

Bachelor of Technology in (AIML)Computer Sci. & Engg.(Credit Based)
KURUKSHETRA UNIVERSITY, KURUKSHETRA
Scheme of Studies/Examination
Semester I (w.e.f. session 2018-2019)

| S.No. | Course No./Code | Subject | L:T:P | Hours/Week | Credits | Examination Schedule(Marks) | | | | Duration of exam(Hours) |
|-------|-----------------|--|--------------------|------------|---------------|-----------------------------|-------------|------------|---------------|-------------------------|
| | | | | | | Major Test | Minor Test | Practical | Total | |
| 1A | BS-115A | Semiconductor Physics | 3:1:0 | 4 | 4 | 75 | 25 | 0 | 100 | 3 |
| 2A | ES-105A | Programming for Problem Solving | 3:0:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 3 | BS-133A | Calculus & Linear Algebra | 3:1:0 | 4 | 4 | 75 | 25 | 0 | 100 | 3 |
| 4A | ES-109A | Engineering Graphics & Design | 1:2:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 5A | BS-141A | Biology | 2:1:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 6A | BS-117LA | Semiconductor Physics Lab | 0:0:3 | 3 | 1.5 | -- | 20 | 30 | 50 | 3 |
| 7A | ES-107LA | Programming for Problem Solving Lab | 0:0:2 | 2 | 1 | -- | 20 | 30 | 50 | 3 |
| 8A | ES-113LA | Engineering Graphics & Design Practice | 0:0:3 | 3 | 1.5 | -- | 20 | 30 | 50 | 3 |
| | | Total | 12:5:8/ 12:3:10 | 25/25 | 21.0/ 20.0 | 375/ 300 | 185/ 200 | 90/ 150 | 650A/ 650B | |

| BS-115 A | | Semiconductor Physics | | | | | |
|------------------------|---|-----------------------|--------|------------|------------|-------|------|
| L | T | P | Credit | Major Test | Minor Test | Total | Time |
| 3 | 1 | - | 4 | 75 | 25 | 100 | 3h |
| Purpose | To introduce the fundamentals of solid state physics and its applications to the students. | | | | | | |
| Course Outcomes | | | | | | | |
| CO1 | To make the students aware of basic terminology of crystal structure. | | | | | | |
| CO 2 | Introduce the elementary quantum mechanics, which will be useful in understanding the concepts of solid state physics. | | | | | | |
| CO 3 | Discussion of classical free electron theory, quantum theory and Band theory of solids. | | | | | | |
| CO 4 | Basics and applications of semiconductors. | | | | | | |

Unit - I

Crystal Structure: Crystalline and Amorphous solids, Crystal Structure: lattice translation vector, symmetry operations, space lattice, basis; Unit cell and Primitive cell, Fundamental types of lattices: two-dimensional and three dimensional Bravais lattices; Characteristics of Unit cells: Simple Cubic (SC), Body Centred Cubic (BCC), Face Centred Cubic (FCC), Hexagonal Close Packed (HCP) structure; Simple crystal structures: Sodium Chloride, Cesium Chloride, Diamond, Cubic Zinc Sulfide; Miller Indices, Bonding in Solids, Point defects in crystals: Schottky and Frenkel defects.

Unit – II

Quantum Theory: Need and origin of Quantum concept, Wave-particle duality, Phase velocity and group velocity, Uncertainty Principle and Applications; Schrodinger's wave equation: time-dependent and time –independent; Physical Significance of wave function ψ .

Unit – III

Free Electron Theory: Classical free electron theory: electrical conductivity in metals, thermal conductivity in metals, Wiedemann-Franz law, success and drawbacks of free electron theory; Quantum free electron theory: wave function, eigen values; Fermi-Dirac distribution function, Density of states, Fermi energy and its importance, Thermionic Emission (qualitative).

Band theory of Solids: Bloch theorem, Kronig-Penney Model (qualitative), E versus k diagram, Brillouin Zones, Concept of effective mass of electron, Energy levels and energy bands, Distinction between metals, insulators and semiconductors, Hall effect and its Applications.

Unit –IV

Semiconductors: Conduction in Semiconductors, Intrinsic Semiconductors: Conductivity of charge carriers, Carrier concentration in intrinsic semiconductors; Extrinsic Semiconductors: n-type semiconductors, p-type semiconductors, charge carrier concentration in extrinsic semiconductors.

