Central University of Haryana
Odd Semester Term End Examination Mar 2023
B. Tech. Programme
Branch: Computer science & Engineering

Course Code: BT MAT 111B
Course Title: Mathematics-I

Max Time: 3 Hours
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries a total of 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q 1.

a) Find the value of $\Gamma(4.5)$?

b) If λ is an eigenvalue of a matrix A, then an eigenvalue of A^t *and* A^4 is ?

c) If $x = (x_1, x_2, x_3)$ & $y = (y_1, y_2, y_3) \in \mathbb{R}^3$, then determine whether $\langle x, y\rangle$ is a real inner product for $\mathbb{R}^3$ if $\langle x, y\rangle$ defined by $\langle x, y\rangle = |x_1y_1 + x_2y_2 + x_3y_3|$.

d) If the rank of a matrix $A = \begin{bmatrix} a & -1 & 0 \\ 0 & a & -1 \\ -1 & 0 & a \end{bmatrix}$ is 2, then value of a is equal to?

e) Show that $\{(x, y, z) \in \mathbb{R}^3 : x + y - 2z = 5\}$ is not a subspace of $\mathbb{R}^3$.

f) Evaluate the integral $\int_0^\infty e^{-x}\, dx$.

g) The set of vectors {(1,2,2), (2,1,2), (2,2,1)} is linearly dependent or independent in $\mathbb{R}^3$?

PART –II

Q 2.

a) Reduce the matrix A to the row-reduced echelon form and hence find its rank.

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

b) If $A = \begin{bmatrix} 2 & 3+2i & -4 \\ 3-2i & 5 & -6i \\ -4 & -6i & 3 \end{bmatrix}$, then prove that A is Hermitian and iA is skew-Hermitian.

OR

Q 2.

a) Find the condition for which the system of equations has (i) unique solution (ii) no solution, and (iii) many solutions.

$$3x - 2y + z = b$$
$$5x - 8y + 9z = 3$$
$$2x + y + \lambda z = -1$$

b) Use Gauss Jordan method to find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$

Q3.

a) Find the eigenvalues and the corresponding eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & -2 & 4 \\ 3 & -3 & 6 \end{bmatrix}.$$

b) Use Gram-Schmidt process to obtain an orthonormal basis of the subspace of the Euclidean space $\mathbb{R}^4$ with standard inner product space generated by the linearly independent set $\{(1,1,,0,1), (1,1,0,0), (0,1,0,1)\}$.

OR

Q 3.

a) Find a matrix P such that $P^{-1}AP$ is a diagonal matrix where $A = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$.

b) Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 1 & 0 & 2 \\ 0 & -1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ and find A^{-1}& A^9.

Q 4.

a) Obtain the Taylor's series expansion of $f(x) = x^5 + 2x^4 - x^2 + x + 1$ about the point $x = -1$.

b) Determine the area between the curve $y = x^3$ and the parabola $y = 4x^2$.

OR

Q 4.

a) Determine the volume of the solid generated by revolving the plane area bounded by $y^2 = 4x$ and $x = 4$ about the line $x = 4$.

b) Evaluate the integral $\int_0^\infty x^4 e^{-x^4} dx$.

Q 5.

a) For a linear map $f: \mathbb{R}^3 \to \mathbb{R}^3$ define by $f(x_1, x_2, x_3) = (2x_1 + x_2 - x_3, x_2 + 4x_3, x_1 - x_2 + 3x_3), (x_1, x_2, x_3) \in \mathbb{R}^3$. Find the matrix of f relative to the ordered bases (0,1,1), (1,0,1), (1,1,0) of $\mathbb{R}^3$

b) Show that the set $S = \{(1, 2, -1, -2), (2, 3, 0, -1), (1, 2, 1, 4), (1,3, -1,0)$ is a basis of $\mathbb{R}^4$.

OR

Q 5.

a) For a linear map $f: \mathbb{R}^3 \to \mathbb{R}^3$ define by $f(x_1, x_2, x_3) = (x_1 + x_2 + x_3, 2x_1 + x_2 + 2x_3, x_1 + 2x_2 + x_3), (x_1, x_2, x_3) \in \mathbb{R}^3$. Show that f is a linear mapping. Find $Ker(f), Im(f), rank(f)$ & $nullity(f)$.

b) Let $S = \{(x, y, z) \in \mathbb{R}^3: 3x - y + z = 0\}$. Show that S is a sub-space of $\mathbb{R}^3$. Find a basis of S.

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch: Electrical Engineering/ PPT

Course Code: BT CS 104A **Max Time: 3 Hours**
Course Title: Programming for Problem Solving

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) What is the need of programming language in the Computer system?
(b)Differentiate between SRAM and DRAM.
(c) What is semantic error in C?
(d)Explain the working of while and do while loop.
(e)What is a function prototype?
(f)Write the name of three sorting algorithms.
(g)How linked list is different from array?

PART –II

Q. No.2(a) Draw the block diagram of digital computer and explain each component.
Q. No.2(b) Why flowchart is used in C? Draw the flowchart to calculate the average of n numbers.

OR

Q. No.2(a) What is an algorithm? Write a program to find largest number among three numbers.
Q. No.2(b)What are the different kind if data types are available in C? Explain.

Q. No.3(a) Explain the different types of operators in C with examples.
Q. No.3(b)Write a program to calculate the sum of two matrices.

OR

Q. No. 3(a)Write a program to search an element in a given array and also print its position.
Q. No.3(b)Explain the characteristics of array and structures.

Q. No.4Why functions are used in C? Explain any five inbuilt string handling functions.

OR

Q. No .4What are pointers? Write a program that swap the value of two variables using pointers.

Q. No.5What is recursion? Write a program to calculate the X^Y using recursion.

OR

Q. No.5Write a program using structures which can read the record of thirty students and computes the total marks obtained by them. It also prints the grade according to the following rules given below:

Marks	**Grades**
<200	D
>=200<240	C
>=240<320	B
>=320	A

Central University of Haryana
First Semester Term End Examination March, 2023
B.Tech. Programmes

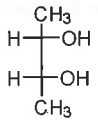
Branch: EE and PPT
Course Code: BT CH 102A **Max Time: 03:00 Hrs**
Course Title: Chemistry **Max Marks: 70**

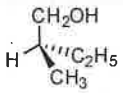
Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q 1.

a. Metals A and B are having their reduction potential as -3.05 and -0.40 respectively, which one of them A or B will be most reducing agent.
b. How many kinds of protons are in CH_3-CH=CH_2?
c. Calculate the bond order of NO^- molecule using molecular energy level diagram?
d. How you will differentiate between aniline and anilinium ion via λ_{max} value in UV spectroscopy?
e. Are racemic mixture and meso compound the same, if no, support with examples?
f. When does a real gas obey the ideal gas equation closely?
g. Define absolute configuration for following compounds. (7×2=14)





PART –II

Q. No.2

a. Which of the two $[Co(H_2O)_6]^{+2}$ or $[Co(CN)_6]^{-3}$ has smaller Δ value? Explain with suitable diagram. Also give the magnetic nature of the complexes.
b. What is the ΔE between the n=4 and n=5 states for an F_2 molecule confined within in a one-dimension box of length 3.0 cm?
c. What is meant by "Effective nuclear charge"? Calculate Z_{eff} experienced by a 2p electron in nitrogen atom? 5, 5, 4

Or

a. What do you mean by the angular probability distribution of d orbitals? Give the pictorial presentation.
b. Calculate the number of unpaired e^- and CFSE value in the following complexes:
I. $[Fe(CN)_6]^{-3}$ ion and II. $[Cr(NH_3)_6]^{+3}$ ion
c. Construct the π-molecular orbitals of benzene and butadiene. 4, 6 ,4

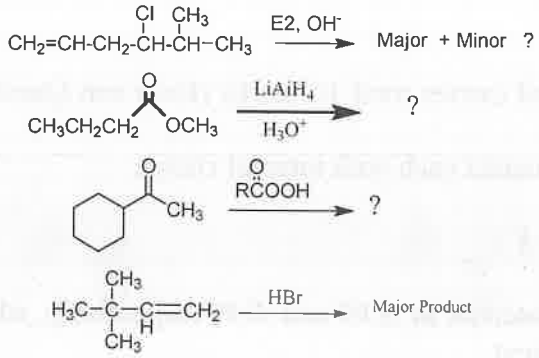
Q 3.

a. What is chirality? Is chiral center, the necessity condition for a molecule to be chiral? Explain.
b. Give the pictorial presentation of conformational analysis in butane considering rotation about C2-C3 bond?

c. If tert-Butyl chloride is treated with OH^- at low temperature than what mechanism will be followed in substitution reaction. 4,5,5

Or

(a) Complete the following reactions with mechanistic details. 3.5×4=14



Q. No.4

a. Carbon is a better reducing agent below 710 °C while carbon monoxide is better reducing agent above 710 °C. Explain using Ellingham diagram.

b. The rusting of iron is electrochemical corrosion, Explain? Why the contact with the more reactive metal does not contribute to the rusting of iron.

c. Calculate the pH and pOH of 0.03 M solution of HCl at 25 °C. 4, 5, 5

Or

a. What is entropy? Why the change in entropy in a system is not a suitable criteria to define spontaneous change?

b. Calculate the half-cell potential at 25 °C for the reaction

$Zn^{2+}_{(ag)}(0.1\ M) + 2e \longrightarrow Zn_{(s)}$

$E^{o}_{Zn^{2+}/Zn} = -0.76$ V.

c. Enthalpy change for the transition of water to vapour is 40.8 kJ/mol at 373 K. Calculate entropy change for the reaction. 4, 5,5

Q 5.

