Central University of Haryana
Even Semester Term End Examination Aug-Sept 2022
B. Tech. Programme
Branch: Electrical/CIVIL/PPT

Course Code: BT MAT 120 (A/B) **Max Time: 3 Hours**
Course Title: Mathematics-II **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) Find integrating factor and hence solve the differential equation $y(2x^2 - xy + 1)dx + (x - y)dy = 0$.

b) Find the solution of Bernoulli equation $dx - (x^2y^3 + xy)dy = 0$.

c) Discuss the transformation $w = sinz$.

d) Find a homogeneous linear differential equation with real coefficients of lowest order which has $x^2e^{2x} + 2e^{-2x}$ as the particular solution.

e) Using Cauchy-Riemann equations, show that the function $f(z) = Arg(z)$ is not analytic at any point.

f) Find the directional derivative of $f = xy^2 + yz^3$ at (2, -1, 1) in the direction of the vector $\bar{\imath} + 2\,\bar{\jmath} + 2\bar{k}$.

g) Find the constant a and b so that the surface $ax^2 - byz = (a + 2)x$ will be orthogonal to the surface $4x^2y + z^3 = 4$ at the point $(1, -1, 2)$.

PART –II

Q 2.

a) Find the general solution of the equation $(D^2 + 2D + 1)y = e^{-x} \ln x$, using the method of variation of parameters.

b) Solve the differential equation $x^2y'' + 3xy' + y = \frac{1}{(1-x)^2}$

OR

Q 2.

a) Find the current at any time $t > 0$ in a circuit having in series a constant electromotive force $40V$, a register 10 Ω, and an inductor $0.2H$ given that initial current is zero. Find the current when $E(t) = 150\ cos200t$.

c) Find the general solution of the equation $(D^2 + 9)y = x^2cos3x$, using the method of undetermined coefficients.

Q3.

a) i) Determine the poles of the function $f(z) = \frac{z+1}{z^2(z-3)^2}$ and find the residue at each pole.

ii) Apply Cauchy Residue theorem to evaluate $\int_0^{2\pi} \frac{d\theta}{(5-3sin\theta)^2}$.

b) Evaluate $\int_C \frac{e^{2z}}{(z+1)^4} dz$, where C is the circle $|z| = 2$ using Cauchy integral formula.

OR

Q 3.

a) Expand the function $f(z) = \frac{1}{z(z-1)(z-2)}$, for $|z| > 2$ using Laurent's series.

b) i) Show that the function $v(x,y) = e^x \, siny$ is harmonic. Find the conjugate function $u(x,y)$ and the corresponding analytic function $f(z)$.

ii) Prove that the function $f(z) = \sin z$ is analytic in the finite z-plane.

Q 4.

a) Define irrotational field and prove that $\bar{A} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$ is irrotational. Find a scalar function $f(x,y,z)$ such that $\bar{A} = \nabla f$.

b) Find the area of the region in the first quadrant bounded by the curves $y = x, y = \frac{1}{x}$, and $y = \frac{x}{4}$, Using Green's theorem.

OR

Q 4.

a) Verify Stroke's theorem for $\bar{A} = x^2 i + xyj$, where S is the square

$$0 \le x \le a, \qquad 0 \le y \le 0, in\ the\ xy\ plane$$

b) If $\nabla f = (y^2 - 2xyz^3)i + (3 + 2xy - x^2z^3)j + (6z^3 - 3x^2yz^2)k$, find f if $f(1,0,1) = 8$.

Q 5.

a) Evaluate $\iint_R e^{-(x+y)} \sin\left(\frac{\pi y}{x+y}\right) dx\, dy$ where R is the entire first quadrant in the xy-plane.

b) Calculate the area which is inside the cardioid $r = 2(1 + cos\theta)$ and outside the circle $r = 2$.

OR

Q 5.

a) i) Evaluate the integral $\int_0^{\pi} \int_0^{x} x \, siny \, dy \, dx$.

ii) Evaluate the integral $\iint_D (4xy - y^2) dx\, dy$ where D is the rectangle bounded by $x = 1, x = 2, y = 0, y = 3$.

b) Evaluate $\iiint \left[\frac{(1-x-y-z)}{xyz}\right]^{\frac{1}{2}} dx\, dy\, dz$ taken over the volume bounded by the planes $x = 0, y = 0, z = 0$ and $x + y + z = 1$.