Semiconductor Devices: The p-n junction, Current-voltage characteristics of p-n junction; The Transistor: Bipolar Junction Transistor (BJT), Field Effect Transistor (FET), Metal-Semiconductor Junction (Ohmic and Schottky); Semiconductor Laser.

Suggested Books:

1. Applied Physics for Engineers, Wiley India Pvt. Ltd.
2. Introduction to Solid State Physics, John Wiley & Sons. .
3. Concepts of Modern Physics (5th edition), Tata McGraw-Hill Publishing Company Limited.
4. Solid State Physics, New Age International (P) Limited.
5. A Textbook of Quantum Mechanics, McGraw Hill Education (India) Private Limited.
Introduction to Nanotechnology, John Wiley & Sons.

Note: The paper setter will set the paper as per the question paper templates provided.

| BS-117LA | Semiconductor Physics Lab | | | | | | |
|------------------------|---|---|--------|-----------|------------|-------|------|
| L | T | P | Credit | Practical | Minor Test | Total | Time |
| - | - | 3 | 1.5 | 30 | 20 | 50 | 3h |
| Purpose | To give the practical knowledge of handling the sophisticated instruments. | | | | | | |
| Course Outcomes | | | | | | | |
| CO | To make the students familiar with the experiments related with Semiconductor Physics. | | | | | | |

Note: Student will be required to perform at least 10 experiments out of the following list.

1. To study the V-I characteristics of a p-n diode.
2. To find the flashing and quenching potential of Argon and to find the capacitance of unknown capacitor.
3. To find the value of Planck's constant by using photoelectric cell.
4. To find the temperature coefficient of resistance by using Pt resistance thermometer by post office box.
5. To find the ionization potential of Argon/Mercury using a thyratron tube.
6. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
7. To study the characteristics of (Cu-Fe, Cu-Constantan) thermocouple.
8. To find the value of Hall Coefficient of semiconductor.
9. To find the value of e/m for electrons by Helical method.
10. To find the band gap of intrinsic semiconductor using four probe method.
11. To calculate the hysteresis loss by tracing a B-H curve.
12. To find the frequency of ultrasonic waves by piezoelectric methods.
13. To verify Richerdson thermionic equation.

Suggested Books:

1. C.L.Arora, B. Sc. Practical Physics, S. Chand.
2. B.L. Worshnop and H, T, Flint, Advanced Practical Physics, KPH.
3. S.L. Gupta & V. Kumar, Practical Physics, PragatiPrakashan.

| ES-105A Programming for Problem Solving | | | | | | | |
|---|---|---|--------|------------|------------|-------|------|
| L | T | P | Credit | Major Test | Minor Test | Total | Time |
| 3 | - | - | 3 | 75 | 25 | 100 | 3h |
| Purpose To familiarize the students with the basics of Computer System and C Programming | | | | | | | |
| Course Outcomes | | | | | | | |
| CO 1 | Describe the overview of Computer System and Levels of Programming Languages. | | | | | | |
| CO 2 | Learn to translate the algorithms to programs (in C language). | | | | | | |
| CO 3 | Learn description and applications of conditional branching, iteration and recursion. | | | | | | |
| CO 4 | To use arrays, pointers and structures to formulate algorithms and programs. | | | | | | |

UNIT - I

Overview of Computers: Block diagram and its description, Number systems, Arithmetic of number systems, Computer Hardware: Printers, Keyboard and Mouse, Storage Devices.

Introduction to programming language: Different levels of PL: High Level language, Assembly language, Machine language; Introduction to Compiler, Interpreter, Debugger, Linker, Loader, Assembler.

Problem Analysis: Problem solving techniques, Algorithms and Flowchart representation.

UNIT - II

Overview of C: Elements of C, Data types; Storage classes in C; Operators: Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators, precedence & associativity of operators.

Input/output: Unformatted & formatted I/O function in C.

Control statements: if statement, switch statement; Repetition: for, while, and do-while loop; break, continue, goto statements.

UNIT - III

Arrays: Definition, types, initialization, processing an array, String handling.

Functions: Definition, prototype, parameters passing techniques, recursion, built-in functions, passing arrays to functions, returning arrays from functions.

UNIT - IV

Pointers: Declaration, operations on pointers, pointers and arrays, dynamic memory allocation, pointers and functions, pointers and strings.