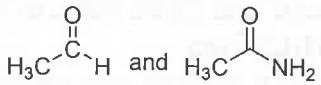
a. Acetone has two absorption bands in its UV spectrum, one at 180 nm and one at 280 nm. Why these two absorption bands? Explain. 4,6,4

b. What is the principal of IR spectroscopy? Differentiate between figure print and functional group region. Give any two factors which affect the intensity of an IR absorption band?

c. Benzene C-H chemical shift (δ) values are greater than alkenes C-H chemical shift, why?

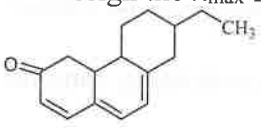
Or

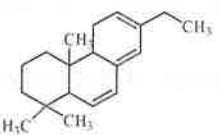
a. How could you differentiate following pair of compounds from their IR spectra?

i) H_3C-OH and CH_3-CH_3 ii)  and

b. What is chemical shift in NMR spectroscopy? Draw the finer NMR spectrum (with splitting) for ethanol.

c. Assign the λ_{max} for the following compounds. 5,4,5





Central University of Haryana
First Semester Term End Examination March, 2023
B.Tech. Programmes

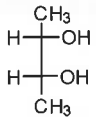
Branch: EE and PPT
Course Code: BT CH 102A **Max Time: 03:00 Hrs**
Course Title: Chemistry **Max Marks: 70**

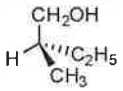
Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q 1.

a. Metals A and B are having their reduction potential as -3.05 and -0.40 respectively, which one of them A or B will be most reducing agent.
b. How many kinds of protons are in CH_3-CH=CH_2?
c. Calculate the bond order of NO^- molecule using molecular energy level diagram?
d. How you will differentiate between aniline and anilinium ion via λ_{max} value in UV spectroscopy?
e. Are racemic mixture and meso compound the same, if no, support with examples?
f. When does a real gas obey the ideal gas equation closely?
g. Define absolute configuration for following compounds. (7×2=14)





PART –II

Q. No.2

a. Which of the two $[Co(H_2O)_6]^{+2}$ or $[Co(CN)_6]^{-3}$ has smaller Δ value? Explain with suitable diagram. Also give the magnetic nature of the complexes.
b. What is the ΔE between the n=4 and n=5 states for an F_2 molecule confined within in a one-dimension box of length 3.0 cm?
c. What is meant by "Effective nuclear charge"? Calculate Z_{eff} experienced by a 2p electron in nitrogen atom? 5, 5, 4

Or

a. What do you mean by the angular probability distribution of d orbitals? Give the pictorial presentation.
b. Calculate the number of unpaired e^- and CFSE value in the following complexes:
I. $[Fe(CN)_6]^{-3}$ ion and II. $[Cr(NH_3)_6]^{+3}$ ion
c. Construct the π-molecular orbitals of benzene and butadiene. 4, 6 ,4

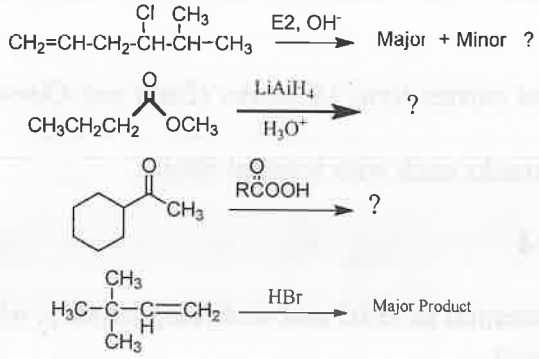
Q 3.

a. What is chirality? Is chiral center, the necessity condition for a molecule to be chiral? Explain.
b. Give the pictorial presentation of conformational analysis in butane considering rotation about C2-C3 bond?

c. If tert-Butyl chloride is treated with OH^- at low temperature than what mechanism will be followed in substitution reaction. 4,5,5

Or

(a) Complete the following reactions with mechanistic details. 3.5×4=14



Q. No.4

a. Carbon is a better reducing agent below 710 °C while carbon monoxide is better reducing agent above 710 °C. Explain using Ellingham diagram.

b. The rusting of iron is electrochemical corrosion, Explain? Why the contact with the more reactive metal does not contribute to the rusting of iron.

c. Calculate the pH and pOH of 0.03 M solution of HCl at 25 °C. 4, 5, 5

Or

a. What is entropy? Why the change in entropy in a system is not a suitable criteria to define spontaneous change?

b. Calculate the half-cell potential at 25 °C for the reaction

$Zn^{2+}_{(ag)}(0.1\ M) + 2e \longrightarrow Zn_{(s)}$

$E^{\circ}_{Zn^{2+}/Zn} = -0.76$ V.

c. Enthalpy change for the transition of water to vapour is 40.8 kJ/mol at 373 K. Calculate entropy change for the reaction. 4, 5,5

Q 5.

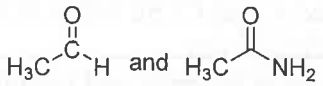
a. Acetone has two absorption bands in its UV spectrum, one at 180 nm and one at 280 nm. Why these two absorption bands? Explain. 4,6,4

b. What is the principal of IR spectroscopy? Differentiate between figure print and functional group region. Give any two factors which affect the intensity of an IR absorption band?

c. Benzene C-H chemical shift (δ) values are greater than alkenes C-H chemical shift, why?

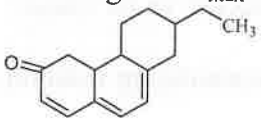
Or

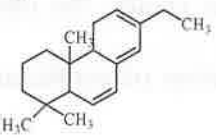
a. How could you differentiate following pair of compounds from their IR spectra?

i) H_3C-OH and CH_3-CH_3 ii)  and

b. What is chemical shift in NMR spectroscopy? Draw the finer NMR spectrum (with splitting) for ethanol.

c. Assign the λ_{max} for the following compounds. 5,4,5





Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch: Civil, PPT and Electrical Engineering (Regular and Reappear)

Course Code: BTMAT112B **Max Time: 3 Hours**
Course Title: Engineering Mathematics 1 **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2 (two) to 5 (five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Find the n^{th} derivative of $e^{ax}cosbx$.

(b) If $A = \frac{1}{3}\begin{bmatrix} 1 & 2 & a \\ 2 & 1 & b \\ 2 & -2 & c \end{bmatrix}$ is orthogonal, find a, b, c.

(c) If $u = \sin^{-1}\left(\frac{x+y}{\sqrt{x}-\sqrt{y}}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{\tan u}{2}$,

(d) Examine the convergence of the series

$$\sum_{n=1}^{\infty} \frac{1}{3}.$$

(e) Show that the following limit does not exists

$$lim_{(x,y)\to(0,0)}\left[\frac{x^2}{x^4+y^2}\right]$$

(f) Prove that $\Gamma(1/2) = \sqrt{\pi}$.

(g) Evaluate the integral

$$\int_0^{\infty} \frac{x^8(1-x^7)}{(1+x)^{25}}dx$$

PART –II

Q. No.2 (a) Use elementary transformations to find the rank of the following matrix:

$$\begin{bmatrix} 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \\ 10 & 11 & 12 & 13 & 14 \\ 15 & 16 & 17 & 18 & 19 \end{bmatrix}$$

(b) Using Cayley-Hamilton theorem, find the inverse of $\begin{bmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$

OR

Q. No.2 (a) Find two non-singular matrices P & Q such that PAQ is in the normal form for the following matrix:

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 1 & 3 & 2 \\ 2 & 3 & 1 \end{bmatrix}$$

(b) Find the characteristic polynomial, eigenvalues, and eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

Q. No.3(a) Examine the convergence of the series:

$$\frac{1}{2} + \frac{1}{5} + \frac{1}{10} + \cdots$$

(b) Discuss the convergence of the series

$$1 + \frac{a+1}{b+1} + \frac{(a+1)(2a+1)}{(b+1)(2b+1)} + \frac{(a+1)(2a+1)(3a+1)}{(b+1)(2b+1)(3b+1)} + \cdots$$

OR

Q. No 3(a) (b) Discuss the convergence of the series

$$\sum_{n=1}^{\infty} \frac{1}{(n+1)\log(n+1)}$$

(b) Find the interval of convergence of the series

$$\sum_{n=1}^{\infty} \frac{(x+2)^{n-1}}{\sqrt{n}}$$

Q. No.4(a) Find the asymptotes of the curve $(x+y)^2(x+y+2) = x + 9y - 2$

(b) The arc of parabola $y^2 = 4x$ between $x = 1/2$ and $x = 1$ is rotated about x-axis. Find the area of the surface generated.

OR

Q. No.4(a) Show that

$$\Gamma(m)\Gamma\left(m + \frac{1}{2}\right) = \frac{\sqrt{\pi}}{2^{2m-1}}\Gamma(2m)$$

(b) Find the surface of the solid formed by revolving the cardioid $r = a(1 + cos\theta)$ about the initial line.

