Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI & ML/DS)(CE/CSE/IT/ETE/EEE/ECE/EE/DS/CSD)/(Robotics & Artificial Intelligence) (Internet of Things and Cyber Security including Block Chain Technology)(Block Chain)(ME)(FT)(Sem.–1)

ENGINEERING MATHEMATICS-I

Subject Code : BTAM101/23

M.Code : 93796

Date of Examination : 16-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Define oscillatory sequence with the help of an example.

   b) Show that the series $1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \ldots \frac{1}{2^{n-1}}$ .... converges to the sum 2.

   c) Define Comparison Test for the series.

   d) Find the length of the arc of the curve $y = x^{\frac{2}{3}}$ from $x = -1$ to $x = 8$.

   e) Test for convergence of integral $\int_1^{\infty} \frac{\log x}{x^2} \, dx$.

   f) Define Gamma function.

   g) What is Homogenous function? Give an example.

   h) Evaluate $\lim\limits_{\substack{x \to 1 \\ y \to 2}} \frac{2x^2 y}{x^2 + y^2 + 1}$.

(S2)-1496

i) Evaluate $\int\limits_{0}^{2}\int\limits_{0}^{y^2} e^{x/y}\, dx\, dy$.

j) Evaluate $\int\limits_{0}^{1}\int\limits_{0}^{\sqrt{1-x^2}}\int\limits_{0}^{\sqrt{1-x^2-y^2}} x\, y\, z\, dz\, dy\, dx$.

SECTION-B

2. Prove that the sequence $\{a_n\}$ where $a_n = \left(1 + \dfrac{1}{n}\right)^n$ is convergent.

3. Discuss the convergence or divergence of the series $\sqrt{\dfrac{1}{2^3}} + \sqrt{\dfrac{2}{3^3}} + \sqrt{\dfrac{3}{4^3}} + \ldots\ldots\ldots$

4. Find the area of the surface of revolution formed by the curve $r = 2a \cos\theta$ about the initial line.

5. Prove that $\beta(m,n) = \dfrac{\Gamma(m).\Gamma(n)}{\Gamma(m+n)}$ where $m > 0$, $n > 0$.

SECTION-C

6. If $V = (x^2 + y^2 + z^2)^{\frac{1}{2}}$, prove that $x\dfrac{\partial V}{\partial x} + y\dfrac{\partial V}{\partial y} + z\dfrac{\partial V}{\partial z} = -V$.

7. By Taylor's theorem, expand $e^x \sin y$ in power of x and y up to third degree term.

8. Evaluate $\int\limits_{0}^{1}\int\limits_{0}^{\sqrt{1-x^2}} y^2\, dy\, dx$, by change of order of integration.

9. Find the volume of the tetrahedron bounded by the coordinate planes and the plane $\dfrac{x}{a} + \dfrac{y}{b} + \dfrac{z}{c} = 1$.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AI&DS/BlockChain/CE/CSE/AI&ML/CSD/EEE/EE/ECE/FT/IT/ME/
Internet of Things and Cyber Security including Block Chain
Technology)   (Sem.–1)

ENGINEERING MATHEMATICS-I

Subject Code : BTAM 101-23

M.Code : S93796

Date of Examination: 16-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Section-A is compulsory consisting of TEN questions carrying TWO marks each.
2. Each Section-B & C consist of FOUR questions of EIGHT marks.
3. Attempt any FIVE questions from Section-B & Section-C, Selecting at least TWO question from each one of the TWO sections.

SECTION-A

1. Solve the following:

   a) Define sequence and series with the help of an example.

   b) Prove that the sequence $(-1)^n$ does not converge.

   c) Prove that the series $\sum_{n=1}^{\infty} \frac{1}{\lfloor n}$ converges.

   d) Find the length of the arc of the parabola $y^2 - 4y + 2x = 0$ that lie in the first quadrant.

   e) Test for convergence of integral $\int_{1}^{\infty} x^n e^{-x} dx$.

   f) Define Gamma function.

   g) Find first order partial derivative of $u = \frac{x}{y} \tan^{-1}\left(\frac{y}{x}\right)$.

(S-2578)

h) Evaluate $\lim_{\substack{x \to 1 \\ y \to 1}} \dfrac{3xy^2}{2x^2 + 3y^2 + 4}$.

i) Evaluate $\int\limits_{0}^{1} \int\limits_{x^2}^{2-x} xy \, dy \, dx$.

j) Evaluate $\int\limits_{-1}^{1} \int\limits_{0}^{z} \int\limits_{x-z}^{x+z} x + y + z \; dy \, dx \, dz$.

SECTION-B

2. Prove that the sequence $\{a_n\}$ where $a_n = \left(8 + \dfrac{1}{n^3}\right)$ is a cauchy sequence and find its limit.

3. Discuss the convergence or divergence of the series $\sum \left(n\log+\dfrac{2n+1}{2n-1} - 1\right)$.

4. Find the volume of the solid obtained by revolving one arc of the cycloid $x = a(\theta + \sin\theta)$ and $y = a(1 + \cos\theta)$ about x-axis.

5. Prove that $\beta(m,n) = \int\limits_{0}^{\infty} \dfrac{x^{m-1}}{(1+x)^{m+n}} \, dx = \int\limits_{0}^{\infty} \dfrac{x^{n-1}}{(1+x)^{m+n}} \, dx, m,n > 0$.

SECTION-C

6. If $V = x^2 \, y-z + y^2 \, z-x + z^2 \, x-y$, then $\dfrac{\partial V}{\partial x} + \dfrac{\partial V}{\partial y} + \dfrac{\partial V}{\partial z} = 0$.

7. Obtain Taylor's expansion for $f(x,y) = e^{xy}$ at $(1,1)$ up to third term.

8. Evaluate $\int\limits_{0}^{1} \int\limits_{3y}^{3} e^{x^2} \, dx \, dy$, by change of order of integration.

9. Find the volume common to the sphere $x^2 + y^2 + z^2 = a^2$ and the cylinder $x^2 + y^2 = ay$.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09   Total No. of Pages : 02

B.Tech.(AI & ML/Block Chain/CE/CSE/CS/DS/CSD/EE/ECE/IT/ME/
/Internet of Things and Cyber Security including Block Chain
Technology) (Sem.–1,2)
PROGRAMMING FOR PROBLEM SOLVING
Subject Code : BTPS101/18
M.Code : 93803
Date of Examination : 20-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

l.   Answer Briefly :

  a. What is conditional operator? Give an example on how to use it.

  b. Explain different types of computer memory.

  c. What is pseudocode? Give an example.

  d. Give an example of logical error in C.

  e. Write the syntax of (if- else if) control statement.

  f. What is an array? How to initialize each element of the array?

  g. What is a function? Differentiate between user-defined and library function.

  h. Differentiate between array and structure.

  i. What is pointer? How can we access a variable using pointer?

  j. Differentiate between while and do-while loop.

SECTION-B

2. What is recursion? Write a program to find the factorial of a number using recursion.

3. Write a program to find the sum of all elements of an array.

4. Explain in detail various type of operators in C.

5. Explain various data types in C.

SECTION-C

6. Write a program or algorithm to implement bubble sort.

7. Explain in detail various string library functions with the help of proper syntax.

8. What is an operating system? List various features or characteristics of operating system.

9. Write a program to check if the given number is prime or not?

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Total No. of Questions : 09

Total No. of Pages :03

B.Tech.(AI&ML/DS/Block Chain/CE/CSE/Cyber Security/Computer Science and Design)/EE/ECE/ETE/IT/ME/(Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technolog) (Sem.–1, 2)

ENGLISH

Subject Code : BTHU-101-18

M.Code : 93806

Date of Examination :23-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Do as directed :

   a. Give synonym and antonym of fast.

   b. Write full form of USSR and UNO

   c. He is worried _____ his son's well being, (fill in preposition)

   d. _____ honest critics is better than _____ fake admirer. (Fill in articles)

   e. The book that I borrowed was fascinating. (identify clause)

   f. Create antonyms of any two words using prefix "un-".

   g. Change any two words into adverb using suffix "-ly"

   h. The dog waged _____ tail as soon as _____ saw her. (use pronouns)

   i. People was discussing the matter in an outrageous manner. (identify the error and correct it)

   j. She almost drove her kids to school every day. (place the modifier at correct place)

SECTION-B

2. What strategies can you use to improve the flow of your writing?.

3. How does the use of headings and sub-headings improve document organization?

4. What are the essential elements of a strong introduction?

5. Draft an introduction to a paper on "Environmental Degradation".

SECTION-C

6. Write an email to your client apologising him/her for the delivery of wrong assignment.

7. Write an essay on any of the following: The Impact of Technology on Communication, The Role of Education in Personal Development, or Social Media: A Double-Edged Sword.

8. **Make a precise of the following and give a suitable title :**

In recent years, the importance of mental health awareness has gained significant traction in society. Mental health issues affect millions of people globally, yet they often remain stigmatized and misunderstood. Raising awareness about mental health is crucial for promoting understanding and compassion among individuals. Educational campaigns and public discussions can help dismantle the stereotypes surrounding mental illness, allowing those affected to seek help without fear of judgment. Additionally, workplaces are increasingly recognizing the need for mental health resources, such as counseling services and employee support programs. By fostering a culture that prioritizes mental well-being, organizations not only enhance productivity but also contribute to a healthier workforce. Schools, too play a pivotal role in this movement by integrating mental health education into their curricula, equipping students with the knowledge and tools to support their peers. Moreover, promoting self-care practices, such as mindfulness and stress management techniques can empower individuals to take charge of their mental health. Ultimately, the goal of increasing mental health awareness is to create a supportive environment where everyone feels safe to express their struggles and seek assistance. By breaking down barriers and encouraging open conversations, society can work towards a future where mental health is treated with the same importance as physical health, benefiting individuals and communities as a whole.

9. **Read the following paragraph and answer the questions that follows:**

Renewable energy sources such as solar, wind, and hydropower have become increasingly important in the fight against climate change. Unlike fossil fuels, which release greenhouse gases when burned, renewable energy is considered sustainable and

environmentally friendly. The adoption of these energy sources can significantly reduce our carbon footprint and reliance on non-renewable resources. Many countries are investing in renewable technologies to create jobs, boost their economies, and promote energy independence. Additionally, advancements in technology have made renewable energy more efficient and cost-effective, allowing it to compete with traditional energy sources. Transitioning to renewable energy not only helps combat climate change but also contributes to a cleaner environment and healthier communities.

Comprehension Questions :

a. What are the three types of renewable energy sources mentioned in the paragraph?

b. How do renewable energy sources differ from fossil fuels in terms of environmental impact?

c. What are two benefits of adopting renewable energy mentioned in the text?

d. Why is investing in renewable technologies important for countries?

e. How have advancements in technology affected the competitiveness of renewable energy?

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Total No. of Questions : 09

Total No. of Pages : 03

B.Tech. (AI & ML / AI & DS / AE / CE / CSE / DS / IOT / EE / ECE / IT / ME / Internet of Things and Cyber Security including Block Chain Technology) (Sem.–1,2)

CHEMISTRY-I

Subject Code : BTCH-101-18

M.Code : 75343

Date of Examination : 20-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A
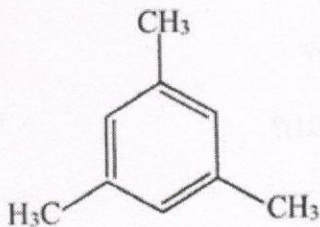
l. Write short notes on:

   a) What are the criteria for the molecule to be aromatic?

   b) What is role of doping on band structure?

   c) What is magnetic resonance imaging(MRI)?

   d) What is dry corrosion?

   e) Differentiate between ion dipole and dipole-dipole interaction.

   f) What is cell potential?

   g) What are the differences between diastereoisomer and enantiomer?

   h) What are possible geometries for a metal complex with four coordination, number?

   i) What is polarizability?

   j) What is Chirality? Explain with examples.

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SECTION-B

2. a) Derive the Schrodinger wave equation for a particle in one dimension box.

   b) Draw the molecular orbital diagram of NO molecule.

3. a) Discuss the crystal field splitting in octahedral complexes.

   b) What is the principle of electronic spectroscopy?

4. a) What is Entropy?

   b) What is Ellingham diagram? How can it be constructed? Discuss its important characteristics.

5. a) How many signals are present in following compounds in PROTON NMR SPECTROSCOPY?

   1. CH_3-NH_2

   2. CH_3-CH_2-O-CH_3

   3.

   4. CH_3-CH_2.CH_2-OH

   b) Explain the mechanism of fluorescence and phosphorescence by Jablonski diagram.

SECTION-C

6. a) What is electrochemical corrosion? Discuss its various types.

   b) Calculate the equilibrium constant for the reaction.

   Sn^{2+} (aq) + Pb(s) $\rightleftharpoons$ Sn(s) + Pb^{2+} (aq)

   At 298K given E° (Sn^{2+}/Sn) = - 0.14V and E° (Pb^{2+}/Pb) = -0.13 V

7. a) Discuss the structure of BCl_3 and NH_3 according to VSEPR theory.

b) Why ionisation energy of nitrogen is more than oxygen?

c) Explain why electron affinities of halogens are high?

8. Discuss the potential energy surface diagram of H_3.

9. a) What are addition reaction? Explain with examples.

b) Discuss the various possible isomerisation in transitional metal complexes.

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Total No. of Questions : 09

B.Tech. (AI & ML/CSE/DS/IT/Internet of Things and Cyber Security including Block Chain Technology) (Sem.–1,2)

SEMI-CONDUCTOR PHYSICS

Subject Code : BTPH-104-18

M.Code : 75360

Date of Examination:23-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write briefly:**

   a) Why are electrons in metals often considered to have free-electron behavior?

   b) Out of direct and indirect band gap materials, which is used to fabricate LED and why?

   c) In a solid, consider the energy level lying 0.01 eV above Fermi level. What is the probability of this level being occupied by an electron at 200 K?

   d) How does doping affect the electrical properties of an intrinsic semiconductor?

   e) Describe the depletion region in a p-n junction.

   f) Explain the term "population inversion" and its importance in lasers.

   g) What is optical loss, and how does it impact the performance of optoelectronic devices?

   h) What is the difference between spontaneous and stimulated emission in semiconductors?

i) What are the necessary conditions for applying Van der Pauw method?

j) Can we determine the type of extrinsic semiconductor (n-type or p-type), using hot-point probe?

SECTION-B

2. What are the special features of Classical free electron theory of metals? Derive an expression for the electrical conductivity of a metal.

3. What is Kronig-Penny model? Solve Schrödinger wave equation for periodic potential and explain the origin of energy bands in solids.

4. Obtain the expression for electron density in n-type extrinsic semiconductor.

5. What is the need of extrinsic semiconductors? Discuss the effect of temperature on the Fermi level in extrinsic semiconductors.

SECTION-C

6. What is Fermi's golden rule? Derive the expression for joint density of states.

7. Define the Einstein coefficients for spontaneous and stimulated emission and absorption. Derive the relationships among these coefficients and explain their importance.

8. Define beam spot and divergence for laser beam. Explain the procedure to measure the divergence of laser beam.

9. What is Four-point probe method? How four probe is better than two probe method? Explain the measurement of resistivity using it.