Structure & Union: Definition, processing, passing structures to functions, use of union.

Data files: Opening and closing a file, I/O operations on files.

Suggested Books:

1. Brian W. Kernighan Dennis Ritchie, "C Programming Language" Pearson Education India.
2. SubrataSaha,Subhodip Mukherjee:Basic Computation & Programming with 'C'-Cambridge University Press.
3. Ajay Mittal, "Programming in C - A Practical Approach", Pearson.
4. E Balagurusamy :Programming in ANSI C,TMH Education.
5. PradipDey and ManasGhose, "Computer Fundamental and Programming in C", Oxford Pub.
6. ForouzanBehrouz, "Computer Science: A Structured Programming Approach Using C", Cengage Learning.
7. Ashok Kamthane, "Programming in C, 3e", Pearson Education India..
8. YashwantKanetker, "Let us C", BPB Publications.
9. A K Sharma, " Fundamentals of Computers & Programming" DhanpatRai Publications
10. Rajaraman V., "Computer Basic and C Programming", Prentice Hall of India Learning.

Note: The paper setter will set the paper as per the question paper templates provided.

| ES-107LA | Programming for Problem Solving Lab | | | | | | |
|------------------------|--|---|--------|-----------|------------|-------|------|
| L | T | P | Credit | Practical | Minor Test | Total | Time |
| - | - | 2 | 1 | 30 | 20 | 50 | 3h |
| Purpose | To Introduce students with problem solving using C Programming language | | | | | | |
| Course Outcomes | | | | | | | |
| CO 1 | To formulate the algorithms for simple problems | | | | | | |
| CO 2 | Implementation of arrays and functions. | | | | | | |
| CO 3 | Implementation of pointers and user defined data types. | | | | | | |
| CO 4 | Write individual and group reports: present objectives, describe test procedures and results. | | | | | | |

LIST OF PROGRAMS

1. Write a program to find the sum of individual digits of a positive integer.
2. Write a program to generate the first n terms of the Fibonacci sequence.
3. Write a program to generate all the prime numbers between 1 and n, where n is the input value given by the user.
4. Write a program to find the roots of a quadratic equation.
5. Write a function to generate Pascal's triangle.
6. Write a program for addition of Two Matrices
7. Write a program for calculating transpose of a matrix.
8. Write a program for Matrix multiplication by checking compatibility
9. Write programs to find the factorial of a given integer by using both recursive and non-recursive functions.
10. Write a function that uses functions to perform the count the lines, words and characters in a given text.
11. Write a program to explores the use of structures, union and other user defined variables
12. Write a program to print the element of array using pointers
13. Write a program to implement call by reference
14. Write a program to print the elements of a structure using pointers
15. Write a program to read a string and write it in reverse order
16. Write a program to concatenate two strings
17. Write a program to check that the input string is a palindrome or not.
18. Write a program which copies one file to another.
19. Write a program to reverse the first n characters in a file.

Note: At least 10 programs are to be performed & executed from the above list.

| BS-133 A | | Calculus and Linear Algebra | | | | | |
|------------------------|---|-----------------------------|--------|------------|------------|-------|------|
| L | T | P | Credit | Major Test | Minor Test | Total | Time |
| 3 | 1 | - | 4 | 75 | 25 | 100 | 3 h |
| Purpose | To familiarize the prospective engineers with techniques in calculus, sequence & series, multivariable calculus, and linear algebra. | | | | | | |
| Course Outcomes | | | | | | | |
| CO1 | To introduce the idea of applying differential and integral calculus to notions of improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions. | | | | | | |
| CO 2 | To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems. | | | | | | |
| CO 3 | To develop the essential tool of matrices and linear algebra in a comprehensive manner. | | | | | | |
| CO 4 | To familiarize the student with vector space as an essential tool in most branches of engineering. | | | | | | |

UNIT-I (12 hrs)

Calculus:

Evaluation of definite and improper integrals: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Rolle's Theorem, Mean value theorems, Indeterminate forms and L'Hospital's rule.

UNIT-II (8 hrs)

Matrices

Matrices, vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

UNIT-III (10 hrs)

Vector spaces

Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps.

UNIT-IV (10 hrs)

Vector spaces

Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbases. Diagonalization; Inner product spaces.