Q. No.5 (a) If $u = \sin^{-1}\dfrac{x+y}{\sqrt{x}+\sqrt{y}}$, prove that $x^2\dfrac{\partial^2 u}{\partial x^2} + 2xy\dfrac{\partial^2 u}{\partial xy} + y^2\dfrac{\partial^2 u}{\partial y^2} = -\dfrac{\sin u \cos 2u}{4\cos^3 u}$.

(b) A rectangular box, open at the top, is to have a volume of 32 c.c. Find the dimensions of the box requiring lease material for its construction.

OR

Q. No.5 (a) Discuss the maxima and minima of $f(x,y) = x^3y^2(1-x-y)$.

(b) If

$$u = \frac{yz}{x}, v = \frac{xz}{y}, w = \frac{yx}{w}$$

Show that the jacobian of u, v, w with respect to x, y, z is 4.

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch:

Course Code: BT HUM 101B — **Max Time: 3 hrs**
Course Title: English Language Skills — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I
Q. No.1

(a) What are three P's of professional writing?
(b)Differentiate between CV, Resume and Bio-data.
(c) Differentiate between BATNA and WATNA.
(d)Define three kinds of Resume.
(e) Give two advantages of Telephonic interview.
(f) Mention any two personal gains that one gets on writing a report.
(g) Define paragraph. Name the four components of a paragraph.

PART –II
Q. No.2 (a) Do as directed in brackets. (7 marks)
i) Everyone of the prisons _____ full. (is/are)
ii) Neither my friend not I _____ to blame (is/am/was)
iii) Three parts of the business _____ left for me to do. (are/is)
iv) She called him a fool. (Identify the verb pattern)
v) You have made your shirt dirty. (Identify the verb pattern)
vi) I saw him crossing the bridge. (Identify the verb pattern)
vii) We have paid him the money. (Identify the verb pattern)
(b) i) Complete the following passages with the most appropriate choices given in brackets.
Insects do not have (1)_____ (wings, vision, absorption) as sharp as that of mammals or birds. The insect compound eye is more familiar to movement and so it cannot (2)_____ (hilariously, precisely, tangibly) position distant objects. So, insects tend to take a rather unsteady flight path to navigate to a particular object. (2 marks)
ii) You are HR of an ABC Publishing house. Interview is to be conducted for clerical staff. As the HR you need to inform the shortlisted candidates for details (venue, timings, etc.) regarding the interview. Draft a NOTICE in 50 words covering all the necessary information which is to be displayed at the Head Office. (5 marks)

OR

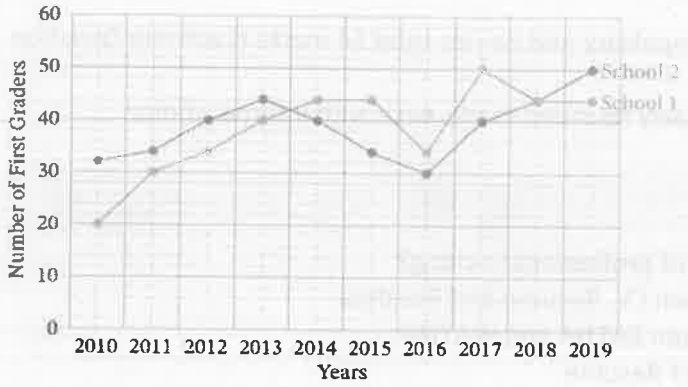
Q. No.2 (a) Write an essay on "Soft Skills: Key to Success" in about 200 words. (7 marks)
(b) Arrange the following sentences in the correct order to construct a unified and coherent paragraph. Give an appropriate TITLE to the paragraph. (7 marks)
i) By passing the steam through specially designed turbines geared to the generator to be rotated, electric power can be produced.
ii) In some countries an alternative source of heat energy is provided by the controlled nuclear fission of uranium and other fissile elements.
iii) By the combination of such fuels in the boiler, high-pressure steam can be generated.
iv) Coal, oil, and natural gas are the commonest prime sources of energy.
v) The electric power thus produced is fed into the distribution network of power lines and cables radiating from the generation station.

vi) The energy released by the nuclear reaction heats a stream of gas which is used to raise steam for driving the turbines and generators.

vii) it is here from that the electric power is transmitted to its industrial customers.

Q. No.3 (a) The following line graphs compare the average number of first graders in two different schools for 10 years. The orange line represents school 1, and the blue line represents school 2. Compare the two line graphs with the use of proper comparatives in about 150 words.

(7 marks)



(b) (i) Differentiate between Bell and Belle by using them in sentences. (2 marks)

(ii) Differentiate between Anonymous and Unanimous by using them in sentences (2 marks)

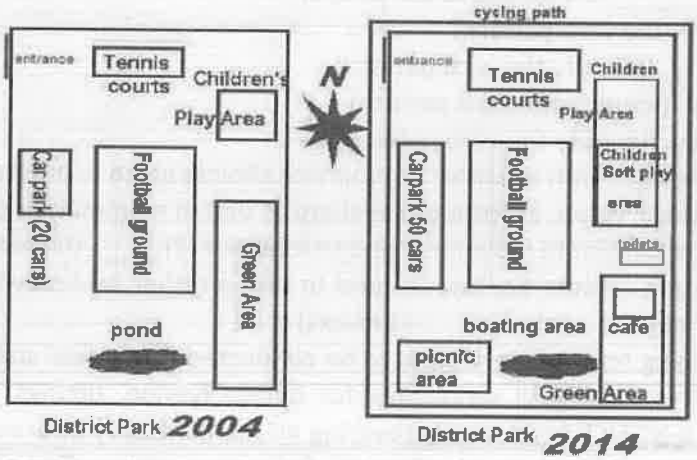
(iii) Give one-word substitution of: One for whom the world is home. (1 mark)

(iv) Construct a sentence for the Idiom: "Flash in the pan" (1 mark)

(iv) Use the following phrasal verb "nod off" in your sentence

OR

Q. No 3 (a) Elaborate the changes seen in a District within 10 years in 150 words. Use appropriate comparatives. (7 marks)



The diagrams show how a District park looked ten years ago and how it looks now.

(b) Do as directed in brackets: (7marks)

i) I want to find a gym that is not only close to my apartment but also I want to find a cheap one. (make the sentence parallel)

ii) Using twenty-one different instruments, they will collect data that scientists hope will help explain the origins of comets and other celestial bodies. (Delete the redundant word or phrase)

iii)Use the following phrasal verbs in sentences: call off; count on.

iv)Give one word substitution of : One who does not drink wine.

v) Differentiate between Cease and Seize by using them in sentences.

Q. No.4 (a) do as directed in brackets: (7 marks)

i) She wants a medical advice (change the adjective into adjective phrase)
ii) He tried hard (Change into adverb phrase)
iii) We enjoy cricket (change into noun phrase)
iv) All desire wealth and some acquire it (change to passive)
v) He must work very hard to make up for the lost time (change into compound)
vi)I called him but he gave me no answer (into Simple)
vii) He replied to the best of his ability (into complex)
(b) Do as directed in brackets: (7 marks)
i) If I had been there, I ..... have helped. (would/could/either)
ii) Whatever you do, do well. (Identify whether Complex, compound or simple)
iii) They saw the storm approaching. (Change into passive)
iv) They saw the storm approaching. (Into passive)
v) Alice was not much surprised at this. (into active)
vi) One should keep one's promises. (Into passive)
vii) Had I known in advance, I ____ enough money. (would take/ will take/ took/ would have taken)

OR

Q. No 4 (a) Do as directed in brackets: (7 marks)
i) He remarked how impudent the boy was. (into simple)
ii) Do as I tell you or you will regret it. (into complex)
iii)The Russians burnt Moscow. The French were forced to quit it. (into simple)
iv) He was my school fellow. He has become a great man. He has grown proud. He forgets his old friends. (into compound)
v) Do not insult the weak. (into passive)
vi) If I were you, I _____ him right away (will dismiss/ would dismiss/ would have dismissed)
vii) The melody has been composed wonderfully by A.R. Rahman. (change into active)
(b) In modern times, working women are facing problems like eve teasing, sexual harassment, gender discrimination at the time of promotion, salary fixation etc. You, as the Head of Women Welfare Association, have been asked to write a report on Gender Discrimination at Work Places. Prepare a Questionnaire to be sent to women professionals working in various organizations in order to elicit the relevant information. (7 marks)
Q. No.5 (a) The following advertisement was given in The Hindustan Times. Write a COVER letter with a detailed CV for the given post : Wanted a Plant Manager (Operations) at our new factory in Gaziabad, UP. Engineering Graduates with minimum 5 years experience in manufacturing industries as Plants Managers can apply. Salary is negotiable. Apply with particulars to Box 650, The Hindu, Chennai- 600004. (7 marks)
(b) "Her only message of cheer to people who knew they had not much longer to live was *Bhogoban Achhen*". Discuss about Mother Teresa in the light of the above statement. (7 marks)

OR

Q. No.5 (a) Define negotiation. Give the requisites of a negotiation process. (7 marks)
(b) Lala Har Dayal in his book "Hints for Self Culture" discusses about five groups of natural phenomena. Name them and discuss them briefly. (7 marks)

Central University of Haryana
Odd Semester Term End Examination Mar 2023
B. Tech. Programme
Branch: Computer science & Engineering

Course Code: BT MAT 111B
Course Title: Mathematics-I

Max Time: 3 Hours
Max Marks: 70

Instructions:

Question Number **one (PART-I)** is compulsory and carries a total of 14 marks (Each sub-Question carries two Marks).

Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q 1.

a) Find the value of $\Gamma(4.5)$?

b) If λ is an eigenvalue of a matrix A, then an eigenvalue of A^t *and* A^4 is ?

c) If $x = (x_1, x_2, x_3)$ & $y = (y_1, y_2, y_3) \in \mathbb{R}^3$, then determine whether $\langle x, y\rangle$ is a real inner product for $\mathbb{R}^3$ if $\langle x, y\rangle$ defined by $\langle x, y\rangle = |x_1y_1 + x_2y_2 + x_3y_3|$.

d) If the rank of a matrix $A = \begin{bmatrix} a & -1 & 0 \\ 0 & a & -1 \\ -1 & 0 & a \end{bmatrix}$ is 2, then value of a is equal to?

e) Show that $\{(x, y, z) \in \mathbb{R}^3 : x + y - 2z = 5\}$ is not a subspace of $\mathbb{R}^3$.

f) Evaluate the integral $\int_0^\infty e^{-x}\, dx$.

g) The set of vectors {(1,2,2), (2,1,2), (2,2,1)} is linearly dependent or independent in $\mathbb{R}^3$?

PART –II

Q 2.

a) Reduce the matrix A to the row-reduced echelon form and hence find its rank.

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

b) If $A = \begin{bmatrix} 2 & 3+2i & -4 \\ 3-2i & 5 & -6i \\ -4 & -6i & 3 \end{bmatrix}$, then prove that A is Hermitian and iA is skew-Hermitian.

OR

Q 2.

a) Find the condition for which the system of equations has (i) unique solution (ii) no solution, and (iii) many solutions.

$$3x - 2y + z = b$$
$$5x - 8y + 9z = 3$$
$$2x + y + \lambda z = -1$$

b) Use Gauss Jordan method to find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$

Q3.

a) Find the eigenvalues and the corresponding eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & -2 & 4 \\ 3 & -3 & 6 \end{bmatrix}.$$

b) Use Gram-Schmidt process to obtain an orthonormal basis of the subspace of the Euclidean space $\mathbb{R}^4$ with standard inner product space generated by the linearly independent set $\{(1,1,,0,1), (1,1,0,0), (0,1,0,1)\}$.

OR

Q 3.

a) Find a matrix P such that $P^{-1}AP$ is a diagonal matrix where $A = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$.

b) Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 1 & 0 & 2 \\ 0 & -1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ and find A^{-1}& A^9.

Q 4.

a) Obtain the Taylor's series expansion of $f(x) = x^5 + 2x^4 - x^2 + x + 1$ about the point $x = -1$.

b) Determine the area between the curve $y = x^3$ and the parabola $y = 4x^2$.

OR

Q 4.

a) Determine the volume of the solid generated by revolving the plane area bounded by $y^2 = 4x$ and $x = 4$ about the line $x = 4$.

b) Evaluate the integral $\int_0^\infty x^4 e^{-x^4} dx$.

Q 5.

a) For a linear map $f: \mathbb{R}^3 \to \mathbb{R}^3$ define by $f(x_1, x_2, x_3) = (2x_1 + x_2 - x_3, x_2 + 4x_3, x_1 - x_2 + 3x_3), (x_1, x_2, x_3) \in \mathbb{R}^3$. Find the matrix of f relative to the ordered bases (0,1,1), (1,0,1), (1,1,0) of $\mathbb{R}^3$

b) Show that the set $S = \{(1, 2, -1, -2), (2, 3, 0, -1), (1, 2, 1, 4), (1,3, -1,0)$ is a basis of $\mathbb{R}^4$.

OR

Q 5.

a) For a linear map $f: \mathbb{R}^3 \to \mathbb{R}^3$ define by $f(x_1, x_2, x_3) = (x_1 + x_2 + x_3, 2x_1 + x_2 + 2x_3, x_1 + 2x_2 + x_3), (x_1, x_2, x_3) \in \mathbb{R}^3$. Show that f is a linear mapping. Find $Ker(f), Im(f), rank(f)$ & $nullity(f)$.

b) Let $S = \{(x, y, z) \in \mathbb{R}^3 : 3x - y + z = 0\}$. Show that S is a sub-space of $\mathbb{R}^3$. Find a basis of S.

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch: Electrical Engineering

Course Code: BT EE 606A **Max Time: 3 hours**
Course Title: Applications of Psychology in Engineers life **Max Marks: 70 marks**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1
(a) Describe the characteristics of an individual having good mental health?

(b) What are the different causes of Industrial Accidents?

(c) Explain the stages of Consumer buying behaviour.

(d) Describe the need and relevance of counselling.

(e) What are main types of counselling? Discuss each in brief.

(f) Explain the differences between Prejudice and Stereotype using appropriate examples.

(g) Discuss the nature and types of conflict

PART –II

Q. No.2 Describe the nature and scope of psychology.

OR

Q. No.2 Explain the different types of fatigue and ways of coping it.

Q. No.3 Explain the criteria of Abnormality by giving suitable examples.

OR

Q. No 3 Describe the symptoms and causes of any two Psychological Disorders.

Q. No.4 Explain the various application areas of counselling with suitable examples.

OR

Q. No .4 Discuss the various stages of Counselling process with examples.

Q. No.5 Define and discuss the characteristics of effective team building.

OR

Q. No.5 Explain the necessary skills for effective communication with suitable examples.

Central University of Haryana
ODD Semester Examination March 2023
B.Tech. Programmes
Branch: Electrical Engineering

Course Code: BTEE523A
Course Title: Industrial Electrical System

Max Time: 3hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) What is Tariff Structure?

b) Describe metering systems?

(c) Describe earthing of Commercial installation?

(d) Explain PCC and MCC panels?

(e) Explain Inverse current characteristics and draw its symbol?

(f) What is contactor?

(g) Explain difference between Switchgear and Relay?

PART –II

Q. No.2

Explain the operating principle of protection components Fuse, MCB, MCCB and ELCB?

OR

Q. No.2

Explain the selection of cable, switches and wire?

Q. No.3

What are the general rules and guidelines for installation of residential and commercial wiring system?

OR

Q. No 3

Explain the mechanism of electrical shock and state electrical safety practices?

Q. No.4

How to calculate KVar and related equipment for power factor correction?

OR

Q. No .4

What are the selection criteria of UPS, DGs and battery bank?

Q. No.5

Explain the working and operation of CFL and LED with neat diagram?

OR

Q. No.5

Explain the term candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor?

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes

Branch: Electrical Engineering
Course Code: BT EE 506A
Course Title: Economics for Engineers

Max Time: 3 Hrs
Max Marks: 70

Instructions:

Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).

Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2*7 = 14)

a) Differentiate between Fixed cost and variable cost?
b) Define Inelastic demand?
c) Mention any three examples of annuity?
d) Define the term Debt?
e) Define salvage value?
f) Define Risky Situation with suitable example?
g) Define Present Worth Analysis?

PART –II

Q. No.2 Differentiate between average cost and marginal cost with suitable example and also describe the importance of opportunity cost with suitable example? (14 marks)

OR

Q. No.2 Define the term Cost indexes and explain the various types of price elasticity of demand with suitable example? (14 marks)

Q. No.3 Write down the importance of Cash flow statements and also explain the importance of time value of money while taking various business decisions? (14 marks)

OR

Q. No 3 Differentiate between compounding and discounting techniques and calculate the future value of the deposit of Rs 50000 made by Mr. X today, in a Bank at 12% rate of interest compounded quarterly for four years. (14 marks)

Q. No.4 Describe the importance of Break Even analysis with suitable example and also explain the usefulness of sensitivity analysis to the business organizations with suitable example? (14 marks)

OR

Q. No .4 Consider the following two mutually exclusive alternatives.

	A	B
Cost	Rs 8,000	Rs 10,000
Uniform annual benefit	Rs 940	Rs 1360
Useful life (years)	Rs 15	Rs 15

Using a 15% interest rate, determine which alternative should be selected based on the future worth method of comparison (F/P,i,n = 16.367; P/F,i,n = 0.0611; F/A,i,n = 102.444; A/F,i,n = 0.0098; P/A,i,n = 6.2593; A/P,i,n = 0.1598 and A/G,i,n = 5.3651)? (14 marks)

Q. No.5 Differentiate between direct and indirect taxes with suitable examples and Explain the various forms in which firms can borrow long term sources of finance? (14 marks)

OR

Q. No.5 Differentiate between Inflation and Deflation with suitable examples and explain the importance and usefulness of Wholesale price index and Consumer price index? [14 marks]

Central University of Haryana
ODD Semester Carry Examination March 2023
B.Tech. Programmes
Branch: Electrical Engineering

Course Code: BTEE532A
Course Title: Power Plant Engineering

Max Time: 3hrs
Max. Marks:70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Describe renewable sources of energy solar and wind?
(b) State any two advantages of thermal power plant.
(c) State any three types of condensers used in thermal power plants.
(d) List out advantages of disadvantages of wind turbine.
(e) What is super-heater?
(f) What is the use of moderator?
(g) State any two disadvantages of nuclear power station.