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Total No. of Questions : 09

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B.Tech. (AIDS/AIML/IOT/CSD/ETE/Blockchain/CE/CSE/DS /EE/ECE/FT/IT/ME/Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology) (Sem.–1,2)

CHEMISTRY-I
Subject Code : BTCH101/23
M.Code : 93800
Date of Examination : 18-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

l. Write short notes on :

a) What does ψ^2 represent in the context of the Schrodinger wave equation?

b) Explain how n-type and p-type doping modify the band structure of a semiconductor and affect its conductivity?

c) Define chromophores and auxochromes. How do they influence the absorption spectrum of a molecule?

d) Write the expression for the energy levels of a diatomic molecule in rotational spectroscopy.

e) What are Ionic interactions, and how do they differ from dipolar interactions?

f) How does the zeolite process work in softening of hard water?

g) What is the hardness of water? Differentiate between temporary and permanent hardness.

h) What is ionization energy, and how does it vary across periods and groups in the periodic table?

i) What is optical activity and how it can be used to distinguish between enantiomers?

j) How does a free radical addition reaction occur?

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SECTION-B

2. a) How can you explain the splitting of d-orbitals in an octahedral crystal field?

   b) Give the solution to the Schrodinger equation for a particle in a one-dimensional box.

3. a) Provide the molecular orbital energy level diagram for nitrogen (N_2). Based on this diagram, determine the bond order, discuss the molecule's stability, and explain whether it is paramagnetic or diamagnetic.

   b) What is fluorescence, and how is it used in medical applications?

4. a) What are the selection rules for vibrational and rotational transitions in diatomic molecules?

   b) List two factors that can affect the wavelength (λ_{max}) and intensity of absorption bands in electronic spectroscopy. Also explain the reason.

5. a) What is the van der Waals equation of state, and how does it describe the behavior of real gases?

   b) Describe Boyle's Law and Charles's Law. Also derive the ideal gas equation.

SECTION-C

6. a) What is electrochemical corrosion, and how does it differ from dry corrosion?

   b) What is the relationship between free energy and the electromotive force (emf) of a cell?

7. a) Explain the concept of Hard and Soft Acids and Bases (HSAB) and give examples of each.

   b) Explain electron affinity and its trend across periods and groups of the periodic table giving suitable reasoning.

8. a) Perform a conformational analysis of Ethane and illustrate the potential energy diagram for its various conformations.

   b) What is chirality and explain why certain molecules are chiral?

9. a) What are the different between E1 and E2 elimination reaction?

   b) What is Markovnikov's rule, and how does it apply to addition reactions?

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B.Tech. (AE/AI&ML/AI&DS/DS/CE/CSE/ME/IOT/EEE/EE/ECE/FT/IT/Internet of Things and Cyber Security including Block Chain Technology)
(Sem.–1,2)

BASIC ELECTRICAL ENGINEERING
Subject Code: BTEE/101/18
M.Code : 75339
Date of Examination: 22-01-2025

Time : 3 Hrs.   Max. Marks: 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer the following questions in brief :

    a. Discuss Kirchoff's voltage law.

    b. Differentiate between reactive and real powers.

    c. What do you mean by rms value? What is its significance?

    d. Write down the different applications of transformers.

    e. Define voltage regulation.

    f. Discuss the importance of BH curve.

    g. Discuss the significance of torque slip characteristics.

    h. What do you mean by efficiency? Discuss.

    i. What is the importance of power factor? Discuss.

    j. List the important characteristics of batteries.

SECTION-B

2. State and prove superposition theorem by considering a suitable example.

3. A 4 ohm resistor is connected to a 10 mH inductor across a 100 V, 50 Hz voltage source. Find input current, voltage drops across resistor and inductor, power factor of the circuit, and the real power consumed in the circuit.

4. What is the need of a transformer? How is an ideal transformer different from a practical transformer? Also, discuss the different losses that occur in a transformer.

5. A coil of resistance 40 ohm and inductance 0.75 H forms part of a series circuit for which resonant frequency is 55 Hz. If the supply is 250V, 50 Hz, find (i) line current (ii) power factor (iii) power consumed and (iv) voltage across the coil.

6. What is an earth leakage circuit breaker? Discuss its principle of operation, advantages and disadvantages.

SECTION-C

7. Obtain the Thevenin's and Norton's equivalent circuit at AB.
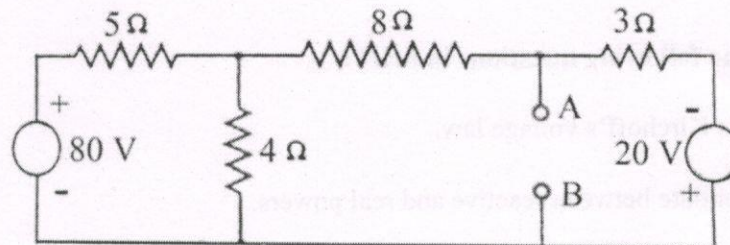
8. **Explain :**

   a. MCCB

   b. Parallel resonance .

9. **Discuss :**

   a. Autotransformer

   b. Time domain analysis of first order RL circuit.

Total No. of Pages : 02

Roll No. ☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

B.Tech.(AI & DS/ AI&ML/ Block Chain/CE/CSE/CS/CSD/EE/ECE
/ETE/FT/IT/ME/ Robotics & Artificial Intelligence/nternet of Things and
Cyber Security including Block Chain Technology)   (Sem.–1,2)

ENGINEERING GRAPHICS & DESIGN

Subject Code : BTME101/21

M.Code : 93799

Date of Examination : 02-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write short notes on:

   a) Explain with the help of an example the Unidirectional system of placement of dimensions.

   b) Show by means of traces, a plane perpendicular to both HP and VP.

   c) What do you mean by Representative Fraction (RF)?

   d) Explain Frustum and Truncated Solids with a suitable drawing.

   e) Explain the difference between 1st Angle Projection and 3rd Angle Projection.

   f) Draw projections of a line inclined to HP and parallel to VP with a suitable freehand drawing. Assume suitable dimensions. Also, show traces.

   g) How will you represent Glass and Wood on a drawing sheet?

   h) What are right solids and oblique solids? Explain with a suitable freehand drawing.

   i) Print the following statement with single stroke capital vertical letters of height 10mm:
   "EXCUSES ARE THE NAILS THAT BUILD THE HOUSE OF FAILURE"

   j) Draw a regular Hexagonal Lamina of side 55mm.

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SECTION-B

2. Draw a Diagonal Scale of R.F=1/40 to read meters, decimeters and centimeters and long enough to measure up to 8m.

3. A point "E" is 62 mm in front of VP and 49 mm above HP. Draw its projections and find out its shortest distance from the reference line.

4. Plan and elevation of a line "AB" 60mm long, measure 54mm and 45 mm respectively. End A is 15mm from HP and 10mm from VP. Draw its projections and determine its inclinations to the reference planes when the line lies in First quadrant.

5. End "C" of line' CD is 13 mm above HP and 51 mm in front of VP and end "D" 12 mm behind the VP and 35 mm below the HP. The end projectors are 52 mm apart. Draw the projections and find TL, θ, φ, HT and VT.

SECTION-C

6. A regular hexagonal thin plate of 45mm side is resting on one of its corners in HP. Draw its projections when the plate surface is vertical and inclined to VP at 30°. Also show traces. Assume the said plate lying in first quadrant.

7. A right regular triangular prism of base edge 42mm, axis 62mm long is resting on its rectangular face on HP, with axis parallel to both HP and VP. Draw its projections.

8. A right regular square pyramid of base edge 45 mm and axis 52 mm long; rests on its base on HP with one of its base edges parallel to VP. Draw its projections assuming the pyramid in 1st quadrant.

9. Draw isometric drawing of a pentagonal prism of base edge 45mm and axis 65mm long.

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B.Tech. (AI&ML/AI&DS/Block Chain/CSD/DS/
CE/CSE/CS/ECE/EEE/EE&TE/IT/ME/Robotics & Artificial
Intelligence/Internet of Things and Cyber Security including Block Chain
Technology) (Sem-1,2)

ENGINEERING PHYSICS

Subject Code : BTPH101-23
M.Code : 93794

Date of Examination : 04-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write short notes on :

   a. What is Bragg's law?

   b. Draw I-V characteristics of p-n junction.

   c. Define magnetic anisotropy.

   d. Define Poynting vector.

   e. What information can be obtained from Wave function?

   f. Write a note on Optical pumping.

   g. What is total internal reflection?

   h. Discuss two mechanisms for loss associated with optic fibres.

   i. Discuss important applications of nano-materials.

   j. Why Ruby laser is a pulsed laser?

SECTION-B

2. Distinguish between X-rays and gamma-rays. Explain the origin of Continuous and Characteristic X-rays.

3. What is Zener diode? Explain the application of Zener diode as a voltage regulator.

4. a) What is superconductivity? Distinguish between Type-I and Type-II superconductors.

   b) Distinguish between Diamagnetic and Paramagnetic materials.

5. Solve the electromagnetic wave propagation equation in free space and obtain the expression for velocity of electromagnetic wave in free space.

SECTION-C

6. Explain the construction and working of He-Ne laser with the help of energy level diagram. Why a narrow discharge tube is used in He-Ne laser?

7. Solve Schrodinger wave equation for particle in a box and show that energy of particle in a box is quantized.

8. What are different modes of propagation of signal in optical fibre? Obtain expression for normalized frequency.

9. What are Carbon nanotubes? What are the different types of Carbon nanotubes? Discuss top-down method of synthesis of nano particles.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AI&ML/AI&DS/DS/CE/CSE/IOT/EE/ECE/FT/IT/ME/Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology/) (Sem.–1,2)

PROGRAMMING FOR PROBLEM SOLVING

Subject Code : BTPS-101-18

M.Code : 75346

Date of Examination : 21-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write briefly :

   a) What are the main components of a computer system?

   b) Define syntax and logical errors with examples.

   c) What is operator precedence in arithmetic expressions?

   d) What is an array, and why is it used in programming?

   e) Define linear search in an array.

   f) What are built-in functions and why are they used?

   g) What is recursion?

   h) What is the structure in programming?

   i) What is a pointer in programming?

   j) What is file handling in programming?

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SECTION-B

2. Explain the process of converting an algorithm to a program, covering source code, variables, and memory locations.

3. Discuss the concept of loops and explain the differences between for, while, and do-while loops.

4. Discuss character arrays and how they differ from string data types in handling text?

5. Explain parameter passing in functions with examples of call by value and call by reference.

SECTION-C

6. Draw a flowchart to find the maximum of three numbers.

7. Create a program that checks if a number is prime using conditional statements and loops.

8. Explain the process of linear and binary search algorithms with examples.

9. Explain the concept of merge sort and quick sort using recursion, with a step-by-step example.

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INSTRUCTIONS TO CANDIDATES :

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2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION-A

l. **Write short notes on :**

a) Write the following statement using single stroke capital vertical letters of 12 mm size: *"WHOEVER IS HAPPY WILL MAKE OTHERS HAPPY TOO".*

b) Explain any two types Lines used in Engineering Drawing.

c) Explain with the help of an example the unidirectional system of placement of dimensions.

d) What is difference between plane scale and diagonal scale?

e) Draw a regular Hexagonal Lamina of side 65mm.

f) How will you represent Metals and Glass on a drawing sheet?

g) Draw projections of a line inclined to HP and parallel to VP with a suitable freehand drawing. Assume suitable dimensions. Also, show traces.

h) Show by means of traces, a plane perpendicular to HP and inclined to VP.

i) Differentiate between Frustum and Truncated solid.

j) Differentiate Isometric Projections and Isometric Drawing.

SECTION-B

2. Line "KL" 68mm long; has its end "K" both in HP and VP. It is inclined at 42° to the "HP" and 33° to the "VP". Draw its projections when the line is lying in first quadrant.

3. A line CD has its end "C" 10 mm above HP and 15 mm in front of VP. End "D" 42 mm above HP and 58 mm in front of VP. The distance between the end projectors, is 48 mm. Draw the projections of the line and find out its true length, true inclinations with principle planes, HT and VT.

4. A point "M" is 39mm behind VP and 32mm below HP. Draw its projections and find out its shortest distance from the reference line.

5. Construct a Plane Scale of R.F= 1:40 to read meters and decimeters and long enough to measure up to 6m. Indicate 4.4m on the scale.

SECTION-C

6. A hexagonal prism of side of base 28mm and length of axis 65mm lies on one of its rectangular faces on HP with axis Perpendicular to VP and parallel to HP. Draw its projections.

7. A circular lamina of diameter 42mm is inclined to VP at 44° and perpendicular to HP and it is resting on VP on a point on its circumference. Draw its projections. Also show traces.

8. A cone of base rim diameter 45mm and axis 65 mm lying on HP on a point of its circumference such that the generator is perpendicular to HP. Draw its projections assuming the cone lying in first quadrant.

9. Draw the isometric drawing of the Frustum of a right regular hexagonal pyramid, side of the base hexagon is 20 mm, side of top hexagon is 10 mm, and the height of the frustum is 40 mm.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech.(AI&ML/DS/Block Chain/CE/CSE/EEE/EE/ECE/IT/ME/Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology) (Sem.–1,2)

BASIC ELECTRICAL ENGINEERING

Subject Code : BTEE101-18

M.Code : 93797

Date of Examination : 08-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is ohm's law? Also discuss the limitations of ohm's law.

   b) An Electric iron is rated 1000W, 240V. Find the current drawn & resistance of the heating element.

   c) Describe the 'from factor' and 'peak factor' in terms of alternating current.

   d) Define resonance in an AC circuit.

   e) What is the necessity of Earthing?

   f) Explain the concept of power factor and its significance.

   g) Define magnetic materials and provide examples.

   h) Describe and state the laws of Kirchhoff.

   i) State the purpose of earthing in electrical systems

   j) What is the principle of power factor correction?

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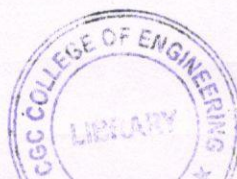
## SECTION-B

2. Discuss the time domain analysis of first order Series RL Circuit with circuit diagram.

3. A series circuit consisting of a $10\,\Omega$ resistor, a $100\mu F$ capacitor and a 10 mH inductor is driven by a 50 Hz A.C. voltage source of maximum value 100 volts. Calculate the equivalent impedance, current in the circuit and the phase angle.

4. For the single-phase transformer, obtain an expression for EMF induced in either primary side or secondary side.

5. With a neat circuit diagram, explain the behavior of individual components (resistor, inductor, capacitor) in an AC circuit.