Suggested Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Erwin Kreyszig and Sanjeev Ahuja, Applied Mathematics- I, Wiley India Publication, Reprint 2015.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
6. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
9. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East-West press, Reprint 2005.
10. S. Lipschutz and M. Lipson, Schaum's outline of Linear Algebra,, McGraw Hill Education; 3 edition (1 July 17).

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| | | | | | | | | |
|---------------------------|--|----------|----------|----------------|-------------------|-------------------|--------------|-------------|
| Course code | ES-109A | | | | | | | |
| Course title | Engineering Graphics & Design | | | | | | | |
| Scheme and Credits | L | T | P | Credits | Major Test | Minor Test | Total | Time |
| | 1 | 2 | 0 | 3 | 75 | 25 | 100 | 3h |

Course Outcomes

| | |
|---|---|
| Objective- To expose students to the basics of Engineering Drawing , graphics and Projections. | |
| CO-1 | To learn about construction of various types of curves and scales. |
| CO-2 | To learn about orthographic projections of points, lines and planes. |
| CO-3 | To Learn about the sectional views and development of Right regular solids |
| CO-4 | To Learn about the construction of Isometric Projections and conversion of Isometric views to Orthographic views and vice-versa. |

UNIT - I

Introduction to Engineering Drawing:

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

UNIT - II

Orthographic Projections:

Principles of Orthographic Projections- Conventions- Projections of Points and lines inclined to both planes; Projections of planes inclined to one principal Plane.

Projections of Regular Solids:

Solid with axis inclined to both the Planes;

UNIT - III

Sections and Sectional Views of Right Regular Solids:

Sectional views of simple right regular solids like prism, pyramid, Cylinder and Cone. Development of surfaces of Right Regular Solids- Prism, Pyramid, Cylinder and Cone;

UNIT - IV

Isometric Projections:

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

Suggested Books:

1. Engineering Graphics using AUTOCAD 2000: T. Jeyapoovan, Vikas Publishing House.
2. Engineering Drawing: Plane and Solid Geometry: N.D. Bhatt and V.M.Panchal, Charotar Publishing House.
3. Engineering Drawing: Amar Pathak, Dreamtech Press, New Delhi.
4. Thomas E.French, Charles J.Vierck, Robert J.Foster, "Engineering drawing and graphic technology", McGraw Hill International Editions.
5. Engineering Graphics and Drafting: P.S. Gill, Millennium Edition, S.K. Kataria and Sons.
6. A Primer on Computer aided Engineering Drawing-2006, published by VTU, Belgaum.
7. A.Yarwood, Introduction to AutoCAD 2017, Published by CRC Press.
8. O. Ostrowsky, Engineering Drawing with CAD applications, Butterworth Heinemann, 1999.
9. BSI, Technical production documentation (TPD) – specification for defining, specifying and graphically reporting products, BS8888, 2002.
10. Corresponding set of CAD Software Theory and User Manuals.

Note: The paper setter will set the paper as per the question paper templates provided.

| | | | | | | | | |
|-------------------------------|--|----------|----------|---------------------|------------------|-----------------------|--------------|-------------|
| Course code | ES-113LA | | | | | | | |
| Coursetitle | EngineeringGraphics&Design Practice | | | | | | | |
| Scheme and Credits | L | T | P | Credit s | Practical | Minor Test | Total | Time |
| | - | - | 3 | 1.5 | 30 | 20 | 50 | 3h |
| Pre-requisites(if any) | - | | | | | | | |

Aim: To make student practice on engineering graphics and designsoftwaresand provide exposure to the visual aspects of engineering design.

| | |
|-------------|--|
| CO-1 | To give an overview of the user interface and toolboxes in a CAD software. |
| CO-2 | To understand to customize settings of CAD software and produce CAD drawing. |
| CO-3 | To practice performing various functions in CAD softwares. |
| CO-4 | To Learn about solid modelling and demonstration of a simple team design project. |

Module 1:Overview of ComputerGraphics:

Listingthecomputertechnologiethatimpactongraphicalcommunication,Demonstrating Knowledge of the theory ofCADsoftware[suchas:TheMenuSystem,Toolbars(Standard, ObjectProperties,Draw,Modify and Dimension),Drawing Area(Background, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus(Button Bars),The Command Line(where applicable),The Status Bar, Different methods of zoom asusedin CAD,Select and erase objects.; Isometric Views oflines, Planes, Simple and compound Solids];