Central University of Haryana
Second Semester Term End Examination Aug-Sept. 2022
B.Tech. Programmes

Branch: CSE and CE
Course Code: BT CH 102A
Course Title: Chemistry

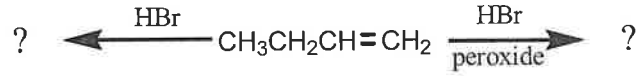
Max Time: 03:00 Hrs
Max Marks: 70

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.

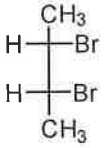
PART -I

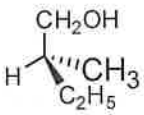
Q 1.

a. Which indicator is used to calculate the alkalinity of water due to OH^- and CO_3^{2-} ions?
b. What is meant by "Doping"?
c. How you will differentiate between aniline and anilinium ion via λ_{max} value in UV spectroscopy?
d. How many fundamental modes of vibrations do you expect from C_6H_6 molecule?
e. What is MRI? Why it is important?
f. Complete the reaction



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 $[Co(NH_3)_6]^{+3}$ has smaller Δ value? Explain with suitable diagram.
b. I) Discuss the factors affecting electron gain enthalpy and the trend in its variation in the periodic table.
II) An element X (Atomic number 20) burns in the presence of oxygen to form a basic oxide: state its group and period number in the Modern Periodic Table also write a balanced chemical equation for the reaction when this oxide is dissolved in water.
c. Derive the time independent Schrodinger equation and explain their physical Significance. 4, 5, 5

Or

a. In a region of space, a particle with mass m and with zero energy has a time-independent wave function $\psi(x) = Axe^{-x2}/L^2$ where A and L are constants. Determine the potential energy U(x) of the particle.
b. Calculate the number of unpaired e^- and CFSE value in the following complexes:

I. $[Fe(NH_3)_6]^{+3}$ ion II. $[Cr(NH_3)_6]^{+3}$ ion III. $[Co(Cl)_4]^{3-}$ ion

c. Draw π-molecular orbitals of benzene and butadiene 4, 6 ,4

Q 3.

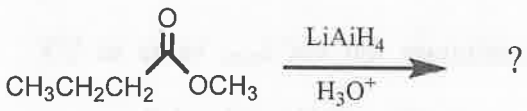
(a) Give the pictorial presentation of conformational analysis in butane considering rotation about C2-C3 bond?

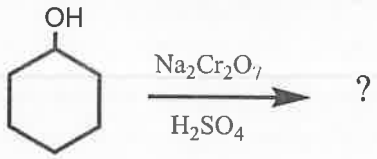
(b) Differentiate between racemic mixture and meso compound with example.

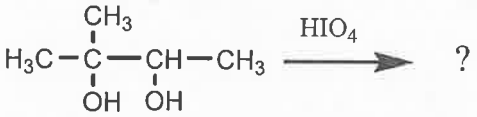
(c) Discuss substitution reaction in tert-Butyl chloride with mechanistic details. 5,4,5

Or

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







Q. No.4

a. Calculate the weight of ethane (C_2H_6) in a $5X10^{-3}$ m^3 vessel at 398K and $1.01x10^7$ Nm^{-2} pressure, using ideal gas equation. ($R=8.31$ JK^{-1} mol^{-1})

b. Calculate the emf of the cell in which the following reaction takes place:
$Ni(s) + 2Ag^+ (0.002\ M) \rightarrow Ni^{2+} (0.160\ M) + 2Ag(s)$. Given that $E^0cell = 1.05$ V

c. Predict the products of electrolysis in each of the following:
(i) An aqueous solution of $AgNO_3$ with silver electrodes
(ii) An aqueous solution $AgNO_3$ with platinum electrodes
(iii) A dilute solution of H_2SO_4 with platinum electrodes
(iv) An aqueous solution of $CuCl_2$ with platinum electrodes. 4, 5, 5

Or

a. Calculate the pressure exerted by 1.5 moles of water vapour in $1x10^{-2}m^3$ volume at 423K using van der Waal's equation. For water $a=0.552$ Nm^4mol^{-2}, $b=3.05x10^{-5}m^3mol^{-1}$ and $R=8.31JK^{-1}mol^{-1}$.

