Indian Institute of Information Technology Una [HP]
An Institute of National Importance under MoE
Saloh, Una (HP) – 177 209

Website: www.iiitu.ac.in

AY 2022-23
School of Electronics and Communication Engineering
Cycle Test – I
4th January 2023

Degree	B. Tech.	**Branch**	ECE
Semester	I		
Subject Code & Name	ENC 125: Communication Skills		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

S. No.	Question	Marks
1.a	Explain psychological barriers to communication.	(1)
1.b	Define any of the following **two** concepts: 1. Kinesics 2. Paralinguistics 3. Proxemics	(2)
1.c	Writing and Reading are different in terms of their execution. Explain.	(2)
2.a	Write down at least two positive facial expressions.	(1)
2.b	What is the difference between Homophone and Homograph? Provide at least four examples in support of the answer.	(2)
2.c	Explain Encoding in communication with proper examples.	(2)
3.a	Write down at least formal words for the following words: 1. Same 2. Hurt	(1)
3.b	Apply the rules of Present Indefinite to the following sentences: 1.Shweta is mixing the colours. 2.Two and two made four.	(2)
3.c	Write down one word substitution for the following words: 1. A broad road bordered with trees 2. A general pardon of offenders 3. A group of girls 4. A bicycle for two or more people	(2)

4.a	What are the characteristics and barriers of Interpersonal Communication?	(1)
4.b	Provide at least two examples of physical barriers to communication.	(2)
4.c.	Write down at least two synonyms for the following words: 1. Abjure 2. Bewitching 3. Comic 4. Deceit	(2)

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AY 2022-23

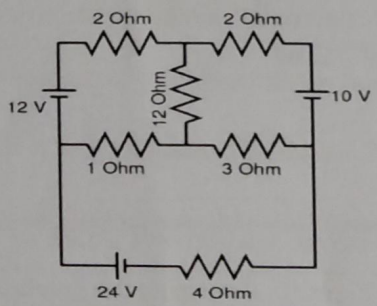
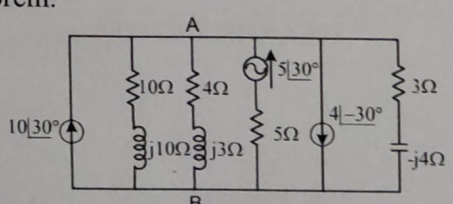
School of Electronics

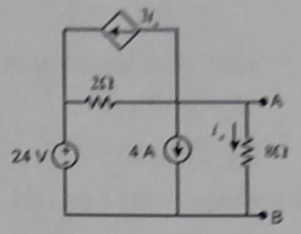
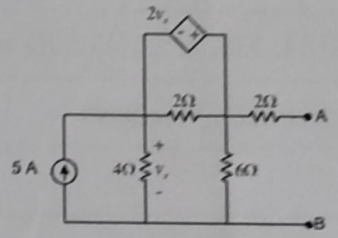
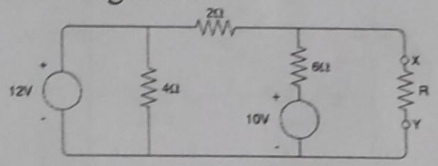
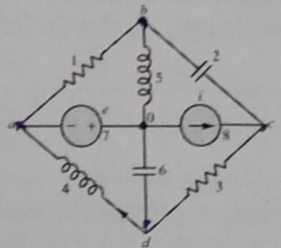
Cycle Test – I

03, January '23

Curriculum – IIITUGECE22

Degree	B. Tech.	**Branch**	ECE
Semester	I		
Subject Code & Name	ECC104: Electrical Circuits and Networks		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

Sl. No.	Question	Marks
1.a	Consider a delta connection, what is the lag angle of line current from the phase current?	(1)
1.b	Use Kirchhoff's Voltage Law to calculate the current through 4Ω resistor for the circuit shown in Figure1.  Figure1: Circuit Diagram for Question 1b.	(2)
1.c	Explain Kirchoff's Current Law. Mention the different types of the network for which KCL withholds.	(2)
2.a	State Superposition Theorem.	(1)
2.b	State and Compare the active components and passive components.	(2)
2.c	For the circuit shown in Figure 2, find the current through (4+j3)Ω impedance using Millman's Theorem.  Figure2: Circuit Diagram for Question 2c.	(2)

3.a	A non-ideal voltage source V has an internal impedance of Z, if a purely resistive load is to be chosen that maximizes the power transferred to load, its value should be _____ (in terms of Z).	(1)
3.b	Find the Norton equivalent of the circuit shown in Figure 3 across the terminals A-B.  Figure3: Circuit Diagram for Question 3b.	(2)
3.c	Find the Thevenin voltage and resistance across terminal A-B for the circuit shown in Figure 4.  Figure4: Circuit Diagram for Question 3c.	(2)
4.a	What will be the rank for the cut-set and tie-set matrix for a graph with 8 branches and 5 nodes.	(1)
4.b	Determine the value of resistance R such that maximum power transfer takes place in the circuit shown in Figure 5.  Figure5: Circuit Diagram for Question 4b.	(2)
4.c	For the network shown in Figure 6, determine the number of possible trees. For the tree consisting branches (1,2,3), draw (i)tie-set matrix; (ii) cut-set matrix.  Figure6: Circuit Diagram for Question 4c.	(2)

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AY 2022-23
School of Electronics
Curriculum: IIITUGECE22
Cycle Test - I
January 2, 2023

Degree	B.Tech
Branch	ECE
Semester	I
Subject code/name	MAC121/ Mathematics-I
Time	60 minutes
Maximum Marks	20

Answer all the questions.