6. Explain the purpose and functionality of a Switch Fuse Unit. Discuss the various types of fuses used in electrical wiring systems.
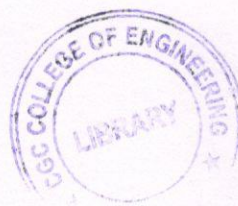
SECTION-C

7. Derive the numerical relationship between line and phase currents for a balanced 3- phase delta connection.

8. State and explain Thevenin's theorem. Using Thevenin's theorem, determine the current flowing through the load resistance (R_2) in Figure 1.
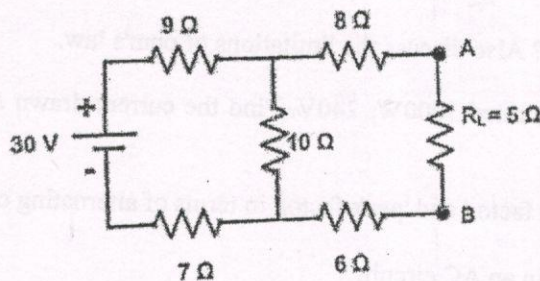
9. Explain how a rotating magnetic field is generated in a three-phase induction motor. Define the torque-slip characteristic of an induction motor.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

Total No. of Pages : 03

B.Tech.(AI & ML/DS/CSE/IT/Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology) (Sem.–2)

MATHEMATICS-II

Subject Code : BTAM204-18

M.Code : 91960

Date of Examination : 08-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

l. Solve :

a) Find the median of the following numbers :

7, 3, 5, 11, 9, 4, 8, 7, 14.

b) The mean the following data, is 16. Find k :

2, 1, 3.7, 8, k, k– 3, 11, 17, 16, 26.

c) Two dice are rolled simultaneously. Find the probability of getting a sum of 9.

d) For a moderately skewed data, the arithmetic mean is 130, the coefficient of variation is 6 and Karl Pearson's coefficient of skewness is 0.4. Find the mode.

e) If $n = 7$, $\Sigma D^2 = 9$, what is the coefficient of rank correlation?

f) Find the probability distribution of the number of tails when two coins are tossed simultaneously.

g) A random sample of 1100 females has a mean weight of 170.6 pounds. Can it be reasonably regarded as a sample from a large population of mean 171.2 pounds and standard deviation 169.1 pounds?

h) Write down the normal equation of fitting a parabola to the given data.

i) Find the value of a such that the following function is a probability density function.

$$f(x) = \begin{cases} a \sin x & 0 \le x \le \dfrac{\pi}{2} \\ 0, & \text{otherwise} \end{cases}$$

j) The percentage of students in two big universities with honours degree is 1500 and 2000 respectively. Is this difference likely to be hidden in sample of 5000 and 8000 students, respectively from the two Universities?

SECTION-B

2. a) **Calculate the mode of the following frequency distribution:**

Weight (Kg)	60-70	50-60	40-50	30-40	20-30	10-20
No.of students	16	12	25	9	11	8

b) Ram has 2 tickets in a lottery in which there are 3 prizes and 5 blanks. Rahul has 3 tickets in a lottery in which there are 4 prizes and 6 blanks. Show that Ram's probability of success is to Rahul's success is as 27 : 35.

3. a) Consider the data: 1, 4, 9, 12, 14. Find the first and second moments about the Origin.

b) A die is rolled until a 6 appears. What is the expectation of the number of rollings required?

4. Show that in Poisson distribution with unit mean, mean deviation about mean is $\dfrac{2}{e}$ times the standard deviation.

5. Find the coefficient of correlation between the values of X and Y given below:

X	11	6	9	13	27	15	16
Y	21	30	37	40	29	34	39

SECTION-C

6. Fit Poisson distribution to the following data of frequency of the deaths in road accidents on a highway:

Death	0	1	2	3	4
Frequency	122	60	15	2	1

7. Records taken of the number of male and female births in 800 families having four children are as follows :

No. of male births	0	1	2	3	4
No. of female births	4	3	2	1	0
No. of families	32	178	290	236	94

Using x^2 - test, check whether the data is consistent with the hypothesis that the binomial law holds and the chance of male birth is equal to that of female birth, namely $p = q = 1/2$.

8. The random variable X is normally distributed with mean 5 and standard deviation 4. Find the probability.

a) $X \geq 13$

b) $X \leq 13$

c) $5 \leq X \leq 9$

It is given that $P(0 \leq Z \leq 1) = 0.3413$ and $P(0 \leq Z \leq 2) = 0.4772$.

9. Fit a line $y = a + bx$ to the following data of the population of a city in different years:

Year	1996	1997	1998	1999	2000
Population (in lakhs)	4.5	6	8.2	12	14.7

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Total No. of Questions : 09   Total No. of Pages : 03

B.Tech. (AI&ML / AI&DS / Block Chain / CE / CSE / CS / DS / CSD / EE / ECE / EEE / ETE / IT / ME / Robotics & Artificial Intelligence / Internet of Things and Cyber Security including Block Chain Technology) (Sem.–2)

ENGINEERING MATHEMATICS-II
Subject Code : BTAM201-23
M.Code : 93811
Date of Examination : 10-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Answer the following :

a) Using Echelon form, find the rank of the matrix $A = \begin{pmatrix} 3 & 1 & 7 \\ 1 & 2 & 4 \\ 4 & -1 & 7 \\ 4 & -1 & 5 \end{pmatrix}$.

b) Determine the eigen values of the matrix $\begin{pmatrix} 1 & 4 \\ 3 & 2 \end{pmatrix}$.

c) Let V be a vector space in $\mathbb{R}^3$. Examine whether $W = \{(a, b, c) : a^2 + b^2 + c^2 \leq 1\}$ is a subspace of V.

d) Let V be a vector space over a field F. Show that any subset S of V containing zero vector is Linearly Dependent over F.

e) Determine the value of k for which the system of equations :

$x - ky + z = 0$; $kx + 3y - kz = 0$; $3x + y - z = 0$ has only trivial solution.

(f) Verify if $y = \dfrac{x^2}{2} + C$ satisfies the differential equation $y' = x$.

(g) Solve the initial value problem $\dfrac{dy}{dx} = x + 2$ given $y(0) = 1$.

(h) Find an integrating factor for the differential equation $\dfrac{dy}{dx} + y \tan(x) = \sin(x)$.

(i) Solve the nonlinear first-order PDE $\dfrac{\partial z}{\partial x} + z \dfrac{\partial z}{\partial y} = 0$.

(j) Verify if the surfaces defined by $z = xy$ and $z = x^2 + y^2$ are orthogonal to each other at the point $(1, 1, 1)$.

SECTION-B

2. Solve the following system of equations using Gauss Elimination method :

   $x - y + z = 4;\quad 2x + y - 3z = 0;\quad x + y + z = 2.$

3. Find a Linear transformation $T : \mathbb{R}^3 \to \mathbb{R}^4$ whose range is spanned by $(1, 2, 0, -4)$ and

   $(2, 0, -1, -3)$.

4. Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 3 & -1 \\ -2 & -1 & 1 \end{pmatrix}$. Find A^{-1}.

5. Find the inverse of the matrix using the Gauss-Jordan method : $\begin{pmatrix} 2 & -1 & 1 \\ 1 & 1 & -1 \\ 1 & -2 & 3 \end{pmatrix}$.

SECTION-C

6. Solve $y'' + y = \sin x$ using variation of parameters.

7. An electric RLC circuit has a resistance of 10 Ω, an inductance of 5 H, and a capacitance of 0.02 F. Form and solve the differential equation for the charge $Q(t)$ on the capacitor, given that $Q(0) = 0$ and $Q'(0) = 0$.

8. Solve the PDE $x\dfrac{\partial z}{\partial x} + y\dfrac{\partial z}{\partial y} - z = 0$ using Lagrange's method, and verify your solution by checking if it satisfies the original equation.

9. Find the general solution of the linear PDE $u_{xxx} + 3u_{x^2y} + 2u_{yyy} = e^x$.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI&ML/DS/Block Chain/CSE/CS/CSD/ECE/Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology)   (Sem.–3)

DEVELOPMENT OF SOCIETIES

Subject Code : HSMC101-18

M.Code : 76439

Date of Examination : 11-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a) Discuss importance of the origin of family system.

   b) Two merits of Social System.

   c) Throw light on the role of individual in the development of society.

   d) Define Social structure.

   e) Who is the founder of political system?

   f) Discuss main features of Governance.

   g) What are capitalism's essential features?

   h) Describe nature of idea of development.

   i) Who is the father of development of Ethics?

   j) How does Buddhism affect economics?

SECTION-B

2. What is the role of clan in the development of society?

3. Write in detail about the founder of Political system.

4. How does Socialism affect society?

5. What are the main ideas of development?

6. Examine Buddhist model of economic development.

SECTION-C

7. Describe in detail major concepts of Social systems.

8. Throw light on the functions of Governing system.

9. Is there any incentive to work and development in society under Marxism.

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Total No. of Questions : 09

B.Tech.(AI&ML / AI&DS / Block Chain / CSE / CS / CSD / DS / IT / Robotics & Artificial Intelligence / Internet of Things and Cyber Security including Block Chain Technology)   (Sem.–3)

MATHEMATICS-III

Subject Code : BTAM-302-23

M.Code : 94630

Date of Examination : 07-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What do you mean by Skewness?

   b) Give an example of a random experiment.

   c) A die is thrown at random. Find the probability that the number on it is greater than 4.

   d) Define Poisson distribution.

   e) Write down the mean and variance of binomial distribution.

   f) Write down the steps of method of least square to fit a straight line of the form $y = a + bx$, where a and b are constants.

   g) What do you mean by correlation?

   h) Define Standard Error of a sampling distribution of a statistic.

   i) What do you mean by a small sample and a large sample. Give example of each.

   j) When do we use Chi-square test?

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SECTION-B

2. Calculate the first four moments of the following distribution about the mean :

x:	0	1	2	3	4	5	6	7	8
f:	1	8	28	56	70	56	28	8	1

3. a) A card is drawn from a well-shuffled pack of playing cards. What is the probability that it is either a spade or an ace?

   b) Prove that the probability of the impossible event is zero.

4. In a normal distribution, 31% of the items are under 45 and 8% of items are over 64. Find the mean and standard deviation of the distribution.

5. By using the method of least squares, find the straight line of the form $y = a + bx$ that fits the following data :

x	100	120	140	160	180	200
y	0.45	0.55	0.60	0.70	0.80	0.85

6. A random sample of size 16 has 53 as mean. The sum of squares of the deviation from mean is 135. Can this sample be regarded as taken from the population having 56 as mean?

SECTION-C

7. Define binomial distribution. Fit a binomial distribution to the following data:

x:	0	1	2	3	4
y:	28	62	46	10	4

8. A sample of 12 fathers and their eldest sons gave the following data about their heights in inches :

Father	65	63	67	64	68	62	70	66	68	67	69	71
Son	68	66	68	65	69	66	68	65	71	67	68	70

Calculate the coefficient of rank correlation.

9. What is Chi-square test? A die is thrown 90 times with the following results :

Face	1	2	3	4	5	6	Total
Frequency	10	12	16	14	18	20	90

Use Chi-square test to test whether these data are consistent with the hypothesis that the die is unbiased. Given that $\chi^2_{0.05} = 11.07$ for 5 degrees of freedom.

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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(CSE / AI & DS / AI & ML / Block Chain / Cyber Security / DS / Robotics & Artificial Intelligence / Internet of Things and Cyber Security including Block Chain Technology) (Sem.–3)

DATA STRUCTURE & ALGORITHMS

Subject Code : BTCS-301-18
M.Code : 76436
Date of Examination : 02-01-2025

Time : 3 Hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

    a) What is time and space complexity? Give suitable example of each.

    b) What is Big O notation? Give the Big O of inserting an element in a linear array.

    c) Given sorted array with 32 elements find the time complexity in worst case (in term of number of comparisons) for linear search, and binary search algorithm.

    d) Give any two applications of stack data structure.

    e) What is Big O for enqueue (), dequeue(), isempty(), isfull() operations for array implementation of circular queue?

    f) Give any two advantages of doubly linked list over single linked list.

    g) What is the advantage of using AVL tree over binary search tree?

    h) Give the worst case time complexity (as Big O) for bubble sort, heap sort, selection sort and merge sort.

    i) Give adjacency list and adjacency matrix representations of graph data structures.

    j) Define complete graph, strongly connected graph.

SECTION-B

2. Draw the binary search tree of the following 14,10,17,12, 11, 20, 12, 18, 25, 28, 22, 23 Delete the item say 20 from binary search tree and give the whole solution step by step diagrammatically.

3. Find the time complexity of the following code and mention it in Big O

    ```
    int fun(int n)
    {
        int count = 0;
        for (int i = n; i > 0; i /= 2)
            for (int j = 0; j < i; j++)
                count += 1;
        return count;
    }
    ```

4. Write an algorithm to remove second last occurrence of an item from single linked list.

5. The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table (also show intermediate tables)?

6. Suppose you are given an implementation of a queue of integers. The operations that can be performed on the queue are :

    a) isEmpty (Q) — returns true if the queue is empty, false otherwise.

    b) delete (Q) — deletes the element at the front of the queue and returns its value.

    c) insert (Q, i) — inserts the integer i at the rear of the queue.

    Consider the following function :

    ```
    void f(queue Q){
    int i;
    if (!isEmpty(Q)) {
        i = delete(Q);
        f(Q);
        insert(Q, i);
        }
    }
    ```

What operation is performed by the above function f()? Give step by step explanation with suitable example.

SECTION-C

7. Using the algorithms first convert infix to postfix and then evaluate postfix (give the step by step solution) for evaluating the following expression P.

$$P: (12/(7-3)) + (1 + 5)*2$$

8. Illustrate the execution of heap sort (in increasing order) in the sequence 3, 6, 17, 5, 1 l, 23, 38, 19, 26, 14.

9. What is DFS and BFS traversal of graph? Give the DFS and BFS traversal (starting with node 1) of graph. Show all intermediate steps.
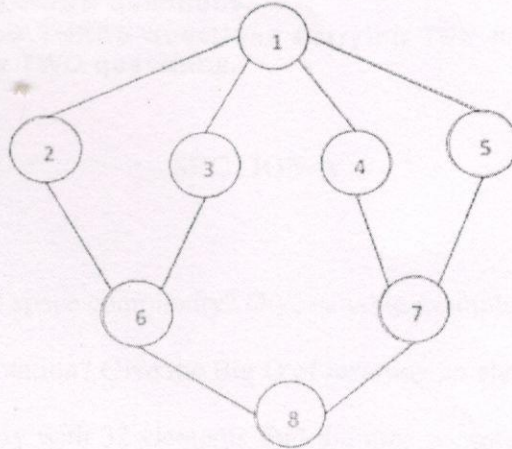
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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AIML/ CSE/ CSD) (Sem.–3)

OBJECT ORIENTED PROGRAMMING

Subject Code : BTCS302-18

M.Code : S76437

Date of Examiantion: 18-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a. Discuss the issues of procedure oriented systems with respect to object oriented systems.

   b. What is the use of static "function?

   c. Define Member functions.

   d. Discuss the use of nested class.

   e. Advantages of function overriding.

   f. Give the concept of union.

   g. What are the types of type conversions?

   h. Discuss base class.

   i. What is the use of binding?

   j. What is a virtual function?