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

c. The standard electrode potential of zinc ions is 0.76V. What will be the potential of a 2M solution at 300K? 5, 4, 5

Q 5.

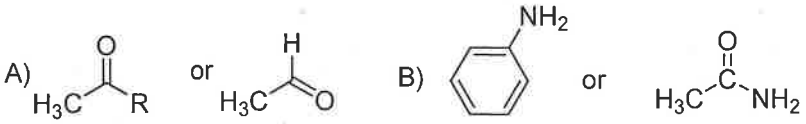
(a) Benzene C-H chemical shift (δ) values are greater than simple alkenes C-H chemical shift, why?

(b) What is IR spectroscopy? List three factors that influence the intensity of an IR absorption band?

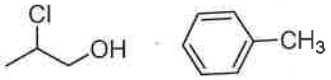
(c) Vinyl acetone has two absorption bands in its UV spectrum, one at 236 nm and one at 314 nm. Why these two absorption band? Explain.

or

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



(b) Draw the finer NMR spectrum (with splitting) for following compounds.



(c) What is surface characterization techniques? Explain one technique in detail?

Central University of Haryana
Second Semester Term End Examination Sept. 2022
B.Tech. Programmes
Branch: Electrical Engineering/Printing & Packaging Technology

Course Code: BTPHY 115A **Max Time: 3 Hrs**
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) Calculate the de Broglie wavelength for a beam of electron whose energy is 50 eV.

(b) Calculate the probability current density of wave function $\psi=1/r\ (e^{ikr})$. Where $r=(x^2+y^2+z^2)^{1/2}$.

(c) What is wavefunction and give condition for the normailized wave function.

(d) State and explain the Bloch's theorem for particles in a periodic potential.

(e) What are electrical oscillators. Drive the energy of the oscillator as an LC circuit.

(f) Differentiate longitudinal and transverse waves. Calculate the frequency of the radio waves transmitted by a station if the wavelength of these waves is 300m.

(g) Explain Fraunhofer diffraction.

PART –II

Q. No.2 What is Simple Harmonic Motion? Obtain differential equation for it and calculate displacement, velocity, time period and energies of simple harmonic oscillator. Draw the graph also.

OR

Q. No.2 Explain the characteristics of Electromagnetic Waves in details. Drive the expression of mean energy density in EM waves. Find the velocity of light in free space.

Q. No.3 Give construction and working of a Michelson Interferometer. Describe the experiment to determine the following:-

(i) Wavelength of monochromatic light.

(ii) Refractive index of thin film.

(iii) Difference of two wavelength of and lines of sodium source.

OR

Q. No.3 What do you mean by spontaneous emission stimulated emission and absorption? Establish the relation between Einstein A and B coefficient. Give the construction and working of a Helium neon laser.

Q. No.4 What is Uncertainty Principle ? Use it to calculate ground state of hydrogen atom. The duration of a radar pulse is 0.25 μs. Calculate the uncertainty in the energy of photon.

OR

Q. No.4 A particle is confined in one dimensional box of length a. Solve Schrodinger equation to find energy values and energy eigen function of the particle. Calculate minimum energy of a proton in one dimensional box of width 1 A°.

Q. No.5 Explain Fermi-dirac distribution function. Plot this function for various temperature including 0K. Mobilities of electrons and holes in a sample of intrinsic germanium at room temperature are 0.37 $m^2/V.s$ and 0.18 $m^2/V.s$, respectively. If each electron and hole densities is equal to $2.5x10^{19}/m^3$, calculate the electrical conductivity and the resistivity of the germanium.

OR

Q. No.5 Discuss the concept of allowed energy bands in solids using the kronig-Penney model. Also explain the physical significance of effective mass of an electron.

Central University of Haryana
ODD Semester Term End Examination August-September 2022
B.Tech. Programmes
Branch: B.Tech. Electrical Engineering/Printing and Packaging Technology

Course Code: Programming for Problem Solving — **Max Time:3 Hrs.**
Course Title: BT CSE 104A — **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. Define Program with suitable example.
b. Discuss about sorting in Array.
c. What is a keyword in C?
d. Describe applications of Recursion.
e. Differentiate between Call by value and Call by Reference.
f. Write a program to find whether the year is leap year or not.
g. What do you mean by File Management?

