TECHNOCRATS INSTITUTE OF TECHNOLOGY

(An Autonomous Institute Affiliated to RGPV, Bhopal)

DEPARTMENTOF ENGINEERING MATHEMATICS

Semester/Year		I/I	Program		B Tech – CIVIL ENGG.
Subject Category	BSC	Subject Code:	BS-101-CE	Subject Name	Engineering Mathematics Level - I

MaximumMarksAllotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
70	20	10	-	-	100	2	1	0	3

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

1. To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.
2. To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
3. To acquaint the student with mathematical tools available in statistics needed in variousfield of science and engineering.
4. To develop the essential tool of matrices and linear algebra in a comprehensive manner.

UNITs	Descriptions
1	Unit – I Calculus: Expansion of functions by Mc.Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables), Method of Lagranges Multipliers.
2	Unit – II Calculus: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications of multiple integrals for calculating area and volumes of the curves.
3	Unit – III Fourier series:Fourier series: Periodic functions, Dirichlet's conditions, Fourier series for functions with periods 2pi and 2l, even and odd functions, Half range Fourier sine and cosine series, Parseval's theorem.

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(Dr. Manoj Jain)

Dr. C.K. Verma

(Aftab Baig)

(Bhasha Sharma)

4	Unit – IV Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.
5	Unit – V Matrices: Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

Reference Books-

1. Higher Engineering Mathematics, B. S. Grewal, 44th Edition, 2015, Khanna Publishers,ISBN: 978-81-933284-9-1.
2. Calculus, Saturinino L. Salas, Einar Hille and Garret J. Etgen, 10th Edition, 2022, Wiley India,ISBN: 9789390421961.
3. Schaum's Outline of Advanced Calculus, Robert Wrede and Murray Spiegel, 3rd Edition, 2010, McGraw-Hill Education, ISBN -10: 0071623663, ISBN -13: 978-0071623667.
4. Advanced Engineering Mathematics, E. Kreyszig, 10th Edition (Reprint), 2016, John Wiley & Sons,ISBN: 978-0470458365.
5. Calculus, James Stewart, 8th Edition, 2016, Cengage Learning, ISBN: 978-1-285-74062-1.
6. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
7. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
8. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics

List/Linksof e-LearningResource

1. https://nptel.ac.in/courses/111/107/111107112/
2. https://nptel.ac.in/courses/111/104/111104092/
3. https://nptel.ac.in/courses/111/107/111107108/
4. https://nptel.ac.in/courses/111/107/111107108/
5. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ma07/

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(Aftab Baig)

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TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ENGINEERING MATHEMATICS

Semester/Year		I/I	Program		B.Tech – CSE, IT, AIML, AIDS, AI, DS & CY
Subject Category	BS	Subject Code:	BS-101-CS	Subject Name	Engineering Mathematics Level –I (Probability Theory & Statistics & Linear Algebra)

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment / Quiz	ES	LW		L	T	P	
70	20	10				2	1	0	3

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques incalculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts andtools at an intermediate to advanced level that will serve them well towards tackling more advanced level ofmathematics and applications that they would find useful in their disciplines. This course also familiarizes the students with probability and statistical techniques.

UNITs	Descriptions
1.	Matrices: Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Cayley-Hamilton theorem.
2.	Vector Spaces :Vector Space, Vector Sub Space, Linear Combination ofVectors,Linearly Dependent, Linearly Independent, Basis of a Vector Space,Linear Transformations.
3	Ordinary Differential Equations I: Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Higher order differential equations with constants coefficients. II: Second order linear differential equations with variable coefficients.
4.	Basic Probability spaces, conditional probability, independence; Discrete random variables,Independent random variables, the multinomial distribution, Poisson approximation to thebinomial distribution, infinite sequences of Bernoulli trials, Expectation of Discrete Random Variables, Moments, Variance of a sum. Probability distributions: Binomial, Poisson and Normal Distribution.
5.	Basic Statistics Measures of Central tendency: Moments, skewness and Kurtosis, evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance.