Module2:Customization &CAD Drawing:

Setupofthedrawingpageandtheprinter,includingscalesettings,Settingup ofunitsanddrawing limits; ISO and ANSI standards forco ordinate dimension ingand tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producingdrawingsbyusingvariouscoordinateinputentrymethodstodrawstraightlines,Applyingvarious waysofdrawingcircles;

Module3:Annotations,layering&other functions:

Applyingdimensionstoobjects,applyingannotationstodrawings;Settingupanduseof Layers,layerstocreatedrawings,Create,editandusecustomizedlayers; Changingline lengths through modifying existing lines(extend/lengthen);Printingdocumentstopaper using theprintcommand;orthographicprojection techniques;Drawingsectionalviewsof compositerightregulargeometricsolids andprojectthetrueshapeof thesectionedsurface; Drawing annotation,Computer-aideddesign(CAD)softwaremodelingof partsand assemblies.Parametricandnon-parametricssolid,surface,and wireframemodels.Partediting andtwo-dimensionaldocumentationofmodels.Planarprojectiontheory,includingsketching of perspective,isometric,multi-view,auxiliary,andsectionviews.Spatialvisualization exercises.Dimensioning guidelines,tolerancingtechniques; dimensioningandscalemulti viewsofdwelling;

Module4:Demonstration ofasimpleteamdesign project:

Geometryandtopologyofengineeredcomponents:creation ofengineeringmodelsandtheir presentationinstandard2Dblueprintform andas3Dwire-frameandshadedsolids;meshed topologiesforengineeringanalysisandtool-path generationforcomponentmanufacture; geometricdimensioningandtolerancing;Useof solid-modelingsoftwareforcreating associativemodels atthecomponentand assemblylevels;floorplans thatinclude: windows,doors,andfixturessuchasWC,bath,sink,shower,etc.Applying colourcodingaccordingto

buildingdrawingpractice;Drawingsectionalelevation
IntroductiontoBuildingInformationModeling (BIM).

showingfoundation

toceiling;

Suggested Books(ES-113L):

1. Chris McMahon and Jimmie Browne, CAD/CAM – Principle Practice and Manufacturing Management, Addison Wesley England, Second Edition, 2000.
2. Chougule N.K.; CAD/CAM /CAE, Scitech Publications India Pvt. Ltd.
3. Vikram Sharma; Computer Aided Design and Manufacturing, S.K. Kataria and Sons.
4. Rogers, D.F. and Adams, A., Mathematical Elements for Computer Graphics, McGraw Hill Inc, NY, 1989
5. Ibrahim Zeid, CAD/CAM theory and Practice, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1992.
6. M.P. Groover, Automation, Productions systems and Computer-Integrated Manufacturing by Prentice – Hall.
7. A Primer on Computer aided Engineering Drawing-2006, published by VTU, Belgaum.
8. A.Yarwood, Introduction to AutoCAD 2017, Published by CRC Press.
9. O. Ostrowsky, Engineering Drawing with CAD applications, Butterworth Heinemann,1999.
10. BSI, Technical production documentation (TPD) – specification for defining, specifying and graphically reporting products, BS8888, 2002.
11. (Correspondingsetof)CADSoftwareTheoryandUserManuals
12. Ibrahim Zeid, Mastering CAD/CAM, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
13. P. Radhakrishnan, S. Subramanayan and V.Raju, CAD/CAM/CIM, New Age International (P) Ltd., New Delhi.
14. Groover M.P. and Zimmers E. W., CAD/CAM: Computer Aided Design and Manufacturing, Prentice Hall International, New Delhi, 1992.
15. Dr. Sadhu Singh, Computer Aided Design and Manufacturing, Khanna Publishers, New Delhi, Second Edition, 2000.
16. Thomas E.French, Charles J.Vierck, Robert J.Foster, “Engineering drawing and graphic technology”, McGraw Hill International Editions.