PART –II

Q. No.2 Write a short note on-

i. Algorithm
ii. Software
iii. Low Level Language
iv. Syntax in C

OR

Q. No.2 What is Flowchart Diagram in C? Discuss it with the help of algorithm and flowchart with same example.

Q. No.3 Explain parameter passing in C. Discuss about call by value and call by reference with example.

OR

Q. No 3 Write a short note on –

i. Arithmetic operations in C
ii. Loops and Branching
iii. Functions with example

Q. No.4 Discuss about Recursion in C by taking an example.

OR

Q. No .4 What is Pointer? Discuss the concept by taking a suitable example. Also Describe it advantages.

Q. No.5. What do you mean by Searching and Sorting algorithms? Explain linear and binary search in detail.

OR

Q. No.5 Discuss about Dynamic Memory Allocation. Also describe calloc, malloc and realloc functions with the help of suitable example

Central University of Haryana
EVEN Semester Term End Examination August/September 2022
B.Tech. Programmes
Branch: Elec. And PPT

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)Write any TWO important purposes of writing Reports.

(b) Differentiate between BATNA and WATNA.

(c) Which day was the "Inspiration Day" for Mother Teresa?

(d) What do you mean by Netiquette. Explain with an example.

(e) What is a Questionnaire?

(f) What do you mean by PPS in a business letter?

(g) Differentiate between Inductive Methodology and Deductive Methodology of writing an Analytical Report.

PART –II

Q. No.2 Do as directed in the bracket.

(a) Two thirds of the acid _____ evaporated. (have been, has been, has, have)

(b) **DAMPEN** means (brighten, corral, diminish, grout)

(c) SVOO (frame a sentence with this pattern)

(d) How did you manage it? (Make passive voice)

(e) It is very hot. I can't go out now. (make a simple sentence)

(f) He wanted to win the prize and worked hard. (change to complex)

(g) He is a wealthy man. (change the adjective into adjective phrase)

(h) Give Synonyms of the following: Alacrity; animosity; debonair.

(i) Make sentence of the given phrasal verbs: (i) black out; (ii) come across

(j) Add Suffix to the following : Book; happy

OR

Q. No.2 Do as directed in brackets

(a) A group of smugglers _____ yesterday. (had, were, was, have been)

(b) CATAPULT means (stationary, propel, launch, gentry)

(c) SVC (frame a sentence with is pattern)

(d) You may attend the meeting. (Make passive voice)

(e) Although she is arrogant I cannot but like her. (change into compound)

(f) My brother is ill. He has high fever. (make a simple sentence)

(g) I live there. (change the adverb into adverb phrase)

(h) Give Antonyms of the following: Persuade; Yield; Zeal

(i) Make sentence of the given phrasal verbs: (i) check in (ii) carry out

(j) Add prefix to the following: friend, cover.

Q. No.3 a) Write an ESSAY on "Cyber Crime: Its remedies" with proper division into Introduction, Main Body and Conclusion.

(b) Develop a well united, coherent and short paragraph of 8-10 lines on "Agneepath: A way to bright future".

OR

Q. No 3 (a) Given below are six sentences (A), (B), (D), (E) and (F) which are jumbled up. Rearrange these sentences in the proper sequence to form a meaningful paragraph, then answer the given questions. Also Give a suitable TITLE to the paragraph.

(A) The policy makers in most of the developing economies recognise this importance and have been implementing a host of programmes and measures to achieve rural development objectives.

(B) While some of these countries have achieved impressive results from those programmes and measures, others have failed to make a significant dent in the problem of persistent rural underdevelopment.

(C) The socioeconomic disparities between rural and urban areas are widening and creating tremendous pressure on the social and economic fabric of many such developing economies.