PART –II

Q. No.2
What is the working and Classifications of the boilers.
OR
Q. No.2
Describe Nuclear Power Plant and Sketch the line diagram of the plant.

Q. No.3
What is thermal power plant. What are the classifications and how site is selected for it?
OR
Q. No 3
Describe about the specification and Characteristics of Hydro generator?

Q. No.4
What are the Principle of energy production by nuclear fission and Draw Schematic diagram of nuclear power plant
OR
Q. No .4
Describe Different types of reactors and Problems of nuclear power plants.

Q. No.5
Explain the working principle of Diesel power plant? Describe its component in brief with schematic diagram?
OR
Q. No.5
Explain the working principle of gas power plant? Describe its component in brief with schematic diagram?

Central University of Haryana
ODD Semester Carry Examination March 2023
B.Tech. Programmes
Branch: Electrical Engineering

Course Code: BTEE523A
Course Title: Industrial Electrical System

Max Time: 3hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) What is Tariff Structure?
b) Describe metering systems?
(c) Describe earthing of Commercial installation?
(d) Explain PCC and MCC panels?
(e) Explain Inverse current characteristics and draw its symbol?
(f) What is contactor?
(g) Explain difference between Switchgear and Relay?

PART –II

Q. No.2
Explain the operating principle of protection components Fuse, MCB, MCCB and ELCB?
OR
Q. No.2
Explain the selection of cable, switches and wire?

Q. No.3
What are the general rules and guidelines for installation of residential and commercial wiring system?
OR
Q. No 3
Explain the mechanism of electrical shock and state electrical safety practices?

Q. No.4
How to calculate KVar and related equipment for power factor correction?
OR
Q. No .4
What are the selection criteria of UPS, DGs and battery bank?

Q. No.5
Explain the working and operation of CFL and LED with neat diagram?
OR
Q. No.5
Explain the term candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor?

Central University of Haryana
Odd Semester Term End Examination March 2023
B.Tech. Programmes

Branch: Electrical Engineering
Course Code: BT EE 506A
Course Title: Economics for Engineers

Max Time: 3 Hrs
Max Marks: 70

Instructions:

Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).

Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2*7 = 14)

a) Differentiate between Fixed cost and variable cost?
b) Define Inelastic demand?
c) Mention any three examples of annuity?
d) Define the term Debt?
e) Define salvage value?
f) Define Risky Situation with suitable example?
g) Define Present Worth Analysis?

PART –II

Q. No.2 Differentiate between average cost and marginal cost with suitable example and also describe the importance of opportunity cost with suitable example? (14 marks)

OR

Q. No.2 Define the term Cost indexes and explain the various types of price elasticity of demand with suitable example? (14 marks)

Q. No.3 Write down the importance of Cash flow statements and also explain the importance of time value of money while taking various business decisions? (14 marks)

OR

Q. No 3 Differentiate between compounding and discounting techniques and calculate the future value of the deposit of Rs 50000 made by Mr. X today, in a Bank at 12% rate of interest compounded quarterly for four years. (14 marks)

Q. No.4 Describe the importance of Break Even analysis with suitable example and also explain the usefulness of sensitivity analysis to the business organizations with suitable example? (14 marks)

OR

Q. No .4 Consider the following two mutually exclusive alternatives.

	A	B
Cost	Rs 8,000	Rs 10,000
Uniform annual benefit	Rs 940	Rs 1360
Useful life (years)	Rs 15	Rs 15

Using a 15% interest rate, determine which alternative should be selected based on the future worth method of comparison (F/P,i,n = 16.367; P/F,i,n = 0.0611; F/A,i,n = 102.444; A/F,i,n = 0.0098; P/A,i,n = 6.2593; A/P,i,n = 0.1598 and A/G,i,n = 5.3651)? (14 marks)

Q. No.5 Differentiate between direct and indirect taxes with suitable examples and Explain the various forms in which firms can borrow long term sources of finance? (14 marks)

OR

Q. No.5 Differentiate between Inflation and Deflation with suitable examples and explain the importance and usefulness of Wholesale price index and Consumer price index? [14 marks]

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT PHY 113A — **Max Time: 3 hrs**
Course Title: Mechanics — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

a) What is the difference between scalar and vector transformations?
b) What is an inertial frame of reference, and how is it used in physics?
c) What is the form invariance of Newton's Second Law?
d) What is the difference between polar coordinates and Cartesian coordinates?
e) A particle moves in a potential field with a potential energy function $V(x) = -x^3$. Calculate the force acting on the particle if it is located at $x = -1$ m.
f) A satellite of mass m is in orbit around a planet with a radius r, and a speed v. Calculate the angular momentum of the satellite.
g) A box of mass m is pushed up a ramp with an angle θ from the horizontal by a constant force F. Calculate the work done by the force

PART –II

Q. No.2 What is a three-dimensional coordinate frame of reference, and how is it used to represent the position and orientation of objects in space through three mutually perpendicular axes?
OR
Q. No.2 How do scalars and vectors transform under rotations, and what is the relationship between the magnitude and direction of the vector before and after the rotation transformation?

Q. No.3 What is the mathematical formulation of the Kepler problem in terms of central forces, and how can it be used to describe the motion of celestial bodies?
OR
Q. No 3 What is a damped harmonic oscillator, and how does it differ from a simple harmonic oscillator in energy dissipation?

Q. No.4 What is the relationship between the angular velocity vector and moment of inertia tensor in describing the three-dimensional motion of a rigid body?
OR
Q. No .4 What are fictitious forces in a noninertial frame of reference, and how do they arise due to the acceleration of the frame and affect the motion of objects within the frame?

Q. No.5 What is a free body diagram, and how is it used to model the forces and moments acting on a body due to typical supports and joints, such as pin joints, roller joints, and fixed supports, in the analysis of mechanical systems? Can you provide a specific example to illustrate the concept?

OR

Q. No.5 What is the principle of invariance of Newton's second law of motion, and how does it demonstrate that the law remains valid in all inertial frames of reference, regardless of their relative motion or orientation?

Central University of Haryana
ODD Semester Examination March 2023
B.Tech. Programmes
Branch: Electrical Engineering

Course Code: BTEE532A — **Max Time: 3hrs**
Course Title: Power Plant Engineering — **Max. Marks:70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Describe renewable sources of energy solar and wind?

(b) State any two advantages of thermal power plant.

(c) State any three types of condensers used in thermal power plants.

(d) List out advantages of disadvantages of wind turbine.

(e) What is super-heater?

(f) What is the use of moderator?

(g) State any two disadvantages of nuclear power station.

PART –II

Q. No.2

What is the working and Classifications of the boilers.

OR

Q. No.2

Describe Nuclear Power Plant and Sketch the line diagram of the plant.

Q. No.3

What is thermal power plant. What are the classifications and how site is selected for it?

OR

Q. No 3

Describe about the specification and Characteristics of Hydro generator?

Q. No.4

What are the Principle of energy production by nuclear fission and Draw Schematic diagram of nuclear power plant?

OR

Q. No .4

Describe Different types of reactors and Problems of nuclear power plants.

Q. No.5

Explain the working principle of Diesel power plant? Describe its component in brief with schematic diagram?

OR

Q. No.5

Explain the working principle of gas power plant? Describe its component in brief with schematic diagram?

Central University of Haryana
V/VII & Re-Appear VI Semester Term End Examination March 2023
B.Tech. Programmes
Branch: Electrical Engineering

Course Code:BT EE505A — **Max Time:3Hrs**
Course Title: Electromagnetic Fields — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Consider a cylinder of length L and radius R. Obtain its volume by integration ?

(b) Determine the electric field E at the origin due to a point charge of 54.9nC located at (-4, 5, 3) m in cartesian co-ordinates ?

(c) What is electric flux? Explain the concept of electric flux density?

(d) Define current density. Write the relation between current and current density?

(e) Write the expression for Lorentz force equation and write its significance.

(f) What is a magnetic dipole? How it is differ from electric dipole?

(g) Write the integral and point forms of Faraday's laws.

PART –II

Q. No.2 (a) Determine the electric field intensity due to infinite line charge, at a point perpendicular to its plane and at a given distance from the line charge from first principles.

(b) Find the electric field at distance 'z' above the center of a flat circular disc of radius 'r', which carries a uniform surface charge. (7+7)

OR

Q. No 2.(a) Derive the Relationship between electric field and electric potential.

(b) A Charge of -0.3 μC is located at A(25, -30, 15) (in cm) and a second charge of 0.5 μC is at B(-10, 8, 12) cm. Find E at (i) the origin (ii) P(15, 20, 50) cm. (7+7)

Q. No.3 (a) Explain different types of polarization.

(b) Find the maximum charge that can be held on the isolated sphere 2m diameter, the sphere being in air with dielectric strength 40 kV/cm. What would be the maximum charge if this sphere were in oil of r = 3.5 and dielectric strength of 75 kV/cm. (7+7)

OR

Q. No 3.(a) What is meant by electric dipole? Derive the expression for electric field intensity due to electric dipole.

(b) Two dipoles with dipole moments -5 az nC/m and 9 az nC/m are located at points (0, 0, -2) and (0, 0, 3) respectively. Find the potential at the origin.(a) Derive the integral form of continuity equation and also write its meaning? (7+7)

Q. No.4 (a) A filamentary current of 15A is directed in from infinity to the origin on the positive x axis and then back out to infinity along the position y-axis. Use the Biot-Savart's law of find H at P (0, 0, 1)?