SECTION-B

2. Explain the steps of input of numbers using arrays.

3. Write the general syntax and working of class and objects in C++.

4. Explain in Memory management in object orientation approach.

5. Explain different string handling functions with examples.

6. What is the benefit of constructor? Write about copy constructor.

SECTION-C

7. Define the pointer with an example, indicate the steps involved in referring to members of the invoking object.

8. What does inheritance mean in C++? What are different forms of inheritance?

9. What is the use of operator overloading? Write a program to any operator.

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DEC 2024

B.Tech.(AI&ML/CSE/CSD) (Sem.–3)
DIGITAL ELECTRONICS
Subject Code : BTES301/18
M.Code : S76435
Date of Examination: 27-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a. Why digital system is required? Discuss.

   b. Which gate is called an all or nothing gate? Why?

   c. Why are BCD codes required?

   d. Discuss the distributive laws of Boolean algebra.

   e. Why is it required to reduce Boolean expression before realization? Discuss.

   f. What do you mean by sequential circuits? Explain.

   g. What is the drawback of a serial adder? For which application are they preferred?

   h. List the drawbacks of JK flip flop.

   i. Write down the various advantages of PAL.

   j. List the advantages of R–2R type D/A converter.

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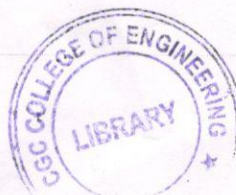
SECTION-B

2. Convert the 1001010110110.10101 binary number to decimal, hexadecimal and octal.

3. Use the laws of Boolean algebra (Name the laws used at each step), to reduce the following expression to their simplest form and implement that with NAND gate circuit.

$$F = A\bar{B} + ABD + AB\bar{D} + \bar{A}\bar{C}\bar{D} + \bar{A}B\bar{C}$$

4. Explain the working of a SR flip-flop. Also mention its advantages and disadvantages.

5. Use a multiplexer having three data select inputs to implement the logic for the function given below

$$F = \Sigma m (0, 1, 2, 3, 4, 10, 11, 14, 15)$$

Also realize the same using 16:1 MUX.

6. Draw the logic diagram and explain the working of deal slope type A/D converted.

SECTION-C

7. Explain in detail :

   (i) Successive approximation A/D converter.

   (ii) Memories and their classification.

8. Reduce the following expression using K map and verify the result using QM method

$$F = \Sigma m (0, 2, 4, 6, 7, 10, 12, 13, 15)$$

9. Discuss :

   (i) Design of 3-bit synchronous counter.

   (ii) BCD Adder.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AIDS/AIML/Block Chain/CSE/IOT/CSD/DS/Robotics and Artificial Intelligence) (Sem.–3)

OBJECT ORIENTED PROGRAMMING

Subject Code : BTCS302-18

M.Code : 76437

Date of Examiantion:18-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a) Explain the typical structure of a C++ program.

   b) What is an array?

   c) What is Destructor? How is it defined?

   d) What are static data members?

   e) Discuss the uses of public, private and protected access specifiers in a class.

   f) Give the order of calling of constructors under inheritance.

   g) Are virtual functions inherited?

   h) What is an abstract class?

   i) When do we use multiple catch handlers?

   j) Discuss the use of ifstream and ofstream classes for file input and output.

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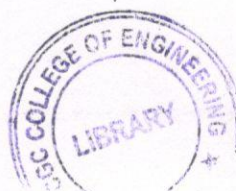
SECTION-B

2. Explain various types of operators in C++ language.

3. How do you achieve operator overloading using friend function?

4. Discuss different visibility modes to derive a class for inheritance.

5. Explain the concept of early binding and late binding in detail.

6. Explain the process of open, read, write and close files in C++.

SECTION-C

7. a) Explain the following with examples:

    i) Inline functions

    ii) Class and Objects

    b) Explain various types of Constructors with examples.

8. What do you mean by Inheritance? What is the need of Inheritance? Explain various types of Inheritance with the help of suitable examples.

9. a) What is a virtual function? Why it is used? Explain with suitable example.

    b) What is exception handling in C++ programming? Explain the exception handling mechanism.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI &ML/ CSE/ Data Science/ IOT/ Internet of Things and Cyber Security including Block Chain Technology) (Sem.–3)

MATHEMATICS-III

Subject Code : BTAM304-18

M.Code : 76438

Date of Examination: 23-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Solve the following:

   a) Examine for maxima and minima $f(x, y) = x^2 + y^2 - 2(x + y)$.

   b) Change order of integration for $\int_{y=0}^{1} \int_{x=y}^{\sqrt{2-y^2}} \int (x, y)\, dxdy$.

   c) State Cauchy convergence criterion.

   d) Using Cauchy's root test, discuss convergence of $\sum \left(1 + \frac{1}{n}\right)^{-n^2}$.

   e) State Leibnitz test for alternating series.

   f) Define integrating factor. Is it unique for a given differential equation? Justify.

   g) Solve $y = px + \cot^{-1} p$.

   h) Solve $y \sin 2x\, dx - (1 + y^2 + \cos^2 x)\, dy = 0$.

   i) Solve $(D^4 - 25)y = 0$.

(S2)- 2116

j) Solve $(x + 1)^2 y'' - (x + 1)y' + y = 0$.

SECTION B

2. If $\Theta = t^n e^{-r^2/4t}$, what value of n will make $\frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial \Theta}{\partial r} \right) = \frac{\partial \Theta}{\partial t}$.

3. Test for convergence the series $\sum \frac{(n!)^2}{(2n)!} x^{2n}$.

4. Discuss uniform convergence of $\sum \frac{\cos nx}{n^p}$, $(p > 0)$.

5. Solve $xy(1 + xy^2) \frac{dy}{dx} = 1$.

6. Using the method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$.

SECTION-C

7. Find the volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

8. Solve : $y = 2px + y^2 p^3$.

9. Solve : $x \frac{d^2y}{dx^2} - 2\frac{y}{x} = x + \frac{1}{x^2}$.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI & DS / AI & ML / Block Chain / CSE / Cyber Security / IOT / CSD / IT / Robotics & Artificial Intelligence / Internet of Things and Cyber Security including Block Chain Technology)   (Sem.–3)

DIGITAL ELECTRONICS

Subject Code : BTES301-18

M.Code : 76435

Date of Examination : 24-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a) Why 1's and 2's complements are required? Discuss.

   b) What do you mean truth table? Write down the truth table of Exclusive-OR gate.

   c) Compare combinational circuits with sequential circuits.

   d) Discuss the significance of multiplexer.

   e) List the advantages of QM method.

   f) What is Race around Condition? Discuss.

   g) What do you mean by PROM and EPROM? Discuss.

   h) What are the advantages of Dual slope A/D converter? Discuss.

   i) List the various characteristics of FPGA.

   j) Explain the term resolution w.r.t. converters.

SECTION-B

2. Explain the working of a SR flip-flop. Also mention its advantages and disadvantages.

3. What is the need of K-Map? Reduce the following expression to simplest Sum of product form using K-Map.
   $F(a,b,c,d) = \sum m(0, 1, 3, 5, 7, 10, 11, 12)$

4. Prove that NAND and NOR are known as universal gates.

5. Draw the logical diagram and explain the working of 4 bit ring counter.

6. Discuss the working of weighted type D/A converter in detail by considering a suitable example.

SECTION-C

7. **Discuss :**

   a) Successive approximation A/D converter

   b) Classification of memory .

8. Discuss in detail the design procedure of binary half adder and binary full adder.

9. **Explain :**

   a) QM method

   b) RAM organization and its comparison with ROM.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI & ML / AI & DS / CSE / DS / IOT / Internet of Things and Cyber Security including Block Chain Technology)   (Sem.–4)

DESIGN & ANALYSIS OF ALGORITHMS
Subject Code : BTCS-403-18
M.Code : 77629
Date of Examination : 10-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1) Answer briefly :

a) Why the concept of order (Big O) is important?

b) What is time space trade-off?

c) Name some methodologies for design of the algorithm.

d) What are the features of dynamic programming?

e) What are the applications of Spanning Tree?

f) What is the average successful search time taken by binary search on a sorted array of 10 items?

g) Differentiate P *vs* NP.

h) What is Cook's algorithm?

i) What will happen when you apply heuristics in an existing algorithm?

j) What is the role of randomizer in a Randomized algorithm?

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SECTION-B

2) Look at the following recurrence when n is a power of 2 :

$$T(n) = \begin{cases} T(1) & n = 1 \\ T\left(\dfrac{n}{2}\right) + c & n > 1 \end{cases}$$

Solve the above recurrence relation for the following choices of a, b and $f(n)$ (c being a constant) $a = 1$, $b = 2$ and $f(n) = cn$

3) Explain Backtracking with the help of n-queens problem.

4) Write the algorithm for depth first search : Take a suitable example to show its working.

5) **Write short notes on :**

   a) Computability classes

   b) NP Complete Problems.

6) Explain randomized algorithms with example.

SECTION-C

7) Show that the following equalities are correct.

   a) $5n^2 - 6n = \theta\ (n)$

   b) $n! - O\ (n^n)$

   c) $2n^2 2^n + n \log n = \theta\ (n^2 2^n)$

8) What is Prim's algorithm? Explain its steps and Analyze its time complexity too.

9) **Write short notes on :**

   a) Travelling Salesperson Problem

   b) Topological Sorting.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

Total No. of Pages : 03

B.Tech. (AI&ML)/(AI&DS)/(CSE)/(DS)/(ECE)   (Sem–4)

UNIVERSAL HUMAN VALUES

Subject Code : HSMC-122-18

M.Code : 77630

Date of Examination : 09-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A contains TEN objective type questions each questions carries TWO marks.

2. SECTION-B contains FIVE questions in this section. Attempt ANY FOUR questions each question carries FIVE marks each.

3. SECTION-C contains THREE questions in this section. Attempt any TWO question each question carries TEN marks each.

SECTION-A

1. Answer the following :

(2 × 10 = 20)

a) What is value education?

मूल्य शिक्षा क्या है?

ਮੁੱਲ ਸਿੱਖਿਆ ਕੀ ਹੈ?

b) What is Holistic System?

समग्र प्रणाली क्या है?

ਸਰਬਭੌਮਿਕ ਪ੍ਰਣਾਲੀ ਕੀ ਹੈ?

c) What is Artistic-Value?

कलात्मक–मूल्य क्या है?

ਕਲਾਤਮਿਕ-ਮੁੱਲ ਕੀ ਹੈ?

d) What is value of any unit in the larger order?

बड़े आदेश में किसी भी इकाई का क्या मूल्य है?

ਵੱਡੇ ਆਦੇਸ਼ ਵਿੱਚ ਕਿਸੇ ਵੀ ਇਕਾਈ ਦਾ ਕੀ ਮੁੱਲ ਹੈ?

e) Right understanding + ... = Mutual prosperity.

सही समझ + ... = पारस्परिक समृद्धि।

ਠੀਕ ਸਮਝ + ... = ਆਪਸੀ ਖ਼ੁਸ਼ਹਾਲੀ।

[M-77630]

f) What is Material Order?

सामग्री आदेश क्या है?

ਸਾਮਗਰੀ ਆਦੇਸ਼ ਕੀ ਹੈ?

g) .... is right evaluation.

.... सही मूल्यांकन है।

.... ਠੀਕ ਲੇਖਾ ਜੋਖਾ ਹੈ।

h) What do you mean by Respect?

आपका सम्मान से क्या मतलब है?

ਤੁਹਾਡਾ ਆਦਰ ਤੋਂ ਕੀ ਮਤਲਬ ਹੈ?

i) What are the activities and needs of self and body?

आत्म और शरीर की गतिविधियाँ, आवश्यकताएँ क्या हैं?

ਸਵੈ ਅਤੇ ਸਰੀਰ ਦੀਆਂ ਜਰੂਰਤਾਂ ਅਤੇ ਗਤੀਵਿਧੀਆਂ ਕੀ ਹਨ?

j) What is Skill?

कौशल क्या है?

ਹੁਨਰ ਕੀ ਹੈ?

SECTION-B

2. What do you understand by the definitiveness of ethical human conduct? Why is this definitiveness desirable?

नैतिक मानवीय आचरण की निश्चितता से आप क्या समझते हैं? यह निश्चितता वांछनीय क्यों है?

ਤੁਸੀਂ ਨੈਤਿਕ ਮਨੁੱਖੀ ਆਚਰਣ ਦੀ ਨਿਸ਼ਚਿਤਤਾ ਦੁਆਰਾ ਕੀ ਸਮਝਦੇ ਹੋ? ਇਹ ਨਿਸ਼ਚਿਤਤਾ ਲੋੜੀਂਦੀ ਕਿਉਂ ਹੈ?

3. Explain harmony in family?

परिवार में तालमेल के बारे में बताएं।

ਪਰਿਵਾਰ ਵਿੱਚ ਤਾਲਮੇਲ ਦੇ ਬਾਰੇ ਵਿੱਚ ਦੱਸੋ।

4. Differentiate between units and space. What are the units self-organized in space?

इकाइयों और अंतरिक्ष के बीच अंतर करें। अंतरिक्ष में स्व-संगठित इकाइयाँ क्या हैं?

ਇਕਾਈਆਂ ਅਤੇ ਪੁਲਾੜ ਵਿਚਕਾਰ ਫਰਕ ਕਰੋ। ਪੁਲਾੜ ਵਿੱਚ ਸਵੈ-ਸੰਗਠਿਤ ਯੂਨਿਟ ਕੀ ਹਨ?

5. What are the basic guidelines of value education?

मूल्य शिक्षा की बुनियादी दिशानिर्देश क्या हैं?

ਮੁੱਲ ਸਿੱਖਿਆ ਦੀ ਬੁਨਿਆਦੀ ਦਿਸ਼ਾਨਿਰਦੇਸ਼ ਕੀ ਹਨ?

6. "Other than human order, the three orders are mutually fulfilling to each other". Explain with examples, why does human order fail to mutually fulfill itself and to the other orders?

"मानव आदेश के अलावा, तीन आदेश परस्पर एक-दूसरे को पूरा कर रहे हैं''। उदाहरण सहित स्पष्ट करें कि मानव व्यवस्था स्वयं तथा अन्य आज्ञाओं को पारस्परिक रूप से पूरा करने में विफल क्यों हो जाती है?

"ਮਨੁੱਖੀ ਆਦੇਸ਼ ਤੋਂ ਇਲਾਵਾ, ਤਿੰਨੇ ਆਦੇਸ਼ ਆਪਸ ਵਿੱਚ ਇੱਕ ਦੂਜੇ ਨੂੰ ਪੂਰਾ ਕਰਦੇ ਹਨ"। ਉਦਾਹਰਣਾਂ ਦੇ ਨਾਲ ਸਮਝਾਓ, ਮਨੁੱਖੀ ਆਰਡਰ ਆਪਸੀ ਤੌਰ 'ਤੇ ਆਪਣੇ ਆਪ ਨੂੰ ਅਤੇ ਦੂਜੇ ਆਦੇਸ਼ਾਂ ਨੂੰ ਪੂਰਾ ਕਰਨ ਵਿੱਚ ਅਸਫਲ ਕਿਉਂ ਹੁੰਦਾ ਹੈ?