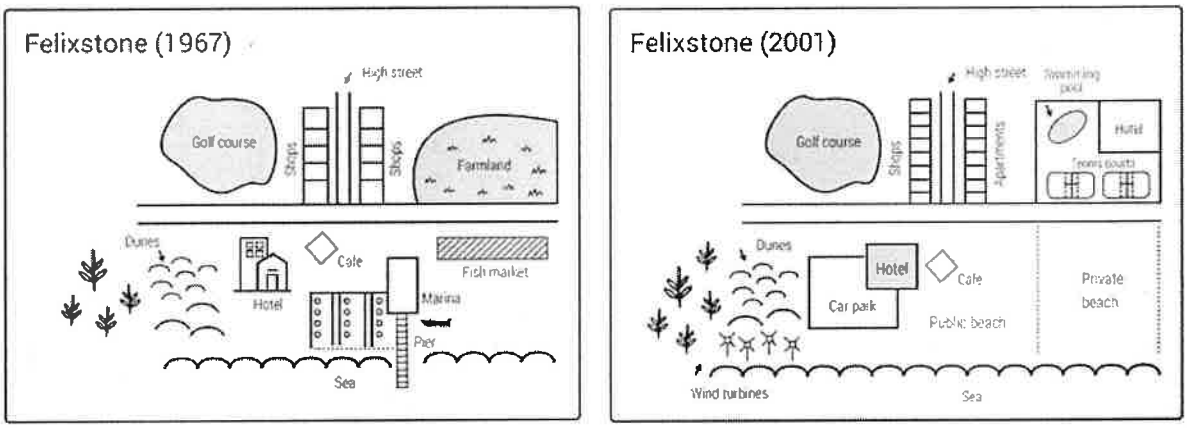
(D) These factors, among many others, tend to highlight the importance of rural development.

(E) Although millions of rural people have escaped poverty as a result of rural development in many Asian countries, a large majority of rural people continue to suffer from persistent poverty.

(F) However, eradicating hunger along with malnourishment still remains a key challenge, according to the millennium development goals.

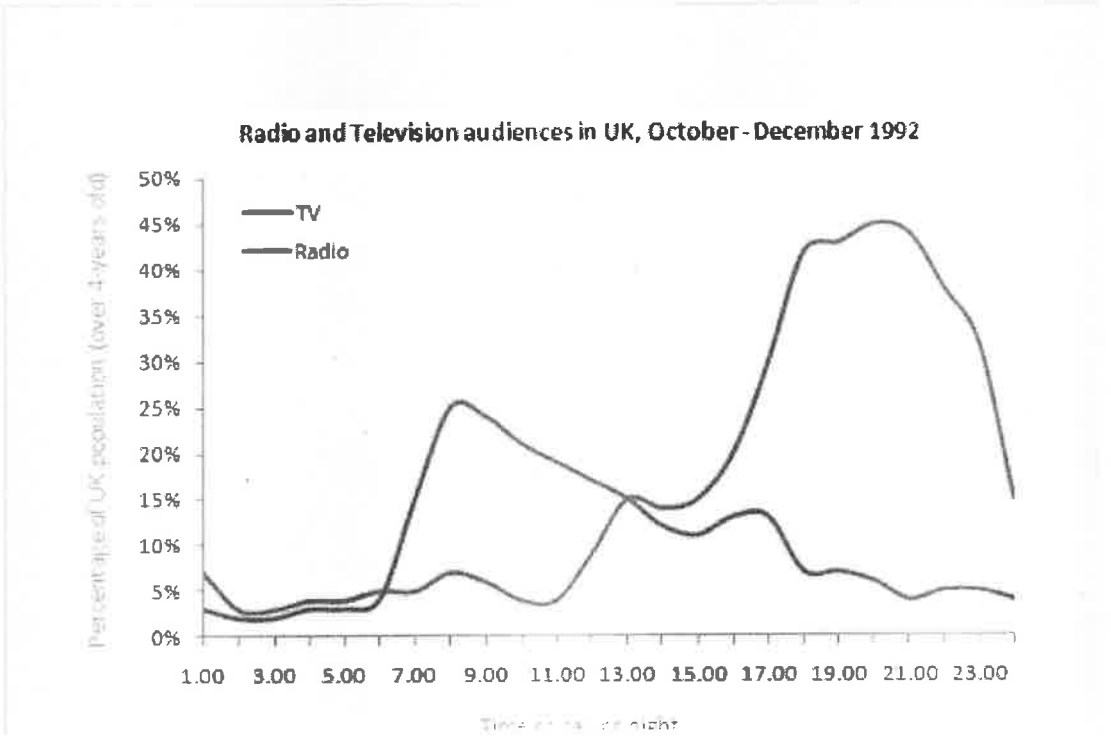
Q. No 3 (b) What are the Central Components of a Paragraph? Explain each in detail with the help of an example.

