of the pups will die before they reach adulthood. Male pups usually leave the pack to fi nd their own territory. Female pups stay with the parent's pack. Wolves and coyotes compete for the same prey animals. Since the coyote is smaller than the wolf, wolves will usually drive the coyote out of any shared territory. The coyote adapts easily to new areas. Unlike the buffalo or wolf, the coyote's range increased after human populations expanded across the continent. For example, the coyote was not native to New England. Once the New England settlers eliminated wolves, however, the coyote moved in. Scientists who have studied the coyote believe it is better than the wolf at living in human areas. Coyotes are now found in most large urban areas. They find an abundant supply of food in these areas, since coyotes are willing to eat garbage, rodents and even small pets, such as cats. Scientists estimate that as many as 2,000 coyotes may be living in the Chicago area. Because of its adaptability, the coyote is not an endangered species, or even a threatened species. It has been classifi ed as "least concern," which means it has the lowest risk of extinction.

1.Differentiate between various types of coyotes.
2.Mention similarity between wolf and coyotes.
3.Provide the meaning of 'to drive out' according to the passage.
4.What is the difference between a male and a female pup in a pack?
5.Write about coyote's adaptability.

SECTION - 2

Q 4 A) Answer the following. [4]

I) How do you prepare before delivering a presentation? Enlist four points

II) Mention four rules for creating an effective presentation.

Q 4 B) Answer the following in detail. (Any One) [6]

I) Discuss in detail Importance of : 1) visual aids in presentation 2) Nonverbal aspects in presentation

II) Prepare a 12 slides Presentaion on the topic: Mass media abuse in India

Q 5 I) She has hurt my sentiments.(Identify tense) [10]
II) My cousin is leaving tomorrow.(Change the sentence into Past continuous tense)
III) By this time tomorrow, I _____my lecture in your institute.(deliver) (Use appropriate verb form in the bracket)
IV) She is believe to be an India.(Improve the sentence)
V) I am reading a book now.(Change the voice)
VI) Walk (on/in)footsteps of your father.(Choose the correct preposition from the bracket and rewrite sentence)
VII) 1.Die 2.Dye(Use given Homonyms in a sentence each)
VIII) 1.Wave 2.wave (Use given Homophones in a sentence each)
IX) Honesty is .....policy. (Use the proper article)
X) Roma has been doing her work since today morning. (Change the sentence into Simple Present Tense)

Q 6 Answer the following in detail. (Any 2) [10]

I) Draft a complaint letter about a delay in order of Mobile phones.

II) Discuss characteristics and types of report in detail.

III) Write a paragraph on – Problems of Online education during Pandemic in India.