SECTION-C

(10 × 2 = 20)

7. Describe in brief the salient values in human relationships.

मानवीय रिश्तों में संक्षिप्त मुख्य मूल्यों का विवरण दें।

ਮਾਨਵੀਂ ਰਿਸ਼ਤਿਆਂ ਵਿੱਚ ਸਬੰਧਿਤ ਮੁੱਖ ਮੁੱਲਾਂ ਦਾ ਵਰਨਣ ਕਰੋ।

8. How is a human-being co-existence of Self and Body? Explain Pre-Conditioning, Sensation and Natural-Acceptance.

इंसान स्वयं और शरीर का सह-अस्तित्व कैसे है? पूर्व-मान्यता, संवेदना और प्राकृतिक-स्वीकृति समझाओ।

ਮਨੁੱਖ ਸਵੈ ਅਤੇ ਸਰੀਰ ਦਾ ਸਹਿ-ਅਸਤਿਤਵ ਕਿਵੇਂ ਹੈ? ਪੂਰਵ-ਮਾਨਤਾ, ਸੰਵੇਦਨਾ ਅਤੇ ਸਹਿਜ-ਸਵਿਕਰਿਤੀ ਸਮਝਾਓ।

9. Compare the Four Orders in Nature on the basis of their salient aspects.

मुख्य पहलुओं के आधार पर प्रकृति में चार आदेशों की तुलना करें।

ਮੁੱਖ ਪਹਿਲੂਆਂ ਦੇ ਆਧਾਰ ਉੱਤੇ ਕੁਦਰਤ ਵਿੱਚ ਚਾਰ ਆਦੇਸ਼ਾਂ ਦੀ ਤੁਲਨਾ ਕਰੋ।

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AI&ML/AI&DS/AI/CSE/DS/IOT/IT/(Internet of Things and Cyber Security including Block Chain Technology) (Sem.–4)

DISCRETE MATHEMATICS

Subject Code : BTCS/401/18

M.Code : 77626

Date of Examination : 04-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly:

   (a) State Well-Ordering Principle.

   (b) If R is an equivalence relation, then show that $\{R^{-1} = (a, b) : (b, a) \in R\}$ is also an equivalence relation.

   (c) In how many ways 4 boys and 3 girls be seated in a row so that two girls are together?

   (d) Find r if $P(10, r + 1) : P(11, r) = 30 : 11$.

   (e) Write the negation of the statement: $p \rightarrow q$.

   (f) Use quantifiers to state that the sum of two real numbers is real.

   (g) Give an example of a semi group which is not monoid.

   (h) In a Boolean algebra B, show that $x + 0 = x, \ \forall \ x \in B$.

   (i) Give an example of a graph which has Euler circuit but not a Hamiltonian circuit.

   (j) Draw a connected graph with one of vertex with degree 5.

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SECTION-B

2. Find the shortest distance between a and z in the following graph:
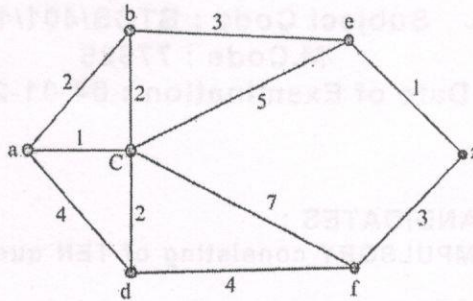
3. Find whole numbers x and y so that $44x + 17y = 1$ with $x > 10$ using Euclidean algorithm.

4. How many words each of 3 vowels and 2 consonants, can be formed from the letters of the word 'INVOLUTE'?

5. Show that $p \wedge q$ logically implies $p \leftrightarrow q$.

6. Check whether the set of all even integers forms a group under the binary operation $a * b = 2a + 2b$.

SECTION-C

7. State and prove Fundamental theorem of Arithmetic.

8. (a) If $f(x, y, z) = (x \vee y) \wedge (x \vee y') \wedge (x' \wedge z)$ be a Boolean function, find its disjunctive normal form.

   (b) Prove that a graph is a tree if and only if it is minimally connected.

9. If p, q, r are three statements, then test the validity of the argument $(S_1, S_2; S)$, where $S_1 : p \to q$, $S_2 : p \to r$ and $S : p \to (q \wedge r)$.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AI & ML / AI & DS / CSE / Internet of Things and Cyber Security
including Block Chain Technology) (Sem.–4)

COMPUTER ORGANIZATION & ARCHITECTURE

Subject Code : BTES 401/18

M.Code : 77627

Date of Examination : 14-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a. Cache Memory

   b. Register Transfer Language

   c. Normalization of Floating Point Representation

   d. Accumulator

   e. Subroutine

   f. Instruction Format

   g. Clock pulse

   h. Hardwired Control

   i. Purpose of Interrupt signal.

   j. Speedup in Pipeline.

(S2)-1396

SECTION-B

2. Explain in detail Instruction Set architecture of a CPU.

3. Explain in detail Purpose and Types of Interrupts.

4. List Benefits and Hazards of using Pipeline.

5. What do you understand by Memory interleaving? Explain in detail.

6. Explain in detail the working of Floating Point Arithmetic by suitable examples.

SECTION-C

7. Briefly explain the block diagram and instruction set of 8085 processor.

8. Explain in detail how I/O transfers is performed in x86 architecture.

9. Explain in detail the role performed by Mapping functions and Replacement Algorithms in memory.

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(S²)-1396

Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AIML/ AI &DS/ IOT/ Cyber Security including Block Chain Technology/CSE) (Sem.–4)

OPERATING SYSTEMS

Subject Code : BTCS-402-18

M.Code : 77628

Date of Examination :22-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a. Give an example where a system moves from safe state to unsafe state when managing deadlock.

   b. Explain the concept of virtual machine.

   c. What is device queue? How it is maintained in memory?

   d. Explain the role of medium term scheduler.

   e. Which scheduling algorithm has lowest response time? Justify.

   f. Differentiate between response time and waiting time with the help of an example.

   g. Explain the concept of race condition with the help of an example.

   h. How can we resolve the problem of circular wait in deadlock prevention?

   i. How is the logical address represented while implementing paging contains? What can be the maximum value of the offset and why?

   j. List various file access methods.

(S2-1995)

SECTION-B

2. Write Peterson's algorithm for 2 process synchronization problem. Justify how it resolves mutual exclusion, bounded wait and progress?

3. What is wait-for-graph in deadlock avoidance? Give an example where wait-for-graph ensures that system does not move from safe state to unsafe state.

4. What is segmentation? Explain how the logical address generated by CPU is converted into physical address using segmentation.

5. Define process. List various process states and explain the transition between these states.

6. What different methods of directory implementation?

SECTION-C

7. Explain various steps to handle page fault when no free frame is available. Also explain LRU and Optimal Scheduling Algorithm.

8. What is deadlock avoidance? Write the banker's algorithm (resource request and safety algorithms). Give an example.

9. **Write short note on:**

   a. MUTEX lock in process synchronization.

   b. Round-robin scheduling algorithm.

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Total No. of Questions : 09

B.Tech. (CSE) (Sem.–5)
WEB TECHNOLOGIES
Subject Code : BTCS 520-18
M.Code : S78326
Date of Examination : 21-01-2025

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) DHTML

   b) Proxy Server

   c) Dialog boxes

   d) Frames

   e) URL

   f) Arrays

   g) PHP

   h) Operators

   i) HTML

   j) POST method

(S2)-M1

SECTION-B

2. Write Difference between Internal and External Style sheets.

3. Why we use Sessions in web Programming?

4. Write steps to connect MySql database in a PHP Program? Explain with the help of an example.

5. What is DOM in Java Script?

6. How we can access the HTML Input components in PHP using GET and POST method?

SECTION-C

7. What is HTML? Explain the various types of HTML tags? Distinguish between HTML and DHTML?

8. Explain various components of AJAX and also explain how we can read and write JSON on client and server?

9. Explain the following :

   a) Forms

   b) Client/Server programming on the web

   c) DHTML

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE) (Sem.–5)

PROGRAMMING IN PYTHON

Subject Code : BTCS 510-18

M.Code : S78324

Date of Examination : 21-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   (a) What are the main features of Python set types? Discuss two operations that can be performed on them.

   (b) Differentiate between an operator and an operand.

   (c) Write a short note on Python standard file objects discussing their importance.

   (d) Define the term 'module reloading'.

   (e) Differentiate between a process and a thread.

   (f) How can you use regular expressions to search for specific patterns in a string using Python?

   (g) What is CGI? How can CGI assist servers in handling client data?

   (h) Explain briefly the concept of client-server architecture.

   (i) Describe the role of the cursor in database programming with Python.

   (j) What is the role of transactions in database programming, and why are they important?

(S2)-M4

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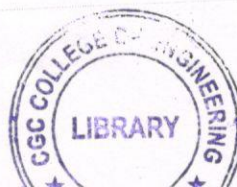
SECTION-B

2. Discuss the role of operators in Python and provide examples of arithmetic, logical and comparison operators.

3. What are sequences in Python, and why are they important? Discuss various types of sequences and provide use cases for each of them.

4. What is an assertion? Describe a scenario where using an assertion would be beneficial with the help of an example.

5. What is GUI Programming? Explain how the functionality of GUI application can be extended by integrating third party libraries.

6. Explain the role of Object-Relational Managers (ORMs) in simplifying database operations. Provide an example showing the usage of ORM in conjunction with DB-API.

SECTION-C

7. Explain briefly the concepts of precedence and associativity. Using these concepts explain how python evaluates complex expressions.

8. **Explain the following terms :**

   a. Pooling

   b. API

   c. Module

   d. Interface

   e. Transaction

9. What is multithreading? What are the advantages and challenges associated with multithreading and how are these challenges addressed?

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI & ML / CSE)   (Sem.–5)

STATISTICAL COMPUTING TECHNIQUES USING R

Subject Code : BTES-501-20

M.Code : 93170

Date of Examination : 26-11-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

   a. List few data types used in R.

   b. Write syntax of while loop in R.

   c. How would you calculate the square root of a number using R?

   d. Name a function in R used to create a sequence of numbers.

   e. What is the role of the data frame function in R?

   f. How can you use the cat() function to concatenate and print multiple values in R?

   g. Write a function to plot box plot in R.

   h. What is the need of probability distributions in statistical analysis?

   i. Write a R script for finding greater of two numbers in R.

   j. What is difference between mean, mode and median?

(S2)-139

SECTION-B

2. What is user defined objects in R and How they are different from system objects?

3. What is preprocessing of data? How we can handle missing values in R?

4. What is regression analysis? How can you perform simple linear regression analysis in R using the lm() function? Provide an example.

5. Write R code to generate the probability distribution table for number of successes from a binomial distribution where n=5 and probability of success in each trial is 0.25.

6. What is Exploratory data analysis? Discuss few principles of Exploratory data analysis.

SECTION-C

7. Discuss different feature and applications of R tool in detail. Why is R a popular choice for big data analysis?

8. Discuss the concept of Generalized Linear Model (GLM), and how does it extend the concept of linear regression?

9. Write a short note on :

   a. Normal distribution

   b. Vector vs Matrix.

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Total No. of Questions : 09

B.Tech. (AI&DS) (Sem.–5)

DATABASE MANAGEMENT SYSTEM
Subject Code : BTCS-501-18
M.Code : 93937
Date of Examination : 26-11-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Explain in brief about Data Independence.

   b) What is a weak and strong entity sets?

   c) Explain the term Query Equivalence in brief.

   d) What are Armstrong's axioms? Explain in brief.

   e) Difference between Relational Algebra and Relational Calculus.

   f) Explain the need of B-trees.

   g) What is Serializability of schedules? Explain in brief.

   h) Write advantages of MAC Model.

   i) Define the term SQL injection.

   j) Explain in brief about Web databases.

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SECTION-B

2. Explain in detail about Network Model along with their advantages and disadvantages.

3. Write a detailed note on Query Optimization Algorithms.

4. Write a detailed note on Indices.

5. Explain in detail about Database recovery.

6. Explain in detail about DAC model.

SECTION-C

7. Write a detailed note on Relational Algebra.

8. Explain in detail about Multi-version and optimistic concurrency control techniques.

9. Write a detailed note on Object Oriented and Object Relational Databases.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Artificial Intelligence (AI) and Data Science) (Sem.–5)

ARTIFICIAL INTELLIGENCE

Subject Code : BTAIML502-20

M.Code : 93940

Date of Examination : 05-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is backtracking?

   b) Discuss various AI problems.

   c) Write a short note on Alpha-Beta pruning.

   d) What is the primary purpose of A* Search?

   e) What is the significance on non-monotonic reasoning in knowledge representation?

   f) What impact does under uncertainty has on reasoning?

   g) Differentiate between learning and rote memorization.

   h) What is the key objective of Winston's learning program?

   i) Describe the purpose of expert system shell.

   j) Write a short note on different approaches to explanation in expert systems.

(S2)-537

SECTION-B

2. How does the A* algorithm combine heuristic information and cost functions to guide the search in problem-solving agents?

3. Explain the concept of probabilistic reasoning. What role does Bayes theorem play in probabilistic reasoning?

4. What are the different approaches to acting under uncertainty? Discuss the advantages and disadvantages associated with each approach.

5. Differentiate between learning by taking advice and learning from examples.

6. What is an expert system shell? Discuss different types of expert system shells with the help of an example.

SECTION-C

7. Differentiate between heuristic search and uninformed search using various search strategies. Discuss the advantages and disadvantages of each approach.

8. What are decision trees? Discuss how Gini impurity and information gain are used in the decision tree algorithm with the help of an example?

9. What is knowledge representation? Discuss various knowledge representation schemes and discuss scenarios where each is preferred over other schemes.

(S2)-537

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (CSE) (Sem.–5)

FORMAL LANGUAGE AND AUTOMATA THEORY

Subject Code : BTCS-502-18

M.Code : 78321

Date of Examination : 05-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

    a. Define Grammar.

    b. What is the meaning of acceptability of string by FA?

    c. $\Sigma=\{0,1\}$, write RE for the alphabet whose 9th symbol from the L.H.S is 1.

    d. Define Derivation Tree and yield of tree.

    e. List closure properties of CFL.

    f. Define Universal Turing Machine.

    g. What is NP hard problem?

    h. State Rice' Theorem.

    i. Define Decidability.

    j. What is halting problem?
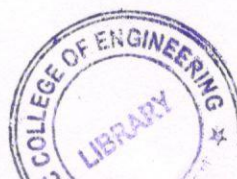
SECTION-B

2. Explain the Chomsky hierarchy of grammars with the help of writing rules for each type of grammars.

3. Write short note on Applications of Regular Expressions.

4. What are non-reachable symbols? Eliminate non-reachable symbols from $S \rightarrow aS \mid A$, $A \rightarrow a, B \rightarrow aa$.

5. Construct the DPDA for "Accepting the language of balanced parentheses".

6. What do you understand by Tractable and Intractable problems with reference to Turing Machines.

SECTION-C

7. Explain the concept of Turing Machine. Construct a TM for $L = \{0^n 1^n 2^n \mid n \geq 1\}$.

8. What is a Context Free Grammar? Prove that If L1 and If L2 are two context free languages, their union $L1 \cup L2$ will also be context free.

9. **Write a short note on :**

   a. FA *vs* PDA

   b. Context Sensitive Languages.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (CSE) (Sem.–5)

COMPUTER NETWORKS

Subject Code : BTCS-504-18

M.Code : 78323

Date of Examination : 29-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is IPv4?

   b) What is the role of firewalls in computer networks?

   c) What is the use of FTP protocol?

   d) What is flow control?

   e) List major transmission media used for data communication.

   f) What is source routing?

   g) What is the role of piggybacking at data link layer?

   h) List the components of a URL.

   i) What is Frequency division multiplexing?

   j) What is checksum?