Q. No.4 (a) Look at these two maps of a place called Felixstone:



Explain the two maps with the proper use of comparatives to bring out the change in both of them. (200 words)

(b) Compare the below given two line graphs in your own words (200 words)



OR

Q. No .4 (a) Give the Complete summary of the Chapter "Mother Teresa" written by Khushwant Singh.

(b) "Sociability expresses itself in virtues". Discuss all the virtues in detail as done by Lala Har Dayal.

Q. No.5 (a) Name all the preliminary pats of a REPORT. Explain them briefly.

(b) Define Negotiation. Briefly explain Informal Negotiation.

OR

Q. No.5 (a) What do you mean by "knowing your audience' in Report Writing. Name the six different categories of audience in report writing.

(b) Who is a Negotiator? Explain the various qualities of a negotiator.

Central University of Haryana
Second Semester Term End Examination August-September 2022
B.Tech. Programmes
Branch: Electrical Engineering, Printing & Packaging Technology

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

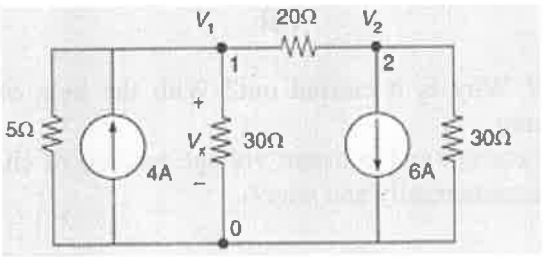
Q. No.1

(a) State Kirchhoff's current and Voltages laws.
(b) Derive the condition for the maximum power transfer.
(c) Define the Average and RMS value.
(d) What is the significance of the peak factor?
(e) Define the transformer's efficiency and maximum efficiency condition.
(f) What is commutator and why it is needed in a dc motor.
(g) Define MCCB.

PART –II

Q. No.2

a) For the given circuit determine using nodal analysis

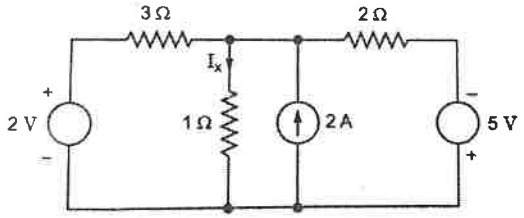


b) Explain star-to-delta and delta-to-star transformation.

OR

Q. No.2

a) Determine the current in the given circuit by using the mesh method of analysis.



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

Q. No.3

a) Derive the values of form factor and peak factor of a sinusoidal varying quantity.

b) How do you analyse series R-C circuit? Draw its phasor diagram

OR

Q. No 3

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

b) Explain parallel resonance. Why is parallel resonance called the current resonance?

Q. No.4

a) Explain the construction and working of Single Phase Transformer and derive its emf equation.

b) Describe the expression of torque for dc motor. Also discuss the characteristics of dc shunt motor.

OR

Q. No .4

a) Derive the equation for voltage regulation of 1-phase transformer at capacitive load by drawing the phasor diagram

b) Single-phase induction motor is not a self-starting. Give the reason and Explain principle of operation of a single phase induction motor.

Q. No.5 Write short note on following:

a) Miniature circuit Breakers (MCB)

b) Earth Leakage Circuit Breakers (ELCB)

OR

Q. No.5

a) What is earthing? Why is it carried out? With the help of diagrams, explain the various types of earthing.

b) Explain constant current and constant voltage method of charging a battery. Which method is employed commercially and why?