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Reference Books-
1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002. 2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. 3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008. 4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005. 5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint). 6. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002. 7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010. 8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

Course Outcomes:
CO 1: To get familiarized with the vector spaces and its transformation. **CO 2:** To introduce the idea of applying differential and integral calculus to notions of curvature and toimproper integrals. Apart from some applications it gives a basic introduction on Beta and Gammafunctions **CO 3:** To getfamiliarized with ordinary higher order differential equations **CO 4:** To able to understand likelihood events and analyse it. **CO 5:** to interpret and analyze various types of data

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Dr. Jyoti Gupta

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(Dr. C.K. Verma)

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(Bhasha Sharma)

TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENTOF ENGG. MATHEMATICS (EC/EX)

Semester/Year		I / I	Program		B.Tech–EC/EX				
Subject Category	BS	Subject Code:	BS-101 EC / EX	Subject Name	Engineering Mathematics Level - I				
MaximumMarksAllotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment / Quiz	ES	LW		L	T	P	
70	20	10	-	-	100	2	1	-	3

CourseObjective:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

- To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.
- To develop the essential tool of matrices and linear algebra in a comprehensive manner.
- To acquaint the student with mathematical tools available in vector calculus needed various field of science andengineering.

UNITs	Descriptions
1.	**Calculus I:** Expansion of functions by McLaurin's and Taylor's for one variable; Taylor's theorem for function of two variables, PartialDifferentiation, Maxima & Minima (two and three variables), Method of Lagrange's Multipliers.

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(Bhasha Sharma)

Suggestivelistofexperiments:	
2.	**Calculus II:**Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surfaceareas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications ofmultiple integrals for calculating area and volumes of the curves.
3.	**Matrices:** Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization ofMatrices, Cayley-Hamilton theorem and its applications to find inverse.
4.	**Vector Calculus:** Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems.
5.	**Concept of Probability:** Probability Mass function, Probability DensityFunction, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: NormalDistribution, Exponential Distribution.

ReferenceBooks-
Textbooks/References: 1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002. 2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. 3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008. 4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010. 5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005. 6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008. 7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010. 8. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005

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Dr. Manoj Jha
Dr. C.K Verma
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TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ENGINEERING MATHEMATICS

Semester/Year		I/I	Program		B Tech- MECH. ENGG.
Subject Category	BSC	Subject Code:	BS-101 ME	Subject Name	Engineering Mathematics Level - I

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
70	20	10	-	-	100	2	1	0	3

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

- To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.
- To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
- To familiarize the student with functions of several variables that is essential in most branches of engineering.
- To develop the essential tool of matrices and linear algebra in a comprehensive manner.

UNITs	Descriptions
1	**Calculus-1:** Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables).

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2	**Calculus-2:** Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumes of the curves.
3	**Vector Spaces:** Vector Space, Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space, Linear Transformations.
4	**Matrices:** Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.
5	**Concept of Probability:** Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution Coefficient of Correlation Regression.

Textbooks/Reference Books-

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

List/Links of e-Learning Resource

1. https://nptel.ac.in/courses/111/107/111107112/
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3. https://nptel.ac.in/courses/111/107/111107108/
4. https://nptel.ac.in/courses/111/107/111107108/
5. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ma07/

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TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF MATHEMATICS

Semester/Year		I/I	Program		B.Tech (All Branches)				
Subject Category	BSC	Subject Code:	BS-107	Subject Name	Critical Reasoning & Cognitive Ability: Level-1				
MaximumMarksAllotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
70	20	10	-	-	100	2	-	-	2

CourseObjective:

The student will be able to

1. Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests.
2. Solve questions related to Number system and Ratio etc. from company specific and other competitive tests.
3. Develop critical thinking which is required for company specific and other competitive tests.

UNITs	Descriptions
I	**NUMBER SYSTEM-I** 1.1 CLASSIFICATION OF NUMBERS: Natural Number, Whole Number, Integer Number, Rational and Irrational Number, Real Number, Complex Number, Prime Number, Co-prime Number, Semi Prime Number, Composite Number, Even and Odd Number, Perfect Square Number, Perfect Cube Number. 1.2 SIMPLIFICATION: BODMAS Rule, Surds-Definition, properties and problems, Indices-Rules of indices-power rule, Multiplication rule, Division rule, problems on indices, Find square root of perfect square number, Approximate square root of Non Perfect Square number, Find cube root of perfect cube number, Approximate cube root of non- perfect cube number. 1.3 PRIME FACTORIZATION: Definition, Prime factorization methods - Division method, Factor tree method. 1.4 APPLICATION OF PRIME FACTORIZATION: To find Total Factors, Total Even & Odd Factors, Total Perfect Square, Perfect Cube Factors, Euler Number, sum of factors, Product of factors, Express composite number as product of two number, two co-prime numbers.
II	**NUMBER SYSTEM –II** 2.1 DIVISIBILITY RULE: For Natural Numbers From 1 to 15, General rule for Composite Numbers. 2.2 LCM & HCF: Definition of Factors, Multiples, LCM & HCF, Prime Factorization Method for LCM & HCF, Division Method for LCM & HCF, LCM & HCF of Decimal numbers, LCM & HCF of Rational numbers, Relation between LCM & HCF, Properties of LCM and HCF, Applications based problem.