| Biology | | | | | | | | | |
|-----------------|--|--|---|--------|------------|------------|-------|------|--|
| BS-141A | L | T | P | Credit | Major Test | Minor Test | Total | Time | |
| | 2 | 1 | - | 3 | 75 | 25 | 100 | 3h | |
| Purpose | | To familiarize the students with the basics of Biotechnology | | | | | | | |
| Course Outcomes | | | | | | | | | |
| C01 | Introduction to essentials of life and macromolecules essential for growth and Development | | | | | | | | |
| C02 | Defining the basic concepts of cell division, genes and Immune system | | | | | | | | |
| C03 | Introduction of basic Concept of ThermoGenetic Engg. & Biochemistry | | | | | | | | |
| C04 | Introduction of basic Concept of Microbiology & Role of Biology in Different Fields | | | | | | | | |

Unit - I

Introduction to living world: Concept and definition of Biology; Importance of biology in major discoveries of life Characteristic features of living organisms; Cell ultra-structure and functions of cell organelles like nucleus, mitochondria, chloroplast, ribosomes and endoplasmic reticulum; Difference between prokaryotic and eukaryotic cell; Difference between animal and plant cell.

Classification of organisms: Classify the organisms on the basis of (a) Cellularity;- Unicellular and Multicellular organisms. (b) Energy and Carbon Utilization:- Autotrophs, Heterotrophs and Lithotrophs (c) Habitat (d) Ammonia excretion:- ammonotelic, Uricotelic and ureotelic. (e) Habitat- aquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life

Unit-II

Introduction to Biomolecules: Definition, general classification and important functions of carbohydrates, lipids, proteins, nucleic acids (DNA & RNA: Structure and forms). Hierarchy in protein structure: Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

Enzymes as biocatalysts: General characteristics, nomenclature and classification of Enzymes. Effect of temperature, pH, enzyme and substrate concentrations on the activity of enzymes. Elementary concept of and coenzymes. Mechanism of enzyme action. Enzyme kinetics and kinetic parameters (K_m and V_{max})

Unit-III

Genetics:- Mendel's laws of inheritance. Variation and speciation. Concepts of recessiveness and dominance. Genetic Disorders: Single gene disorders in human. **Human traits:** Genetics of blood groups, diabetes type I & II.

Cell Division:- Mitosis and its utility to living systems. Meiosis and its genetic significance. Evidence of nucleic acids as a genetic material. Central Dogma of molecular biology

4. Role of immune system in health and disease: Brief introduction to morphology and pathogenicity of bacteria, fungi, virus, protozoa beneficial and harmful for human beings.

Unit-IV

Metabolism:- Concept of Exothermic and endothermic reactions. Concept of standard free energy and Spontaneity in biological reactions. Catabolism (Glycolysis and Krebs cycle) and synthesis of glucose (Photosynthesis:- Light and Dark Reaction) of glucose. ATP as Energy Currency of the cell

Microbiology: Concept of species and strains, sterilization and media compositions, growth kinetics.

Role of Biology : Role of Biology in Agriculture, Medicine, Forensic science, Bioinformatics, Nanotechnology, Micro-electromechanical systems (Bio-MEMS) and Sensors (Biosensors).

Text Book:

1. Introduction to Biotechnology, By Deswal & Deswal, Dhanpat Rai Publications N.A
2. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2014.
3. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
D. L. Nelson and M. M. Cox, "Principles of Biochemistry", W.H. Freeman and Company, 2012.
4. G. S. Stent and R. Calendar, "Molecular Genetics", Freeman and company, 1978.

Note: The paper setter will set the paper as per the question paper templates provided

Suggested Books:

1. Molecular Biology of cell, 4th ed. Alberts, Bruce et al. Garland Science Publishing, New York.
2. Microbiology. Pelczar Jr., M.J.; Chan, E.C.S. and Krieg, N.R. Tata McGraw Hill, New Delhi.
3. Lehninger: Principles of Biochemistry, 3rd edition, by David L. Nelson and M.M. Cox. Maxmillan/ Worth publishers.
4. Genetics by Snusted& Simmons.
5. Molecular Biotechnology: Principles Application of Recombinant DNA. Glick, B. R. and Pasternak, J. J. ASM press WashingtonDC.
6. Kuby's Immunology, Goldsby, R A,.Kindt, T.J, Osborne, B.A.(2003) W. H. Freeman and company, New York.
7. Recombinant DNA 2nd Edition. Watson, James D. and Gilman, M. (2001) W.H Freeman and Company, NewYork.
8. Essentials of Molecular Biology 4thed, Malacinski, G. M. (2003) Jones &Bartlet Publishers, Boston.