Central University of Haryana
Second Semester Term End Examination August-September 2022
B.Tech. Programmes
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Course Code: BT EE 103A **Max Time: 3 Hours**
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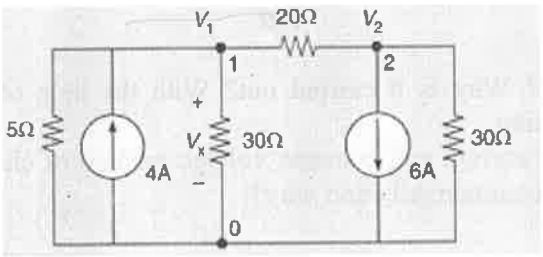

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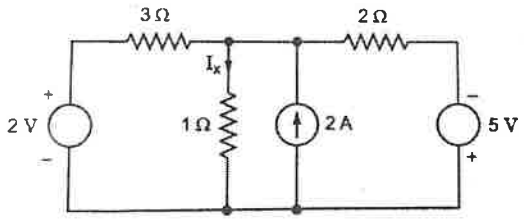

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Q. No.5

a) What is earthing? Why is it carried out? With the help of diagrams, explain the various types of earthing.

b) Explain constant current and constant voltage method of charging a battery. Which method is employed commercially and why?

Central University of Haryana
Even Semester Term End Examination September 2022
B.Tech. Programmes
Branch: CSE (Regular/ Reappear)

Course Code: **BT MAT119B /A** **Max Time: 3 hours**
Course Title: **Mathematics-II** **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.
Note: Normal table should be provided with this paper. Use of scientific calculator allowed.

PART -I

Q. No.1

(a) The Arithmetic mean and variance of a set of 10 figures are known to be 17 and 33 respectively. Of the 10 figures, one figure (that is 26) was subsequently found inaccurate, and was weeded out. What is the resulting arithmetic mean and standard deviation? **[2]**

(b) In four tosses of a coin, let X be the number of heads. Tabulate the 16 possible outcomes with the corresponding value of X. By simple counting, derive the probability distribution of X and hence calculate the expected value of X. **[2]**

(c) A random variable X has mean 12 and variance 9 and an unknown probability distribution. Using Chebyshev's theorem, estimate $P(6 < X < 18)$. **[2]**

(d) Fit a straight line to the following data set **[2]**

x:	1	1.2	1.4	1.6	1.8
y:	1	9	18	27	40

(e) A random variable X has a mean $\mu = 8$, a variance $\sigma^2 = 9$, and an unknown probability distribution. Find $P(-4 < X < 20)$. **[2]**

(f) Show that mean, mode and median coincide in normal distribution. **[2]**

(g) State Central limit theorem and explain it with the help of examples. **[2]**

PART –II

Q. No.2

(a) Suppose that the self-life, in years, of a certain perishable food product packaged in cardboard containers is random variable whose probability density function is given by **[7]**

$$f(x) = \begin{cases} e^{-x} & x > 0 \\ 0, & \text{elsewhere} \end{cases}$$

Let X, Y and Z represent the self-lives for three of these containers selected independently and find $P(X < 2, 1 < Y < 3, Z > 2)$.

(b) There are two bags A and B. A contains n white balls and 2 black balls and B contains 2 white balls and n black balls. One of the two bags is selected at random and two balls are drawn from it without replacement. If both balls drawn white and the probability that bag A was used to draw the balls is 6/7, find the value of n. **[7]**

OR

(a) Assume that a firm has selected a random sample of 100 from its production line and has obtained the data shown in the table below: **[7]**

Class interval	Frequency	Class interval	Frequency
130-134	3	150-154	19
135-139	12	155-159	12
140-144	21	160-164	5
145-149	28		

Compute (i) mean; (ii) standard deviation and (iii) Karl Pearson's coefficient of skewness.

(b) In a certain college, 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body. (a) What is the probability that mathematics is being studied? (b) If a student is selected at random and found is to be studying mathematics, find the probability that the student is a girl (c) a boy? [7]

Q. No.3

(a) An insurance company insures 4000 people against loss of both eyes in a car accident. Based on previous data, the rate were computed on the assumption that on the average 10 persons in 100000 will have car accident each year that result in this type of injury. What is the probability that more than three of the insured will collect on their policy in the given year? [7]

(b) The marks obtained by 10 students in Mathematics (X) and Statistics (Y) are given below. Find the coefficient of correlation and rank correlation between X and Y [7]

Roll No.	1	2	3	4	5	6	7	8
X	75	30	60	80	53	35	15	40
Y	85	45	54	91	58	63	35	43

OR

(a) The following data due to Weldon shows the result of throwing 12 fair dice 4096 time; a throw of four five or six being called success [7]

Success	Frequency	Success	Freq
0	-	7	847
1	7	8	536
2	60	9	257
3	198	10	71
4	430	11	11
5	731	12	-
6	948		

Fit a binomial distribution and find the expected frequencies.