(b) Find the magnetic field intensity at centre of a square of sides equal to 5m and carrying a current equal to 10 A. (7+7)

OR

Q. No 4.(a) State Ampere's circuital law and explain any two applications of Ampere's Circuital law.

(b) Obtain the expression for magnetic field intensity due to infinite long straight carrying a steady current I. (7+7)

Q. No.5 (a) State the Poynting Theorem and derive the necessary expressions.

(b) Explain the concept of displacement current and obtain an expression for the Displacement current density. (7+7)

OR

Q. No.5 (a) Explain (i) Conduction Current. (ii) Displacement current.

(b) Derive the Maxwell's four equations for time varying fields (7+7)

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT PHY 113A — **Max Time: 3 hrs**
Course Title: Mechanics — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

a) What is the difference between scalar and vector transformations?
b) What is an inertial frame of reference, and how is it used in physics?
c) What is the form invariance of Newton's Second Law?
d) What is the difference between polar coordinates and Cartesian coordinates?
e) A particle moves in a potential field with a potential energy function $V(x) = -x^3$. Calculate the force acting on the particle if it is located at $x = -1$ m.
f) A satellite of mass m is in orbit around a planet with a radius r, and a speed v. Calculate the angular momentum of the satellite.
g) A box of mass m is pushed up a ramp with an angle θ from the horizontal by a constant force F. Calculate the work done by the force

PART –II

Q. No.2 What is a three-dimensional coordinate frame of reference, and how is it used to represent the position and orientation of objects in space through three mutually perpendicular axes?
OR
Q. No.2 How do scalars and vectors transform under rotations, and what is the relationship between the magnitude and direction of the vector before and after the rotation transformation?

Q. No.3 What is the mathematical formulation of the Kepler problem in terms of central forces, and how can it be used to describe the motion of celestial bodies?
OR
Q. No 3 What is a damped harmonic oscillator, and how does it differ from a simple harmonic oscillator in energy dissipation?

Q. No.4 What is the relationship between the angular velocity vector and moment of inertia tensor in describing the three-dimensional motion of a rigid body?
OR
Q. No .4 What are fictitious forces in a noninertial frame of reference, and how do they arise due to the acceleration of the frame and affect the motion of objects within the frame?

Q. No.5 What is a free body diagram, and how is it used to model the forces and moments acting on a body due to typical supports and joints, such as pin joints, roller joints, and fixed supports, in the analysis of mechanical systems? Can you provide a specific example to illustrate the concept?

OR

Q. No.5 What is the principle of invariance of Newton's second law of motion, and how does it demonstrate that the law remains valid in all inertial frames of reference, regardless of their relative motion or orientation?

CENTRAL UNIVERSITY OF HARYANA

Term End Examinations March 2023

Programme: M.Tech Civil, CSE and Elec. **Session: 2022-23**

Semester: 1st **Max. Time: 3 Hours**

Course Title: English for Research Paper Writing **Max. Marks: 70**

Course Code: MT AU 101

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. Attempt any four parts (4X3.5=14)

a) How can we ensure that the abstract of our paper has maximum impact?

b) Define ambiguity. Mention any two ways of removing it.

c) Are questions in titles a good way to attract attention? Briefly discuss.

d) What do you mean by Impact factor? What kind of a paper one should write to get it published in high impact factor journals?

e) Who are false friends? Quote an example.

f) What do you mean by readability of a research paper? Name the factors affecting the readability of your paper.

g) What key skills are required in writing the conclusion section?

Q 2. Attempt ant two questions (2X7=14)

a) While planning your research paper what points one should take care of to keep the referees happy?

b) Do as given in brackets:

i) Concerning the side effects of the treatment, only one serious effect is currently known about. [Rewrite the sentence so that it begins with a subject] (1 mark)

ii) With each operation / is associated / a number / which refers to the ranking. [choose the best word order] (1 mark)

iii) In addition, in the mass spectrum are evident peaks at m / z 438, 411, and 410. [Rearrange and / or rewrite the sentence so that the information appears in a more logical order. Delete any redundancy.] (1 mark)

iv) In the given sentences below there is one redundant word in both the sentences. Remove and rewrite them. (2 marks)

The results obtained highlight that x = y. Our research activity consists of x and y.

v) **Divide up the given long sentence into more manageable and shorter sentences that will help the reader understand the content better. You may need to rearrange the word order and / or delete unnecessary words.** (3 marks)

People who have attended boarding schools often have no realization of the effect that leaving their parents at a very young age has had on their emotional development because the signs of this effect generally do not become sufficiently apparent until middle age and are often due to a kind of subconscious repression which is why such subjects do not make the connection between their current levels of over-emotiveness and their childhood lack of parental affection

c) Rearrange the following six sentences (A), (B), (C), (D), (E) and (F) in the proper sequence to form a meaningful paragraph; Also provide a suitable TITLE to the paragraph.

(A) Speculations on future events in the epidemiology, evolution, and biological expression of dengue are presented. (B) At the root of the emergence of dengue as a major health problem are changes in human demography and behaviour, leading to unchecked populations of and increased exposure to the principal domestic mosquito vector *Aedes aegypti*. Virus-specified factors also influence the epidemiology of dengue. (C) The risk of sequential infections, and consequently the incidence of DHF, has risen dramatically, first in Asia and now in the Americas. (D) A severe form, dengue hemorrhagic fever (DHF), is an immune-pathologic disease occurring in persons who experience sequential dengue infections. (E) In the last 20 years the incidence of dengue fever epidemics has increased and hyper endemic transmission has been established over a geographically expanding area. (F) Dengue viruses are members of the *Flaviviridae*, transmitted principally in a cycle involving humans and mosquito vectors.

Q3. Attempt ant two questions (2X7=14)

a) Differentiate between hedging and highlighting. Why and when a writer should hedge.

b) Is an automatic Spell check enough for making a research paper free of spelling mistakes?

c) How we should write an abstract which is to be sent to a conference?

Q 4. Attempt ant two questions. (2X7=14)

a) Write a short paragraph on "Soft Skills". (about 120 words)

b) Differentiate between abstract and introduction section of a research paper.

c) How the researcher should discuss the limitations of his/her research?

Q 5. Attempt ant two questions (2X7=14)

a) What key skills are required when writing a Review of Literature?

b) How should the Methods section be structured?

c) How will a research paper writer end the Discussion section if the paper does not have a Conclusion section?

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes Civil/CSE
Branch: Civil/CSE

Course Code: BT HUM 101B
Course Title: English Language Skills

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) What are three P's of professional writing?

(b)Differentiate between CV, Resume and Bio-data.

(c) Differentiate between BATNA and WATNA.

(d)Define three kinds of Resume.

(e) Give two advantages of Telephonic interview.

(f) Mention any two personal gains that one gets on writing a report.

(g) Define paragraph. Name the four components of a paragraph.

PART –II

Q. No.2 (a) Do as directed in brackets. (7 marks)

i) Everyone of the prisons _____ full. (is/are)

ii) Neither my friend not I _____ to blame (is/am/was)

iii) Three parts of the business _____ left for me to do. (are/is)

iv) She called him a fool. (Identify the verb pattern)

v) You have made your shirt dirty. (Identify the verb pattern)

vi) I saw him crossing the bridge. (Identify the verb pattern)

vii) We have paid him the money. (Identify the verb pattern)

(b) i) Complete the following passages with the most appropriate choices given in brackets.

Insects do not have (1)_____ (wings, vision, absorption) as sharp as that of mammals or birds. The insect compound eye is more familiar to movement and so it cannot (2)_____ (hilariously, precisely, tangibly) position distant objects. So, insects tend to take a rather unsteady flight path to navigate to a particular object. (2 marks)

ii) You are HR of an ABC Publishing house. Interview is to be conducted for clerical staff. As the HR you need to inform the shortlisted candidates for details (venue, timings, etc.)

regarding the interview. Draft a NOTICE in 50 words covering all the necessary information which is to be displayed at the Head Office. (5 marks)

OR

Q. No.2 (a) Write an essay on "Soft Skills: Key to Success" in about 200 words. (7 marks)

(b) Arrange the following sentences in the correct order to construct a unified and coherent paragraph. Give an appropriate TITLE to the paragraph. (7 marks)

i) By passing the steam through specially designed turbines geared to the generator to be rotated, electric power can be produced.

ii) In some countries an alternative source of heat energy is provided by the controlled nuclear fission of uranium and other fissile elements.

iii) By the combination of such fuels in the boiler, high-pressure steam can be generated.

iv) Coal, oil, and natural gas are the commonest prime sources of energy.