SECTION-B

2. Compare and contrast distance vector routing with link state routing.

3. Explain the working of CSMA/CD protocol.

4. Differentiate between Go-Back-N and Selective Repeat ARQ protocols.

5. Discuss the significance and functionality of leaky bucket and token bucket algorithms at transport layer.

6. List and explain the features of each layer in TCP/IP reference model.

SECTION-C

7. Explain the three-way handshake based connection establishment process of TCP protocol in detail.

8. What is HTTP and how does it enable the exchange of resources on the web? Provide an example illustrating an HTTP client-server interaction.

9. Write short notes on:

   a) TELNET

   b) DHCP

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI & ML/ CSE) (Sem–5)

PROGRAMMING IN PYTHON

Subject Code : BTAIML501-20

M.Code : 93173

Date of Examination : 29-11-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What are python strings?

   b) What is tuple in python?

   c) What are the rules for naming a variable?

   d) What is multiline statement?

   e) What is docstring?

   f) Mention the type of arguments in python.

   g) Exception handling

   h) What is the use of comparison operator?

   i) What is chained conditional statement?

   j) What is python continue statement?

(S2)- 271

SECTION-B

2. What is the difference between Lists and Tuples? Give an example for their use.

3. Write Python program to demonstrate Multiple Inheritance.

4. What are three type of import statement in Python? Explain.

5. What is List? Explain the concept of slicing and indexing with proper examples.

6. Explain about the different types of Exceptions in Python.

SECTION-C

7. What are the basic list operations that can be performed in Python? Explain each operation with its syntax and example.

8. What is Dictionary? Explain Python dictionaries in detail discussing its operations and methods in detail.

9. Explain in detail about Python Files, its types, functions and operations that can be performed on files with examples.

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Total No. of Questions : 09

B.Tech. (AI&DS) (Sem.–5)

PROGRAMMING IN PYTHON

Subject Code : BTAIML501-20

M.Code : 93939

Date of Examination : 02-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a. Which operator in Python has the highest precedence?

   b. What is the primary purpose of Python's interactive help feature?

   c. How is a dictionary different from a list in Python?

   d. How do you create an infinite loop in Python?

   e. What data type would you use to store a unique collection of unordered items in Python? How?

   f. What is the purpose of the 'import' statement in Python?

   g. How can you reload a module in Python? When do you need it?

   h. What is the purpose of the 'try' and 'except' blocks in Python?

   i. How is an object created from a class in Python?

   j. What is the difference between an iterator and a generator in Python?

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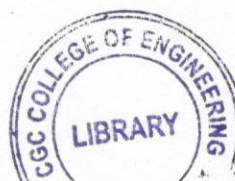
SECTION-B

2. What is the purpose of the 'Counter' collection? Provide an example of its usage using Python Code.

3. What are the different modes available for opening a file in Python? Illustrate.

4. Describe the concept of recursion and provide an example of a recursive function in Python.

5. Explain the purpose and use of assertions in Python with examples.

6. How do you create and use a generator in Python? Explain with a simple example.

SECTION-C

7. Discuss Python's native data types in detail, covering numbers, lists, tuples, sets, dictionaries, and strings. Include their characteristics, common operations and methods with diagrams illustrating data storage and typical use cases.

8. What are the different built-in functions, user-defined functions, anonymous functions (lambda), recursion and the scope and lifetime of variables in Python language? Explain pass-by-value vs pass-by-reference and illustrate recursion with a flowchart.

9. Describe the purpose and functionalities of Python's collections module, covering namedtuple, deque, ChainMap, Counter, OrderedDict, and DefaultDict. Include practical examples for each and illustrate their structure and use cases with diagrams.

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Total No. of Questions : 09

B.Tech. (CSE) (Sem.–5)

SOFTWARE ENGINEERING

Subject Code : BTCS503-18

M.Code : 78322

Date of Examination : 02-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is component based software development?

   b) What is Feasibility Study?

   c) Differentiate between functional and non-functional requirements.

   d) Do you think the maintenance of Software is expensive?

   e) Which SDLC model is the best?

   f) What are Verification and Validation?

   g) What do you mean by SEI-Capability Maturity Model?

   h) What is programming environment?

   i) What are the drawbacks of the Spiral Model?

   j) Explain the term project planning and control in brief.

(S2)- 364

SECTION-B

2. What is mean by Software Scope?

3. What is Waterfall Method and what are its use cases?

4. What is difference between Cohesion and Coupling?

5. Explain in detail about DFD and Structure Chart.

6. Describe the procedures to calculate cost-benefit analysis.

SECTION-C

7. **Explain the following :**

   a) Use-Case diagrams

   b) Software metrics

   c) CASE

   d) Testing

8. a) Explain in detail about Object-oriented software development.

   b) Write detailed difference between White Box and Black Box Testing.

9. a) Explain Software Quality and Quality Attributes. What are Software Quality Standards?

   b) What is the need for Software Maintenance? How are these maintained for client server architecture environment?

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI / DS) (Sem.–5)

MACHINE LEARNING

Subject Code : BTCS 618-18

M.Code : 93947

Date of Examination : 10-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

    a. Define Precision and Recall

    b. What is supervised learning.

    c. What is meant by overfitting of data?

    d. What is Multiple Linear Regression?

    e. Name various algorithms for dimensionality reduction.

    f. Define Data-Preprocessing.

    g. What is dimensionality reduction?

    h. What is the significance of regression?

    i. Define Activation Function,

    j. Define the term "Clustreing".
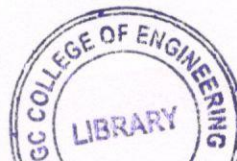
SECTION-B

2. Explain Random Forest Classification algorithm in detail.

3. How KNN is different from k-mean algorithm, explain in detail.

4. What are Artificial Neural Networks? Explain any three activation functions used in neural networks.

5. Explain in detail linear regression and logistic regression. What are the scenarios in which linear regression and logistic regression are used?

6. Define Data-Preprocessing, discuss various methods of data-preprocessing in detail'.

SECTION C

7. What are outliers? Discuss any three methods to deal with outliers.

8. Explain in detail Split algorithm based on Gini index.

9. Explain in context to Genetic Algorithms: Gene representation and Fitness function, Selection and Mutation as well.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE) (Sem.–5)

WEB TECHNOLOGIES

Subject Code : BTCS520-18

M.Code : 78326

Date of Examination : 10-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Why JSON is preferred for web development now a days?

   b) Write HTML code for inserting an image on a webpage.

   c) What is the significance of SSL? Write its latest version.

   d) Why and how meta tags are used in a webpage?

   e) Differentiate get and post methods of an HTML form.

   f) What is Java Script DOM?

   g) List all AJAX components.

   h) What are the types of variables present in PHP?

   i) Name some font-related CSS attributes.

   j) Write down features of HTML5.

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SECTION-B

2. **Write CSS code for the following:**

   a) Set the background color of an element.

   b) Set the color of four borders and apply around text.

3. Write down four properties associated with HTML audio/video and explain them.

4. How will you maintain cookies and session using PHP? Explain with code.

5. Write code to determine the frequency of an element in an array using Java script.

6. How would you read and write JSON on client and server? Illustrate with code.

SECTION-C

7. Design a form in PHP using HTML with attributes FirstName, LastName, Gender, Age, Mobile, Address, Occupation then save the data in MySQL using PHP connection with database.

8. **Answer the following:**

   a. What are the security threats that overcome with Ajax code?

   b. Describe various methods used in XMLHttpRequest.

9. **Answer the following:**

   a. Differentiate internal and external CSS style sheets.

   b. Design a table using HTML with 3 rows and 4 columns and fill the month names in it.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Artificial Intelligence & Machine Learning/CS&E) (Sem–5)

FORMAL LANGUAGE & AUTOMATA THEORY

Subject Code : BTCS 502-18

M.Code : 93172

Date of Examination : 22-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Differentiate between NFA and DFA.

   b) State Pumping Lemma for Context Free Languages.

   c) State Kleene's theorem.

   d) Define union of two languages.

   e) Explain the concept of Unit Production.

   f) Give example of language that is recursive.

   g) Define leftmost and rightmost derivation.

   h) What is ambiguity in CFGs?

   i) What is Griebach Normal Form?

   j) Define decidability.

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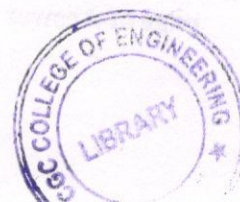
SECTION-B

2. Give regular expression to each of the subsets of {a,b}

   a) Set of all strings containing exactly 2a's

   b) Set of all strings containing substring aa.

3. Construct a Finite Automata equivalent to the regular expression.

   $(0+1)^* (00+11) (0+1)^*$

4. Explain in brief the various types of languages. Also name the automata accepting those languages.

5. What are the steps needed to reduce a context free grammar to an equivalent grammar in Chomsky Normal Form.

6. What is Turing Machine? Discuss its halting problem.

SECTION-C

7. Show the equivalence of DFA and NDFA.

8. Design a Turing Machine M to recognize the language $\{1^n 2^n 3^n \mid n \geq 1\}$.

9. **Write short notes on:**

   a) Context Sensitive Languages

   b) Closure Properties in CFLs

   c) NP Complete Problems

   d) Church Turing Thesis.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AI & DS) (Sem.–5)

STATISTICAL COMPUTING TECHNIQUES USING R

Subject Code : BTES 501-20

M.Code :93936

Date of Examination : 22-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Explain the following :

    a) Logical

    b) Missing Values

    c) Scan

    d) Graphics

    e) Errors

    f) R Script

    g) Median

    h) Variance

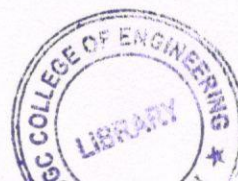   i) Scatter plot

    j) Data frames.

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SECTION-B

2. Differentiate between system and user defined objects.

3. Discuss vectors and their attributes.

4. Write a note on function compiling and function documentation.

5. Describe with example probability distribution.

6. Explain principles of exploratory data analysis.

SECTION-C

7. What is R Script? Explain how to write your own code?

8. Explain in detail with example the working of loops.

9. Discuss models and methods in R. How to customize the user's environment?

Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE) (Sem.–5)

ENTERPRISE RESOURCE PLANNING

Subject Code : BTES 501-18

M.Code : 78319

Date of Examination : 22-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) OLAP

   b) ROI

   c) DSS

   d) EIA

   e) SCM

   f) ERP

   g) HRM

   h) e-Business

   i) Data Mining

   j) Peoplesoft
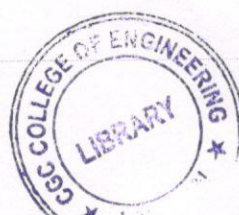
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SECTION-B

2. Explain direct and indirect benefits of ERP.

3. Why is ERP important to a company? List any three ERP implementation strategies and explain it in detail.

4. Explain various subsystems of the Financial Module and Human Resources Module of ERP package.

5. What are the three tasks in SAP?

6. Discuss the reason of growth of ERP Market.

SECTION-C

7. Explain the Subsystems of Plant Maintenance Module in ERP.

8. List out the various ERP system packages available in market. Which one occupies the top most position and why?

9. In terms of ERP explain : Customer Relation Management, Project Management and Quality Management.

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Total No. of Questions : 09

B.Tech. (AI & DS) (Sem.–5)

JAVA PROGRAMMING

Subject Code :BTAIML 509-20

M.Code : 93951

Date of Examination : 12-12-2024

Time : 3 Hrs.   Max. Marks: 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

    a. Define Java compilation.

    b. What are Strings?

    c. Briefly explain Java identifiers.

    d. Discuss finalize( ) method.

    e. What is super in inheritance?

    f. Write concept of JVM.

    g. What are operations on string?

    h. Discuss use of hashing.

    i. Give use Java Swings.

    j. What is web.xml?

SECTION-B

2. What do you understand by JAR files? How they are used in Library packages?

3. Discuss various decision making and branching statements available in Java.

4. What is thread life cycle? Discuss synchronization of threads.

5. What are the AWT components in Java? How they are used in GUI Programming ?

6. Give the introduction of Servlet life cycle.

SECTION-C

7. Discuss meaning of method overloading. Write the syntax and example of its use in Java.

8. What are exceptions in Java? How Try and Catch are used to handle the exception?

9. Explain the concept of database connectivity. Show with example how it is used in Java Program.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (AI & ML / CSE) (Sem.–5)

JAVA PROGRAMMING

Subject Code : BTAIML509-20

M.Code : 93185

Date of Examination : 12-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Define the following :

   a) Keywords

   b) Constant

   c) Multithreading

   d) Synchronization

   e) CLASSPATH

   f) Event handling

   g) Comments

   h) JSP

   i) TCP

   j) doPOST method.
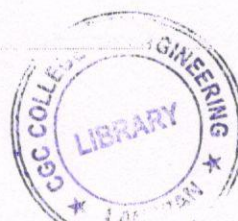
SECTION-B

2. List the features of Java Programming Language.

3. Discuss the role of the try, catch, and finally blocks in handling exceptions in Java.

4. Explain the structure of a Java class and its components, such as fields (attributes) and methods (functions).

5. Explain the major components of the JDBC architecture.

6. Explain the difference between AWT (Abstract Window Toolkit) and Swing.

SECTION-C

7. Write steps how we can create and use user define Package in Java.

8. Explain the life cycle of a Java Servlet. What are the different methods in the life cycle, and what is their purpose?

9. Differentiate between the List, Set and Map interfaces in the Collection framework.

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Total No. of Questions : 09

B.Tech. (CSE) (Sem.–5)
PROGRAMMING IN PYTHON
Subject Code : BTCS-510-18
M.Code : 78324
Date of Examination : 13-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

    a) Explain built-in data types of Python.

    b) What are the key features of Python?

    c) Explain the need for continue and break statements.

    d) Describe list slicing with examples.

    e) How filter is used in Python program? Explain with a suitable example.

    f) Explain raw_input() and input() in Python.

    g) Discuss the need and importance of function in python.

    h) Identify what are the packages in python.

    i) Demonstrate the various expressions in python with suitable examples.

    j) Discuss the various operation that can be performed on a tuple and Lists (minimum 5) with an example.

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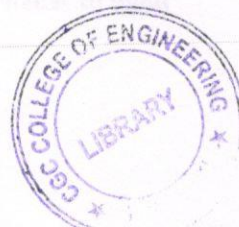
SECTION-B

2. What is difference between error and exception? Explain exception handling in Python with example.

3. Describe the syntax for the following functions and explain with an example.

   a) abs()

   b) max()

   c) divmod()

   d) pow()

   e) len()

4. Write a Python GUI program to create three push buttons using Tkinter. The background colour of the frame should be different when different buttons are clicked.

5. Discuss inheritance in Python programming language. Write Python Program to demonstrate Multiple Inheritance with Method Overriding.