Q.No.	Questions	Marks
1(a)	Find the eigen values of the matrix given below: $$A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ 0 & 2 & 3 \end{bmatrix}$$	1
1(b)	What are the eigen vectors of the matrix A mentioned in 1(a)?	2
1(c)	If possible, diagonalize the matrix A mentioned in 1(a).	2
2(a)	State if the following statement is true or false. Give reason for the answer. A $n \times n$ singular matrix has rank n.	1
2(b)	Outline the steps to find a row echelon matrix which is row-equivalent to $A = \begin{bmatrix} 1 & -i \\ 2 & 2 \\ i & 1+i \end{bmatrix}$. Is the system $AX = 0$ consistent? Give reasons for the answer.	2
2(c)	Investigate the convergence of the series given below: $$\sum_{n=1}^{\infty} a_n = \sum_{n=1}^{\infty} \frac{1}{1+2+3+4+\ldots+n}.$$	2
3(a)	For what values of k does the quadratic form $Q = k(x_1^2 + x_2^2 + x_3^2)$ becomes positive definite?	1

3(b)	Obtain the normal form of the matrix given below: $$A = \begin{bmatrix} 5 & 9 & 6 \\ 0 & 2 & 3 \\ 0 & 0 & 7 \end{bmatrix}$$	2
3(c)	Transform the quadratic form $Q = 3x^2 + 8xy - 3y^2$ into Canonical form. Write its index and signature.	2
4(a)	Let $a_n = \frac{1}{n^{0.75}}$. Does the series $\sum_{n=1}^{\infty} a_n$ converge? Explain giving reasons.	1
4(b)	Examine the series $\sum_{n=1}^{\infty} \frac{1}{n3^n}$ for its convergence.	2
4(c)	Examine whether the series $\sum_{n=1}^{\infty} n!e^{-n}$ is convergent or divergent.	2

******* All the best*******

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AY 2022-23

School of Basic Sciences

CURRICULUM: IIITUGECE22

Cycle Test – I

02, Jan.' 2023

Degree	B. Tech.	**Branch**	Electronics and Communication Engineering
Semester	First		
Subject Code & Name	PHC122: Electricity, Magnetism, and Quantum Mechanics		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

Q.1a- Show that the Galilean transformations are a special case of the Lorentz transformations. [1]

Q.1b- A point mass moves in a vertical plane along a given curve in gravitational field. The equation of motion in parametric form is $x = x(s)$, $z = z(s)$.
Apply the Lagrange's formulation and find the equation of motion. [2]

Q.1c- Find the Hamilton's equation of motion for an electrical circuit comprising an inductance (L) and capacitance (C). The capacitor is charged q coulombs and current flowing in the circuit is i amperes. [2]

Q.2a- What is the meaning of Space-like, Time-like, and Light-like events ? [1]

Q.2b- Make use of the Galilean transformation and show that the acceleration is independent of the motion of frame of reference. [2]

Q.2c- Make use of Lorentz transformation and obtain the velocity components as observed from the frame at rest. [2]

Q.3a- What is the average energy (E) of an oscillator at 127 K, that has a frequency given by $\nu = kT/h$ according to Planck's calculation ? [1]

Q.3b- Make use of the basic laws of conservation and show that a photon can not give rise to an electron-positron pair in free space in the absence of an external field. [2]

Q.3c- Make use of relativistic energy and determine the speed of an electron when it hits a television screen after being accelerated by the 25.55 kV of the picture tube. [2]

Q.4a- Show that the Rayleigh-Jeans law of radiation is a special case of Planck's radiation law of radiation. [1]

Q.4b- Light of wavelength 400 nm and intensity 10^{-2} W/m^2 is incident on potassium of work function 2.22 eV. Estimate the time lag for the emission of photoelectrons expected classically. [2]

Q.4c- Show that the maximum kinetic energy E_k, called the Compton edge, that a recoiling electron can carry away from a Compton scattering event is given by the following equation: [2]

$$E_k = \frac{h\nu}{1 + (mc^2/2h\nu)}.$$

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AY 2022-23

School of Basic Sciences

CURRICULUM: IIITUGECE22

Cycle Test – I

03, Jan.' 23

Degree	B. Tech.	**Branch**	ECE
Semester	First		
Subject Code & Name	EVC103: Basic Environmental Science and Engineering		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

S. No.	Question	Marks
1.a	Compare cogeneration and regenerative cycle with respect to power plant.	(1)
1.b	Explain the term "sustainability" and demonstrate its importance in Energy Conservation.	(2)
1.c	Illustrate the negative impact of hydro power plants on the environment.	(2)
2.a	Explain Energy Conservation Act (ECA).	(1)
2.b	Demonstrate negative impacts of Thermal Power plant on the environment.	(2)
2.c	Compare carbon footprint and carbon sequestration with suitable examples.	(2)
3.a	Explain dome shaped biogas plant.	(1)
3.b	Construct the diagram of closed Ocean thermal energy conversion.	(2)
3.c	Model the block diagram of Solar Pond Electrical power plant.	(2)
4.a	Which of the two turbines, onshore and offshore wind turbines, has more efficiency? and why?	(1)
4.b	Construct the structure of a Wind turbine with proper labelling and explain the wind energy conversion system.	(2)
4.c	Consider an Ocean Thermal Energy Conversion process operating between 5 °C. and 40 °C. What would be the maximum possible efficiency for an electricity generator station operating with these temperatures?	(2)

****GOOD LUCK*****