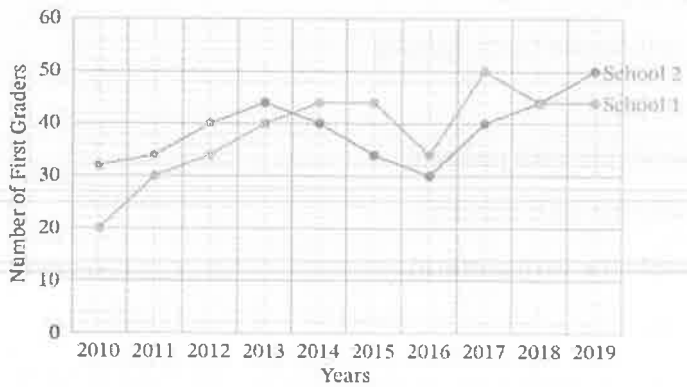
v) The electric power thus produced is fed into the distribution network of power lines and cables radiating from the generation station.

vi) The energy released by the nuclear reaction heats a stream of gas which is used to raise steam for driving the turbines and generators.

vii) it is here from that the electric power is transmitted to its industrial customers.

Q. No.3 (a) The following line graphs compare the average number of first graders in two different schools for 10 years. The orange line represents school 1, and the blue line represents school 2. Compare the two line graphs with the use of proper comparatives in about 150 words.

(7 marks)



(b) (i) Differentiate between Bell and Belle by using them in sentences. (2 marks)

(ii) Differentiate between Anonymous and Unanimous by using them in sentences (2 marks)

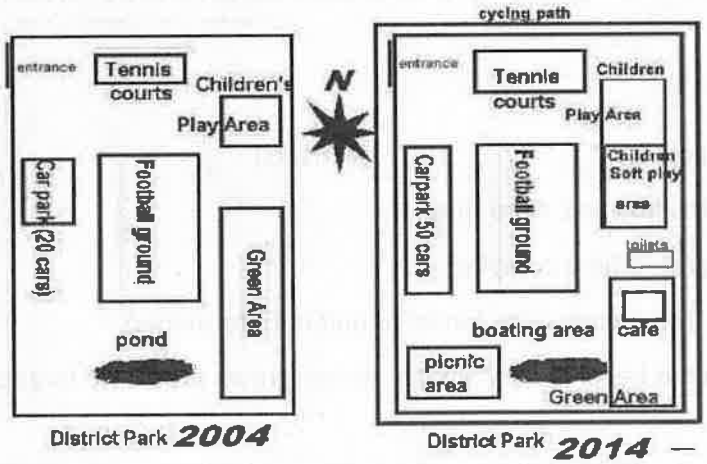
(iii) Give one-word substitution of: One for whom the world is home. (1 mark)

(iv) Construct a sentence for the Idiom: "Flash in the pan" (1 mark)

(iv) Use the following phrasal verb "nod off" in your sentence

OR

Q. No 3 (a) Elaborate the changes seen in a District within 10 years in 150 words. Use appropriate comparatives. (7 marks)



The diagrams show how a District park looked ten years ago and how it looks now.

(b) Do as directed in brackets: (7marks)

i) I want to find a gym that is not only close to my apartment but also I want to find a cheap one. (make the sentence parallel)

ii) Using twenty-one different instruments, they will collect data that scientists hope will help explain the origins of comets and other celestial bodies. (Delete the redundant word or phrase)

iii)Use the following phrasal verbs in sentences: call off; count on.

iv)Give one word substitution of : One who does not drink wine.

v) Differentiate between Cease and Seize by using them in sentences.

Q. No.4 (a) do as directed in brackets: (7 marks)

i) She wants a medical advice (change the adjective into adjective phrase)

ii) He tried hard (Change into adverb phrase)

iii) We enjoy cricket (change into noun phrase)

iv) All desire wealth and some acquire it (change to passive)

v) He must work very hard to make up for the lost time (change into compound)

vi)I called him but he gave me no answer (into Simple)

vii) He replied to the best of his ability (into complex)

(b) Do as directed in brackets: (7 marks)

i) If I had been there, I ..... have helped. (would/could/either)

ii) Whatever you do, do well. (Identify whether Complex, compound or simple)

iii) They saw the storm approaching. (Change into passive)

iv) They saw the storm approaching. (Into passive)

v) Alice was not much surprised at this. (into active)

vi) One should keep one's promises. (Into passive)

vii) Had I known in advance, I ____ enough money. (would take/ will take/ took/ would have taken)

OR

Q. No 4 (a) Do as directed in brackets: (7 marks)

i) He remarked how impudent the boy was. (into simple)

ii) Do as I tell you or you will regret it. (into complex)

iii)The Russians burnt Moscow. The French were forced to quit it. (into simple)

iv) He was my school fellow. He has become a great man. He has grown proud. He forgets his old friends. (into compound)

v) Do not insult the weak. (into passive)

vi) If I were you, I _____ him right away (will dismiss/ would dismiss/ would have dismissed)

vii) The melody has been composed wonderfully by A.R. Rahman. (change into active)

(b) In modern times, working women are facing problems like eve teasing, sexual harassment, gender discrimination at the time of promotion, salary fixation etc. You, as the Head of Women Welfare Association, have been asked to write a report on Gender Discrimination at Work Places. Prepare a Questionnaire to be sent to women professionals working in various organizations in order to elicit the relevant information. (7 marks)

Q. No.5 (a) The following advertisement was given in The Hindustan Times. Write a COVER letter with a detailed CV for the given post : Wanted a Plant Manager (Operations) at our new factory in Gaziabad, UP. Engineering Graduates with minimum 5 years experience in manufacturing industries as Plants Managers can apply. Salary is negotiable. Apply with particulars to Box 650, The Hindu, Chennai- 600004. (7 marks)

(b) "Her only message of cheer to people who knew they had not much longer to live was *Bhogoban Achhen*". Discuss about Mother Teresa in the light of the above statement. (7 marks)

OR

Q. No.5 (a) Define negotiation. Give the requisites of a negotiation process. (7 marks)

(b) Lala Har Dayal in his book "Hints for Self Culture" discusses about five groups of natural phenomena. Name them and discuss them briefly. (7 marks)

Central University of Haryana
First Semester Term End Examination March, 2023
B.Tech. Programmes

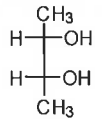
Branch: EE and PPT
Course Code: BT CH 102A **Max Time: 03:00 Hrs**
Course Title: Chemistry **Max Marks: 70**

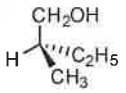
Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q 1.

a. Metals A and B are having their reduction potential as -3.05 and -0.40 respectively, which one of them A or B will be most reducing agent.
b. How many kinds of protons are in CH_3-CH=CH_2?
c. Calculate the bond order of NO^- molecule using molecular energy level diagram?
d. How you will differentiate between aniline and anilinium ion via λ_{max} value in UV spectroscopy?
e. Are racemic mixture and meso compound the same, if no, support with examples?
f. When does a real gas obey the ideal gas equation closely?
g. Define absolute configuration for following compounds. (7×2=14)





PART –II

Q. No.2

a. Which of the two $[Co(H_2O)_6]^{+2}$ or $[Co(CN)_6]^{-3}$ has smaller Δ value? Explain with suitable diagram. Also give the magnetic nature of the complexes.
b. What is the ΔE between the n=4 and n=5 states for an F_2 molecule confined within in a one-dimension box of length 3.0 cm?
c. What is meant by "Effective nuclear charge"? Calculate Z_{eff} experienced by a 2p electron in nitrogen atom? 5, 5, 4

Or

a. What do you mean by the angular probability distribution of d orbitals? Give the pictorial presentation.
b. Calculate the number of unpaired e^- and CFSE value in the following complexes:
I. $[Fe(CN)_6]^{-3}$ ion and II. $[Cr(NH_3)_6]^{+3}$ ion
c. Construct the π-molecular orbitals of benzene and butadiene. 4, 6 ,4

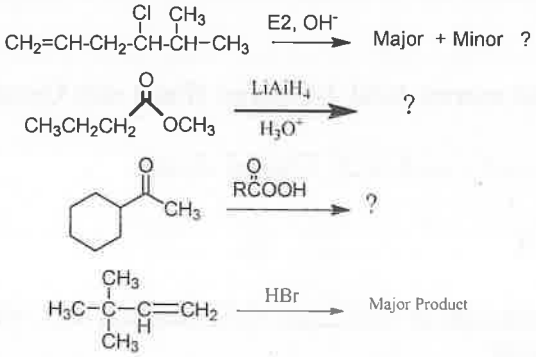
Q 3.

a. What is chirality? Is chiral center, the necessity condition for a molecule to be chiral? Explain.
b. Give the pictorial presentation of conformational analysis in butane considering rotation about C2-C3 bond?

c. If tert-Butyl chloride is treated with OH^- at low temperature than what mechanism will be followed in substitution reaction. 4,5,5

Or

(a) Complete the following reactions with mechanistic details. 3.5×4=14



Q. No.4

a. Carbon is a better reducing agent below 710 °C while carbon monoxide is better reducing agent above 710 °C. Explain using Ellingham diagram.

b. The rusting of iron is electrochemical corrosion, Explain? Why the contact with the more reactive metal does not contribute to the rusting of iron.

c. Calculate the pH and pOH of 0.03 M solution of HCl at 25 °C. 4, 5, 5

Or

a. What is entropy? Why the change in entropy in a system is not a suitable criteria to define spontaneous change?

b. Calculate the half-cell potential at 25 °C for the reaction

$Zn^{2+}_{(aq)}(0.1\ M) + 2e \longrightarrow Zn_{(s)}$

$E^{o}_{Zn^{2+}/Zn} = -0.76$ V.

c. Enthalpy change for the transition of water to vapour is 40.8 kJ/mol at 373 K. Calculate entropy change for the reaction. 4, 5,5

Q 5.