6. Describe the need for catching exceptions using try and except statements.

SECTION-C

7. What are Literals & Data types in Python and explain them with examples?

8. What is the process of compilation and linking in Python? Does Python have OOPs concepts?

9. Describe the different access modes of the files with an example. Consider a line "From Stephen. marquard\@uct.ac.za Sat Jan 5 09:14:16 2008" in the file email.txt. Write Python code to read the file and extract email address from the lines starting from the word "From". Use regular expressions to match email address.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AI&ML/ LE / CSE)   (Sem–5)

DATABASE MANAGEMENT SYSTEMS

Subject Code : BTCS-501-18

M.Code : 93171

Date of Examination : 14-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is database management system?

   b) Differentiate between **SELECT** AND **FROM** clauses in a SQL query.

   c) Define a database deadlock and how it can be avoided?

   d) Explain the concept of role based access control in database security.

   e) Explain the concept of inheritance in the context of object orient databases.

   f) State the difference between relational algebra and calculus.

   g) Define BCNF. Write down its basic properties.

   h) What do you mean by 2PL?

   i) Define the term Relational Databases.

   j) Write down application of DBMS.

(S2)- 393

SECTION-B

2. Differentiate between file based approach and data base approach.

3. What is Transaction? Discuss ACID Properties in details.

4. Why should normalization be performed on a table and what are its benefits.

5. What is authorization and authentication? Explain the access controls in a database.

6. What is Concurrency Control? Discuss three main problems in concurrency control.

SECTION-C

7. What is normalization? Explain 1NF, 2NF, 3NF and BCNF in detail.

8. What is attribute? Explain different type of attributes with examples in detail.

9. What do you mean by file organization? Discuss the importance of file organization database. Discuss various types of file organizations available.

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Total No. of Questions : 09

B.Tech. (Artificial Intelligence (AI) and Data Science) (Sem.–6)

DATA ANALYTICS USING R

Subject Code : BTITCS 601-20

M.Code : 93954

Date of Examination : 14-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

    a. What is Data Science?

    b. Differentiate between structure and unstructured data.

    c. What are the sources of the data?

    d. Write about vectors in R.

    e. Define Strips Charts.

    f. State the Arithmetic Operators in R.

    g. What is environment setup with R studio?

    h. Write syntax of if else in R.

    i. What are the Data Types in R?

    j. Explain initialize() function in R.

           (S2)-1376

SECTION-B

2. Explain the various phases of the data science life cycle.

3. Explain the type of data and Measurement Scales in detail.

4. Explain the procedure and concepts for reading data in R.

5. Describe in detail about various logical operators in R programming.

6. What is the importance of vector in R? Explain operations on vectors.

SECTION-C

7. Write the R script which include relevant packages and procedure to access .csv and .exl files. Elaborate with suitable example.

8. Write about scatter plot and histograms with examples? Explain its importance.

9. Explain about the various statistical functions and math functions in R.

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Total No. of Questions : 09

B.Tech. (AI / DS) (Sem.–6)

DATA MINING AND DATA WAREHOUSE

Subject Code : BTCS 702-18

M.Code : 93953

Date of Examination : 13-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

    a. What is web data mining and what is its primary objective?

    b. Define web content mining in one sentence.

    c. What distinguishes web usage mining from other types of web mining?

    d. Define partition methods in the context of clustering.

    e. What is cluster analysis and what is its main purpose in data mining?

    f. Briefly explain the Naive algorithm in the context of association rule mining.

    g. Define association rule mining.

    h. What is the main challenge in data quality management?

    i. Write the primary purpose of the Apriori algorithm in data mining.

    j. What does DHP stand for and how does it relate to data mining?

SECTION-B

2. What are the design guidelines for implementing a data warehouse? Illustrate them with a diagram showing the data warehouse architecture.

3. Discuss the process of ranking web pages in search engines. Explain the factors influencing page ranking, such as SEO techniques.

4. What is the process of association rule mining? Discuss its significance in uncovering patterns within datasets, and illustrate with a diagram.

5. Explain the different types of clustering methods and their characteristics in cluster analysis, focusing on partitioning, hierarchical and density-based methods.

6. Describe the characteristics of web data mining. Discuss key features such as scalability, data variety, and dynamic nature, and provide a diagram illustrating the different aspects of web data mining.

SECTION-C

7. Explore the various techniques and methods used in web content mining. Describe how data is collected and processed to extract meaningful information from web pages? Discuss the challenges faced in web content mining and include diagrams to illustrate the workflow of content extraction and analysis.

8. Provide an in-depth overview of the history and working of search engines. Highlight key changes in search engine functionality and architecture over time, and include diagrams to visualize the progression and improvements in search engine technology and its impact on information retrieval.

9. Discuss the process of data cube computation in detail. Explain how data cubes are created, the operations that can be performed on them, and the significance of each operation? Illustrate the concepts of slicing, dicing, and drilling down/up.

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Total No. of Pages : 02

B.Tech. (CSE) (Sem.–6)

ARTIFICIAL INTELLIGENCE

Subject Code : BTCS602-18

M.Code : 79250

Date of Examination : 12-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Name some applications of graphs.

   b) What is Bayes Rule?

   c) What is a search tree?

   d) What is Probabilistic reasoning?

   e) What are agents?

   f) Define Artificial Intelligence.

   g) What is classical "water jug problem"?

   h) What are heuristic algorithms?

   i) What is temporal difference learning?

   j) What is dynamic programming?

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SECTION-B

2. Differentiate between tree and graph structure.

3. Give the Algorithm for BFS and DFS and explain it in detail.

4. Explain Bayesian networks with examples.

5. Explain Markov Decision Process and Value Functions.

6. Describe the importance of Q-learning algorithm in reinforcement learning.

SECTION-C

7. What are uninformed search techniques? How are they different from heuristic search? Compare different uninformed search strategies.

8. **Explain:**

   a) Policy Improvement and Policy Iteration in dynamic Programming

   b) Q Learning

9. a) How do utility functions work in Markov decision process?

   b) What is passive reinforcement learning?

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B.Tech. (AI&DS/ AI&ML/ IOT & Cyber security including Block chain Technology/CE/ CSE/ DS/ EE/ ECE/ EEE/ IT/ BCA) (Sem.–6)

WIRELESS COMMUNICATION

Subject Code : BTEC-601-18

M.Code : 79373

Date of Examination : 20-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a. Define frequency reuse and frequency reuse factor.

   b. What is co-channel interference?

   c. Define Doppler spread and coherence time.

   d. Define handoff and its types.

   e. Define blocked call and call dropped rate.

   f. What is the role of Mobile Switching Centre (MSC) in cellular system?

   g. Define AMPS and ETACS.

   h. Why we use directional antenna instead of Omni-directional one in cell?

   i. Differentiate between TDMA and FDMA.

   j. Differentiate between Bluetooth and Zigbee.
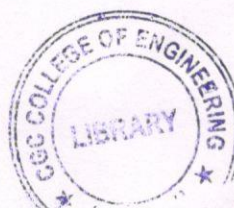
SECTION-B

2. Explain different components and operation of cellular system.

3. With the help of cosine law and hexagon cell geometry, prove that for a hexagonal cell geometry, the co-channel reuse ratio is given by $Q = \sqrt{3N}$, where $N = i^2 + j^2 + ij$.

4. Classify types of fading based on multipath delay spread, doppler spread, symbol period and band width.

5. Write short notes on EDGE and IS-95 CDMA standard.

6. Derive the desired carries to interference (C/I) ratio from a normal case in an Omni directional antenna system.

SECTION-C

7. With the help of proper labeled diagram, explain the frame structure, architecture and speech processing of GSM system. Why are so many logical channels used in the GSM?

8. How diversity technique improves the performance of receiver in multipath scenario? Explain selection and switched combining in detail.

9. **Write a short note on:**

   a. UMTS standards and its specification.

   b. LTE-Advance systems.

   c. Space Division Multiple Access and Packet Radio Protocols.

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Total No. of Questions : 09

DEC 2024

Total No. of Pages : 02

B.Tech. (Computer Science & Engineering) (Sem.–6)

CLOUD COMPUTING

Subject Code : BTCS612/18

M.Code : 79254

Date of Examination : 16-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Grid Computing

   b) Benefits of Cloud Computing

   c) IT as a service

   d) Hypervisors

   e) API

   f) Elasticity

   g) Load Balancing

   h) Azure

   i) Need for Cloud Migration

   j) IaaS.

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(S2)-2590

SECTION-B

2. Write a note on the Driving factors and applications of Cloud Computing.

3. **Explain in detail :**

   a) Multitenancy

   b) Pros of Visualization

4. Write down Selection criteria followed for cloud deployment.

5. Explain in detail various Cloud Deployment Models

6. Briefly explain principal security dangers to cloud computing.

SECTION-C

7. An existing IT Service Company B123.Ltd (Imaginary name) spans multiple Cities; suggest the Cloud deployment model for B123 .Ltd. Explain the Pros and Cons of your suggested Deployment Model over other available models.

8. Compare various cloud service delivery models.

9. Explain different types of Hypervisors and their limitations in detail.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

Total No. of Pages : 03

B.Tech.(AI&ML / AI&DS / Block Chain / CSE / CS / CSD / DS / IT /
Robotics & Artificial Intelligence / Internet of Things and Cyber Security
including Block Chain Technology)   (Sem.–6)

MATHEMATICS-III

Subject Code : BTAM-302-23

M.Code : 94630

Date of Examination : 07-01-2025

Time : 3 Hrs.
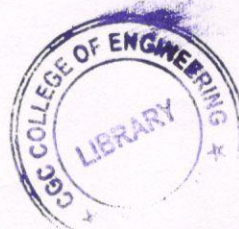
Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a) What do you mean by Skewness?

b) Give an example of a random experiment.

c) A die is thrown at random. Find the probability that the number on it is greater than 4.

d) Define Poisson distribution.

e) Write down the mean and variance of binomial distribution.

f) Write down the steps of method of least square to fit a straight line of the form $y = a + bx$, where a and b are constants.

g) What do you mean by correlation?

h) Define Standard Error of a sampling distribution of a statistic.

i) What do you mean by a small sample and a large sample. Give example of each.

j) When do we use Chi-square test?

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SECTION-B

2. Calculate the first four moments of the following distribution about the mean :

x:	0	1	2	3	4	5	6	7	8
f:	1	8	28	56	70	56	28	8	1

3. a) A card is drawn from a well-shuffled pack of playing cards. What is the probability that it is either a spade or an ace?

   b) Prove that the probability of the impossible event is zero.

4. In a normal distribution, 31% of the items are under 45 and 8% of items are over 64. Find the mean and standard deviation of the distribution.

5. By using the method of least squares, find the straight line of the form $y = a + bx$ that fits the following data :

x	100	120	140	160	180	200
y	0.45	0.55	0.60	0.70	0.80	0.85

6. A random sample of size 16 has 53 as mean. The sum of squares of the deviation from mean is 135. Can this sample be regarded as taken from the population having 56 as mean?

SECTION-C

7. Define binomial distribution. Fit a binomial distribution to the following data:

x:	0	1	2	3	4
y:	28	62	46	10	4

8. A sample of 12 fathers and their eldest sons gave the following data about their heights in inches :

Father	65	63	67	64	68	62	70	66	68	67	69	71
Son	68	66	68	65	69	66	68	65	71	67	68	70

Calculate the coefficient of rank correlation.

9. What is Chi-square test? A die is thrown 90 times with the following results :

Face	1	2	3	4	5	6	Total
Frequency	10	12	16	14	18	20	90

Use Chi-square test to test whether these data are consistent with the hypothesis that the die is unbiased. Given that $\chi^2_{0.05} = 11.07$ for 5 degrees of freedom.

Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech (CSE) (Sem.–6)
COMPILER DESIGN
Subject Code : BTCS601-18
M.Code : 79249
Date of Examination : 18-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is meant by ambiguous grammar?

   b) What are syntax errors, give two examples?

   c) What is an Interpreter?

   d) Give some compiler construction tools.

   e) Differentiate between compiler and interpreter.

   f) Remove left recursion S-→ Aa/b, A--→ Ac/Sd/e.

   g) What is Basic Block? Write its use.

   h) Define the two parts of compilation and its function.

   i) Define Ambiguous Grammar.

   j) What is DAG?

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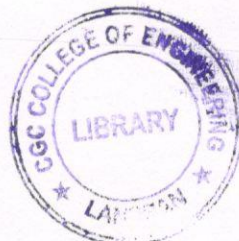
SECTION-B

2. Explain Language Processing System with neat diagram.

3. What are issues in Lexical Analysis?

4. Explain various Errors encountered in different phases of compiler.

5. Construct Stack Implementation of Shift-Reduce Parsing for the grammar below:

   $E \to E+E \quad E \to E*E \quad E \to (E) \quad E \to id$

   For the given input string id1 + id2 * id3.

6. Construct LL(1) grammar for tile sentence $S \to iEts|iEtSeS \,|a \quad E \to b$

SECTION-C

7. Explain the following w.r.t code generation phase:

   a) Input to code generator

   b) Target Program

   c) Memory Management

   d) Instruction Selection

   e) Register Allocation

   f) Evaluation Order

8. Discuss different Storage Allocation Strategies.

9. Explain Principal Sources of Optimization with example.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (CSE) (Sem.–6)
ARTIFICIAL INTELLIGENCE
Subject Code : BTCS602-18
M.Code : 79250
Date of Examination : 12-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Name some applications of graphs.

   b) What is Bayes Rule?

   c) What is a search tree?

   d) What is Probabilistic reasoning?

   e) What are agents?

   f) Define Artificial Intelligence.

   g) What is classical "water jug problem"?

   h) What are heuristic algorithms?

   i) What is temporal difference learning?

   j) What is dynamic programming?

(S2)-1189

SECTION-B

2. Differentiate between tree and graph structure.

3. Give the Algorithm for BFS and DFS and explain it in detail.

4. Explain Bayesian networks with examples.

5. Explain Markov Decision Process and Value Functions.

6. Describe the importance of Q-learning algorithm in reinforcement learning.

SECTION-C

7. What are uninformed search techniques? How are they different from heuristic search? Compare different uninformed search strategies.

8. **Explain:**

   a) Policy Improvement and Policy Iteration in dynamic Programming

   b) Q Learning

9. a) How do utility functions work in Markov decision process?

   b) What is passive reinforcement learning?

(S2)-1189

Roll No. ☐☐☐☐☐☐☐☐☐☐☐

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (Artificial Intelligence (AI) and Data Science) (Sem.–6)

BIG DATA ANALYTICS

Subject Code : BTDS603-20

M.Code : 93960

Date of Examination : 19-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

l. Write short notes on :

  a. What are the three Vs of Big Data?

  b. How has data science transformed businesses?

  c. Why is Hadoop considered scalable?

  d. What is YARN?

  e. List components of Hadoop.

  f. What is Map-Reduce?

  g. What is job tracker?

  h. What is data transformation?

  i. What is cross validation?

  j. Define outlier.

SECTION-B

2. Discuss the challenges faced during data preparation and potential solutions.

3. Explain the Map-Reduce programming model and its significance in Hadoop.

4. Discuss various techniques used for model evaluation and their significance.

5. Discuss the advantages and limitations of using Naive Bayes for classification.

6. Explain the K-means clustering algorithm and its applications in data analytics.

SECTION-C

7. What is significance of Hadoop? Explain the core components of Hadoop and their interdependencies.

8. What is machine learning? Explain the differences between supervised and unsupervised learning with examples.

9. **Write a short note on :**

   a. Text Mining.

   b. Logistic Regression.