(b) The ranks of same 16 students in Mathematics and Physics are as follows. Two numbers within brackets denote the ranks of the students in Mathematics and Physics: [7]

(1,1) (2,10) (3,3) (4,4) (5,5) (6,7) (7,2) (8,6) (9,8) (10,11) (11,15) (12,9) (1
(14,12) (15,16) (16,13)

Calculate the rank correlation coefficient for proficiencies of this group in Mathematics and Physics.

Q. No.4

(a) The local authorities in a certain City install 10,000 electric lamps in the streets of the city. If these lenses have an average life of a 1000 burning are the standard deviation of 200 hours assuming normality, what number of lamps must be expected to fail (i) in the first 800 burning hours? (ii) between 800 to 1200 [7]

burning hours? (iii) after what period of burning hours would you expect that (a) 10% of the lamp would fail? (b) 10% off the lamp would be still burning?

(b) Two random variables X and Y have the joint probability density function: **[7]**

$$f(x,y) = \begin{cases} 2; & 0 < x < 1, 0 < y < x; \\ 0, & elsewhere \end{cases}$$

Find (i) The marginal probability density functions of X and Y.
(ii) The conditional distribution of Y for a given X, and of X for a given Y.
(iii) Check for independence of X and Y.

OR

(a) The diameter, say X, of an electric cable, is assumed to be a continuous random variable with probability density function : $f(x) = 6x(1-x), 0 \le x \le 1$ **[7]**

(i) Check that the above is a probability density function.
(ii) Obtain an expression for the cumulative distribution function of X
(iii) Compute $P(X \le 1/2 \mid 1/3 \le X \le 2/3)$.
(iv) Determine the number k such that $P(X < k) = P(X > k)$.

(b) Following are the values of $ln(x)$ for $x = 1$ to 2, with step size 0.2. **[7]**

x:	1	1.2	1.4	1.6	1.8	2
$ln(x)$:	0	0.182322	0.336472	0.470004	0.587787	0.6693147

Fit a quadratic curve to these values, and use the result to compute the value of $ln(1.7)$.

Q. No.5

(a) A distribution with unknown mean has variance equal to 1.5. Use Central limit theorem to find how large a sample should be taken to form the distribution in order that the probability will be at least 0.95 that the sample mean will be within 0.5 of the population mean. **[7]**

(b) A survey of 800 families with four children each revealed the following distribution: **[7]**

No. of boys:	0	1	2	3
No. of girls:	4	3	2	1
No. of families:	32	178	290	236

Is this result consistent with the hypothesis that male and female births are equally probable?

OR

(a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal, are same against that they are not, at 5% level of significant. **[7]**

(b) The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64,64, 66 inches. Is it reasonable to believe that the average height in greater than 64 inches? Teat at 5% significance level assuming that for 9 degree of freedom $P(t > 1.83) = 0.05$. **[7]**

Central University of Haryana
Second Semester Term End Examination Sept. 2022
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

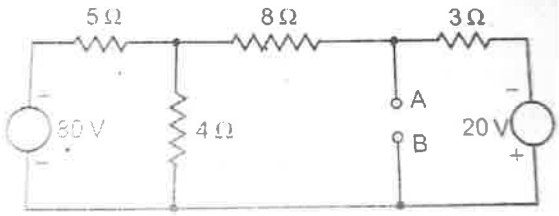
Q. No.1

(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

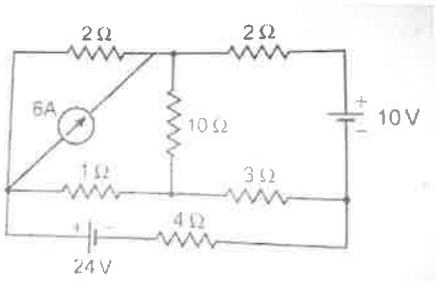
a) Obtain Thevenin's equivalent circuit at AB, in the given network



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.