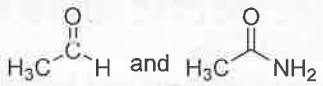
a. Acetone has two absorption bands in its UV spectrum, one at 180 nm and one at 280 nm. Why these two absorption bands? Explain. 4,6,4

b. What is the principal of IR spectroscopy? Differentiate between figure print and functional group region. Give any two factors which affect the intensity of an IR absorption band?

c. Benzene C-H chemical shift (δ) values are greater than alkenes C-H chemical shift, why?

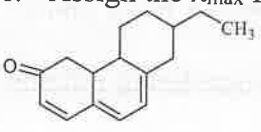
Or

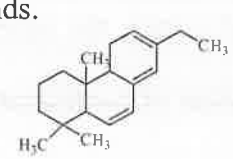
a. How could you differentiate following pair of compounds from their IR spectra?

i) H_3C-OH and CH_3-CH_3 ii)  and

b. What is chemical shift in NMR spectroscopy? Draw the finer NMR spectrum (with splitting) for ethanol.

c. Assign the λ_{max} for the following compounds. 5,4,5





Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch: Civil Engineering, Computer Science Engineering

Course Code: BT EE 103A **Max Time: 3 Hours**
Course Title: Basic Electrical Engineering **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice (Each sub-question carries seven marks)

PART -I

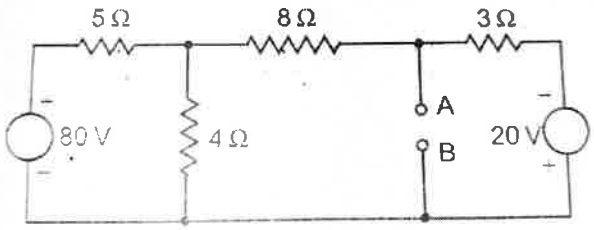
Q. No.1

(a) Define form factor.
(b) State and draw power triangle.
(c) State superposition theorem.
(d) State most important application of Thevenin's theorem.
(e) What do you mean by exciting resistance and exciting reactance?
(f) Why is a commutator needed in dc motor?
(g) Define ampere-hour efficiency of a battery.

PART –II

Q. No.2

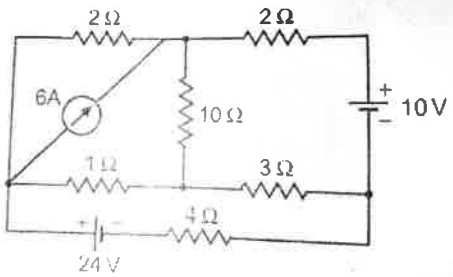
a) Obtain Thevenin's equivalent circuit at AB, in the given network



a) State and explain Norton's theorem and draw its equivalent circuit.

OR

Q. No.2 Determine the current in the 4 ohm resistance of the circuit shown in given network.



Q. No.3

a) When sinusoidal AC voltage is applied across a pure inductor, show that power consumed in the circuit is zero. Further, draw the phasor and wave diagram for voltage and current.

b) Derive the Time domain analysis of the first order series RL circuit.

OR

Q. No 3

a) Explain the behaviour of parallel R-L-C circuit with sinusoidal input.

b) Explain series resonance. Why it is called the voltage resonance?

Q. No.4 What are the various losses in a transformer? Where do they occur and how do they vary with load? How to minimize them and how to measure these losses? Explain in detail with digram.

OR

Q. No .4

a) Explain the construction and working of the single phase capacitor start Induction motor.

b) Draw and explain electrical and mechanical characteristics of the DC shunt and DC series motors.

Q. No.5 Write short note on following:

a) MCCB

b) Earthing

OR

Q. No.5 Explain the working, characteristics, advantages and applications of nickel-iron alkaline cell.

Central University of Haryana
Term End Examination March 2023
B.Tech. Programmes
Branch: Civil, PPT and Electrical Engineering (Regular and Reappear)

Course Code: BTMAT112B — Max Time: 3 Hours
Course Title: Engineering Mathematics 1 — Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2 (two) to 5 (five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Find the n^{th} derivative of $e^{ax}cosbx$.

(b) If $A = \frac{1}{3}\begin{bmatrix} 1 & 2 & a \\ 2 & 1 & b \\ 2 & -2 & c \end{bmatrix}$ is orthogonal, find a, b, c.

(c) If $u = \sin^{-1}\left(\frac{x+y}{\sqrt{x}-\sqrt{y}}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{\tan u}{2}$,

(d) Examine the convergence of the series

$$\sum_{n=1}^{\infty} \frac{1}{3}.$$

(e) Show that the following limit does not exists

$$lim_{(x,y)\to(0,0)}\left[\frac{x^2}{x^4+y^2}\right]$$

(f) Prove that $\Gamma(1/2) = \sqrt{\pi}$.

(g) Evaluate the integral

$$\int_0^{\infty} \frac{x^8(1-x^7)}{(1+x)^{25}}dx$$

PART –II

Q. No.2 (a) Use elementary transformations to find the rank of the following matrix:

$$\begin{bmatrix} 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \\ 10 & 11 & 12 & 13 & 14 \\ 15 & 16 & 17 & 18 & 19 \end{bmatrix}$$

(b) Using Cayley-Hamilton theorem, find the inverse of $\begin{bmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$

OR

Q. No.2 (a) Find two non-singular matrices P & Q such that PAQ is in the normal form for the following matrix:

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 1 & 3 & 2 \\ 2 & 3 & 1 \end{bmatrix}$$

(b) Find the characteristic polynomial, eigenvalues, and eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

Q. No.3(a) Examine the convergence of the series:

$$\frac{1}{2} + \frac{1}{5} + \frac{1}{10} + \cdots$$

(b) Discuss the convergence of the series

$$1 + \frac{a+1}{b+1} + \frac{(a+1)(2a+1)}{(b+1)(2b+1)} + \frac{(a+1)(2a+1)(3a+1)}{(b+1)(2b+1)(3b+1)} + \cdots$$

OR

Q. No 3(a) (b) Discuss the convergence of the series

$$\sum_{n=1}^{\infty} \frac{1}{(n+1)\log(n+1)}$$

(b) Find the interval of convergence of the series

$$\sum_{n=1}^{\infty} \frac{(x+2)^{n-1}}{\sqrt{n}}$$

Q. No.4(a) Find the asymptotes of the curve $(x+y)^2(x+y+2) = x + 9y - 2$

(b) The arc of parabola $y^2 = 4x$ between $x = 1/2$ and $x = 1$ is rotated about x-axis. Find the area of the surface generated.

OR

Q. No.4(a) Show that

$$\Gamma(m)\Gamma\left(m + \frac{1}{2}\right) = \frac{\sqrt{\pi}}{2^{2m-1}}\Gamma(2m)$$

(b) Find the surface of the solid formed by revolving the cardioid $r = a(1 + cos\theta)$ about the initial line.

Q. No.5 (a) If $u = \sin^{-1}\dfrac{x+y}{\sqrt{x}+\sqrt{y}}$, prove that $x^2\dfrac{\partial^2 u}{\partial x^2} + 2xy\dfrac{\partial^2 u}{\partial xy} + y^2\dfrac{\partial^2 u}{\partial y^2} = -\dfrac{\sin u \cos 2u}{4\cos^3 u}$.

(b) A rectangular box, open at the top, is to have a volume of 32 c.c. Find the dimensions of the box requiring lease material for its construction.

OR

Q. No.5 (a) Discuss the maxima and minima of $f(x,y) = x^3y^2(1-x-y)$.

(b) If

$$u = \frac{yz}{x}, v = \frac{xz}{y}, w = \frac{yx}{w}$$

Show that the jacobian of u, v, w with respect to x, y, z is 4.

Central University of Haryana
Term End Examination 2023
B.Tech. Programmes

Branch: FIRST YEAR EE

Course Code: BT PHY 115 A **Max Time: 3 Hour**
Course Title: Waves, Optics & Quantum Mechanics **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Describe the Bloch's Theorem
(b) The Fermi energy of copper is 7 eV. Calculate de Broglie wavelength of the electron
(c) what is difference between metal and semi-metal
(d) what do you mean by p-type and n-type semiconductor
(e) Explain the phenomena of population inversion.
(f) Describe Quantum Nanowires
(g) What are the applications of optical fibers

PART –II

Q. No.2 Discuss in detail the Kronig – Penny model for a linear lattice. How does it lead to the formation of energy band in solids?
OR
Q. No.2
Explain Fermi-Dirac distribution function. Plot this function for various temperatures including 0K. Determine the resistivity by Four Probe Method.

Q. No.3 Describe the density of states for 3D, 2D, 1D and 0D systems.
OR
Q. No 3 Discuss the effect of donor and acceptor impurities in semiconductors. Explain the action of a P-N junction diode and mention its important applications.

Q. No.4 Describe the Damped harmonic oscillations. Explain the effect of damping on oscillatory motion.
OR
Q. No .4 Define and explain wave motion, transverse waves, and longitudinal waves.

Q. No.5 Describe the differences between Stimulated Emission and Spontaneous Emission. What is laser and its major components.
OR
Q. No.5 What do you understand by the resolving power of grating? Derive the necessary expression.