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Total No. of Questions : 09

B.Tech. (AI & DS)   (Sem.–6)

DEEP LEARNING

Subject Code : BTCS-704-18

M.Code : 93966

Date of Examination : 22-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is the difference between supervised and unsupervised learning?

   b) What is over-fitting in machine learning?

   c) What is back-propagation?

   d) Define a bidirectional RNN.

   e) What is the role of computational graph in neural networks?

   f) What is the stride in a convolution operation?

   g) What type of data are RNNs particularly suited for?

   h) What is a generative model?

   i) What is the difference between an auto encoder and a variational auto encoder?

   j) What is the purpose of Stochastic Gradient Descent (SGD)?

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SECTION-B

2. Explain Stochastic Gradient Descent (SGD) and its advantages over batch gradient descent.

3. What is the role of hidden units in a feed-forward neural network? How do they contribute to the model's learning capability?

4. Discuss the role of unsupervised feature learning in convolutional networks. Provide an example.

5. What are Recurrent Neural Networks (RNNs), and how do they differ from traditional feed-forward neural networks?

6. Discuss the challenges of training deep recurrent networks and potential solutions.

SECTION-C

7. Describe the complete architecture of a Convolutional Neural Network (CNN) and explain how each component contributes to pattern recognition.

8. Describe the structure and training process of a Restricted Boltzmann Machine (RBM) and how it forms the basis for Deep Belief Networks (DBNs)?

9. Explain Maximum Likelihood Estimation (MLE) and its application in logistic regression and Gaussian mixture models.

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Total No. of Questions : 09

B.Tech. (CSE) (Sem.–6)
MACHINE LEARNING
Subject Code : BTCS-618-18
M.Code : 79257
Date of Examination : 22-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Define machine learning and explain its importance.

   b) Write the key elements of Reinforcement learning.

   c) Why do we need data integration in a machine learning process?

   d) What is the purpose of splitting data into training and test sets?

   e) What is multiple linear regression, and how does it differ from simple linear regression?

   f) What is polynomial regression?

   g) Explain the logistic function and its role in logistic regression.

   h) Explain the concept of a hyperplane in the context of SVMs.

   i) Name common activation functions used in Artificial Neural Networks.

   j) What is the purpose of the selection operation in a genetic algorithm?

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SECTION-B

2. Explain the concept of Supervised learning along with its advantages and disadvantages.

3. Write a detailed note on Data Cleaning.

4. Write a detailed note on Simple linear regression.

5. Write a detailed note on need and applications of clustering.

6. Explain in detail about Apriori algorithm.

SECTION-C

7. Write a detailed note on various issues in Machine Learning.

8. Write a detailed note on following feature scaling techniques along with their advantages and disadvantages.

   a) Normalization

   b) Standardization

9. **Write a detailed note on following algorithms:**

   a) Random Forest classification

   b) Logistic Regression

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Total No. of Questions : 09

B.Tech. (Computer Science & Engineering) (Sem.–7,8)

QUANTUM COMPUTING

Subject Code : BTCS718-18

M.Code : 90509

Date of Examination : 22-12-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is quantum bit?

   b) What is the difference between conventional computing and quantum computing?

   c) What is nuclear magnetic resonance?

   d) Define quantum noise.

   e) What is fault tolerance with regard to quantum computers?

   f) Give example of quantum error correcting code.

   g) What is ion trapping?

   h) What is quantum search?

   i) What is stabilizer code?

   j) Define data compression

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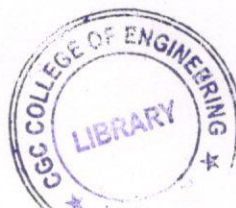
SECTION-B

2. Explain the concept of quantum circuits in quantum information theory.

3. What are quantum computers? Discuss the few conditions for quantum computation.

4. What is Shannon Entropy? Discuss few properties of Entropy.

5. What is Quantum Search? How Quantum search can be used for unstructured database?

6. Discuss basic properties of distance measures for quantum states.

SECTION-C

7. What is quantum computing? How does Quantum computing works? Discuss few real-world applications of quantum computing.

8. What are quantum operations? Discuss few applications of quantum operations.

9. **Write a short note on :**

   a. Simulation of Quantum systems

   b. Limitations of quantum operation formalisms.

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Roll No.

Total No. of Questions : 09

Total No. of Pages : 03

B.Tech. (Computer Science & Engg.) (Sem.–7,8)
AGILE SOFTWARE DEVELOPMENT
Subject Code : BTCS-710-18
M.Code : 90501
Date of Examination : 29-11-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a) Define User stories.

b) Name the agile manifesto.

c) What is the Kanban board?

d) What is XP?

e) What are the advantages and disadvantages scrum?

f) Define refactoring.

g) Write the names design principles?

h) What is the need sprint review?

i) Explain the concept of artifacts.

j) Explain retrospective.

SECTION-B

2. What are the fundamental activities of agile software process? Explain one relevant project management tool for agile team activity.

3. Consider the code written for storing the details of a Student like the student id, name and batch name.

a. class Demo {

b. public static void main(String args[]){

c. String student[3];

d. student[0]="1001";

e. student [1]="Jennifer";

f. student[2]="Jun 14LCI";

g. }

h. }

An array has been used to represent the attributes of the student class in line numbers 4,5,6. What is the issue with the code? Write the revised code to resolve the issue.

4. Distinguish between error and failure. Explain steps for TDD.

5. A team claims that they have started using Test Driven Development in their project. They have test automation in place and code coverage percentage is showing convincing percentages. However, the customers have raised concerns on the quality of code. What could have gone wrong here? Explain the solution.

6. A Scrum team has completed 5 sprints. They now find the going difficult. The code quality is not good, there is patchy and duplicate code. They are finding it increasingly difficult to integrate code. What would you suggest to reduce these issues and why?

SECTION - C

7. Why software development is not quick and easy method? Why a disciplined approach need to be adapt in software development of complex software? What is the role of agile manifesto and principles in software development? Illustrate with the help of example.

8. Define all design principles. Identify the **SOLID principle** which is applied in scenario and explain the reason with the help of diagram.

   *Consider an example of a class called **Car**. This class has a method called brake which slows down the car. A subclass of **Car** class is made called **RegularCar** which implements this **brake** method to add the functionality of showing an indicator on the dashboard of the car. Another subclass of **Car** class is made which also implements the brake method to additionally switch on the brake lights.*

9. How to write a user acceptance test? Explain the acceptance criteria and acceptance test cases of the following user stories:

   a) As a user, I want to be able to register for the service so that 1 can start shopping online.

   b) As a user, I am able to access notification on my device immediately after receiving it.

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Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐ Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE) (Sem–7,8)

ADHOC AND WIRELESS SENSOR NETWORKS

Subject Code : BTCS-716-18

M.Code : 90507

Date of Examination : 04-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Define wireless sensor networks.

   b) What is sensor network localization?

   c) Compare sensor network with ad-hoc network.

   d) What are the disadvantages of flooding?

   e) Define black hole attack.

   f) What is data aggregation strategy in wireless sensor networks?

   g) What are contention based protocols?

   h) Define jamming.

   i) Define key management.

   j) List basic security requirements.

SECTION-B

2. Explain in detail about IEEE 802.15.4.

3. Explain the requirements of a Secure Routing Protocol for Ad-hoc Wireless Network.

4. Discuss various energy efficient routing challenges and issues in transport layer.

5. What is routing protocol? Outline the issues in designing a routing protocol for ad-hoc wireless networks.

6. List the various characteristics of ideal routing protocol for ad hoc wireless network.

SECTION-C

7. Discuss the different issues in designing a MAC protocol for ad-hoc wireless networks.

8. Discuss network security requirement issues and challenges in security provisioning. networks.

9. Discuss the architecture of wireless sensor network with diagrammatic illustration.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AI&DS/CSE/AIML) (Sem.–7,8)

COMPUTER VISION

Subject Code : BTAIML 701-20

M.Code : 94006

Date of Examination :17-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a) Discuss the effects of quantization on an image and how can those be addressed or minimized?

b) What is pixel connectivity? Discuss briefly different types of pixel connectivity.

c) Discuss the advantages of filtering in frequency domain over spatial domain.

d) Differentiate between image degradation and image restoration.

e) Write some applications of wavelet transform in image processing.

f) Write a short note on Haar Transform. How is it used to decompose an image into different frequency subbands?

g) Differentiate between Stereo reconstruction and Multiview reconstruction.

h) Write a short note on loss functions.

i) Discuss briefly about patterns and pattern classes.

j) What is feature-based object recognition?

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SECTION-B

2. Differentiate between spatial and sharpening spatial filters with the help of an example.

3. Explain the general model for image degradation and restoration. Discuss some common types of image degradation.

4. Discuss the concept of erosion and dilation. Explain how are they used to perform basic operations on binary images?

5. What role does epipolar geometry plays in stereo and multiview reconstruction? How are the fundamental and essential matrices used to compute epipolar lines?

6. What are the advantages and disadvantages of template matching and feature-based methods for object recognition?

SECTION-C

7. Describe different types of noise in images and their sources. How can the noise be eliminated or reduced in the images using image processing techniques?

8. Explain Fast Fourier Transform (FFT) and discuss how it can be used to efficiently compute the DFT of large images? Describe key challenges in implementing efficient FFT algorithms.

9. Explain the concept of Hit-or-Miss transformation and explain how it can be used to detect specific features in binary images? Discuss various applications of Hit-or-Miss transformation in image processing.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI & DS / CSE / AI & ML /
(Internet of Things and Cyber Security including Block Chain
Technology / ECE / IT / ME)   (Sem.–7,8)

ROUTING AND SWITCHING

Subject Code : BTEC-905A-18

M.Code : 90691

Date of Examination : 03-01-2025

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

   a) Define routing protocol.

   b) List three advantages of IPv6 routing over IPv4.

   c) What is ICMP used for?

   d) Write down any two differences between circuit switching and packet switching.

   e) What is multicast broadcast?

   f) What is the difference between dynamic IP and static IP addressing?

   g) What is distance vector Routing?

   h) What is ADSL Internet service?

   i) List the different network security techniques.

   j) Describe wireless LAN.

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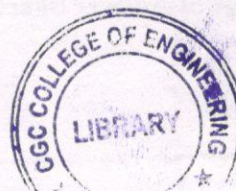
SECTION-B

2. Describe Flow Control and Buffering in Transport Layer.

3. Explain the term Authentication, Authorization and Accounting (AAA) used in network security.

4. Mention the advantages of RIP over OSPF.

5. Difference between host name and IP address.

6. What is Generic Routing Encapsulation? How does it work?

SECTION-C

7. What are some of the possible services that a link-layer protocol can offer to the network layer? Which of these link-layer services have corresponding services in IP?

8. What are the services provided by application layer? Explain FTP and SMTP application Layer protocol in detail.

9. **Explain any two:**

   a) Link state Routing.

   b) Generic Routing Encapsulation.

   c) Bridging Enterprise Networks with Serial WAN Technology.

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Total No. of Questions : 09

B.Tech. (CSE) (Sem.–7,8)

DATA MINING AND DATA WAREHOUSING

Subject Code : BTCS702-18

M.Code : 90488

Date of Examination : 26-11-2024

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What are the similarities between data warehouse and database?

   b) Describe different types of data cube operations.

   c) Let $x_1 = (4, 8, 2)$ and $x_2 = (1, 3, 8)$ represent two points in space. Find the Euclidean distance and Manhattan distance between x_1 and x_2.

   d) Compute the information gain for the columns age and income for the Table given in Question 7.

   e) What are the limitations of Apriori algorithm for association rule mining?

   f) Write the general characteristics of hierarchical based clustering methods.

   g) Discuss briefly about the enterprise search engine software.

   h) Which software is used for web data mining?

   i) What are the characteristics of OLAP?

   j) How clustering is done in large databases?

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SECTION-B

2. How data cube operations help in data warehousing?

3. Write a short note on Frequent Pattern mining without candidate generation.

4. Given the following confusion matrix for two classes "positive" and "negative", compute the performance measures i.e. accuracy, error rate, sensitivity, specificity and precision.

		Predicted Class	
		Positive	Negative
Actual Class	Positive	6954	46
	Negative	412	2588

5. Discuss the search engine architecture in detail.

6. Discuss and differentiate between web usage mining and web structure mining.

SECTION-C

7. Develop a decision tree for the following data (Use Gini index as the splitting criterion): Class-Labeled Training Tuples from the *All Electronics* Customer Database

RID	Age	Income	Student	Credit Rating	Class : Buys Computer
1	youth	high	no	fair	no
2	youth	high	no	excellent	no
3	Middle_aged	high	no	fair	yes
4	senior	medium	no	fair	yes
5	senior	low	yes	fair	yes
6	senior	low	yes	excellent	no
7	Middle_aged	low	yes	excellent	yes
8	youth	medium	no	fair	no
9	youth	low	yes	fair	yes
10	senior	medium	yes	fair	yes
11	youth	medium	yes	excellent	yes
12	Middle_aged	medium	no	excellent	yes
13	Middle_aged	high	yes	fair	yes
14	Senior	medium	no	excellent	no

8. Describe in detail and give examples of each of the following approaches to clustering: partitioning methods, hierarchical methods and density-based methods.

9. What is data preprocessing? What are different methods of data preprocessing? Explain in detail.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE)   (Sem.–7,8)

NETWORK SECURITY AND CRYPTOGRAPHY

Subject Code : BTCS701-18

M.Code : 90487

Date of Examination: 22-11-2024

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a) Vulnerability

   b) Attack

   c) Encryption

   d) Cipher

   e) Hash Function

   f) Active Attack

   g) Digital Signature

   h) Strong Authentication

   i) IDS

   j) Roll of Modular arithmetic.

1 | ...

SECTION-B

2. Explain in detail the working of CIA Model.

3. Briefly explain Euclidean and Extended Euclidean algorithms.

4. Explain in detail the purpose of using Feistal Cipher Structure.

5. How Secure Hash Function works? Explain in detail.

6. How Email security is achieved?

SECTION-C

7. Write a note on Block Ciphers (DES and AES).

8. Write a note on Kerberos.

9. Explain in detail Various Controls available for Network Security.

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Roll No. ☐☐☐☐☐☐☐☐·☐☐

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI&DS / CSE) (Sem.–7,8)

BUSINESS INTELLIGENCE

Subject Code : BTDS 705-20

M.Code : 94023

Date of Examination : 12-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) What is business intelligence?

   b) What is a business intelligence user?

   c) What is parameterized Reports

   d) What is interactive analysis?

   e) What is an Ad Hoc Query and How Does the Process Work?

   f) What do you mean by dimensional analysis?

   g) What is integrated analysis in business intelligence?

   h) What is efficiency in business intelligence?

   i) What is CCR stands for?

   j) What is cluster analysis?

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SECTION-B

2. Write a step by step procedure of business intelligence reporting.

3. How will you incorporate virtual inputs and outputs in cross efficiency analysis?

4. Discuss the elements used to optimizing presentations for right message.

5. What do you understand by pattern matching?

6. Explain the role of mathematical model in business intelligence.

SECTION-C

7. What is Data Visualization and its Importance in Business Intelligence? Explain the various types of data visualization in detail.

8. What is the CCR model? Explain with the help of suitable example.

9. **Write a note on the following :**

   a) Ethics and business intelligence

   b) Parameterized Reports and Self-Service Reporting.

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