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	2.3 POWER Of PRIME: Power of Prime in Factorial Number, Power of (Prime)^N in Factorial Number, Power of composite number in Factorial number. 2.4 REMAINDER CONCEPTS: Definition, Concept of negative remainder, Remainder of sums, Remainder of product, Remainder Theorems- Euler theorem, Fermat's Theorem, Wilson theorem, Binomial theorem, Chinese theorem, Euler's theorem.
III	**RATIO, PROPORTION & VARIATION** 3.1 RATIO: Definition, Types of ratio-Duplicate ratio, Triplicate ratio, Sub-duplicate ratio, Sub triplicate ratio, Inverse ratio, Compound ratio, combined ratio, properties of ratio, Ratio based word problems. 3.2 PROPORTION: Definition, Types of proportion-Fourth proportion, Third proportion, Mean proportion, Properties of proportion, proportion based word problems. 3.3 VARIATION: Direct variation, Indirect Variation, How to identify Direct variation, Indirect Variation, word problems.
IV	**APPLICATIONS OF RATIO** 4.1 PROBLEM ON AGES: Basic concepts, Age problems based on ratio, age problems based on average. 4.2 PROBLEM ON PARTNERSHIP: Partner, Types of Partner, Working Partner or Active Partner, Sleeping Partner, Types of Partnership, Simple Partnership, Compound Partnership 4.3 MIXTURE & REPLACEMENT PROBLEMS: Mixture of two elements, mixture of more than two elements - mixture containing 3 ingredients, mixture containing 4 ingredients, mixing without replacement, mixing with replacement - When the quantity withdrawn and the quantity replaced are of the same volume, When the quantity withdrawn and the quantity replaced are of the same volume, but the total volume before replacement does not remain the same, When the quantity withdrawn and the quantity replaced are not of the same volume, mixing of two different mixtures. 4.4 ALLEGATION: Concept of allegation, the allegation situation, graphical representation of allegation, Mixture of two elements or mixtures, Mixture of three elements and mixtures.
V	**LOGICAL REASONING** 5.1 Coding Decoding – Simple alphabet shifting i.e. moving the letters one or more step forward or backward. Analogical letter coding (Direct Coding). Letters of the given word are written (partly or wholly) or interchanges. Replacement of the letters in original alphabet series by the same positioned letters in reverse alphabet series. Substitution of digits / Symbols for letters or vice-versa. Coding based on matrix. Column coding. Conditional coding. Decoding Message words / codes. Decoding of number / symbol. 5.2 Direction and sense- Turns and Rotations. Distance and Displacement. Shadow based (At the time of sunrise; At the time of sunset; At 12.00 Noon) . Coded Direction and Distance. Direction Puzzle. 5.3 Cube and Dice: Cubes- find number of pieces when number of cuts are given, find Minimum Number of Pieces when total numbers of cuts are given, find Maximum Number of Pieces when total number of cuts is given, find Number of cuts when total numbers of pieces are given, Painted Cube (Same Color), Painted Cube (Different Color), opening a cube, cube net patterns, Dice. 5.4 Water Image, Mirror Image, paper cutting & Folding

ReferenceBooks-

R.S.AGARWAL,ARUN SHARMA, M.TYRA
List/Linksofe-learning resource

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TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENTOF ENGINEERING CHEMISTRY

<table>
<tr><td colspan="2">Semester/Year</td><td>1 &2 /I</td><td colspan="2">Program</td><td colspan="5">B.Tech. Common to all branches</td></tr>
<tr><td>Subject Category</td><td>BSC</td><td>Subject Code:</td><td>BS-102</td><td>Subject Name</td><td colspan="5">Engineering Chemistry & Sustainability</td></tr>
<tr><td colspan="6">Maximum Marks Allotted</td><td colspan="3" rowspan="2">Contact Hours</td><td rowspan="3">Total Credits</td></tr>
<tr><td colspan="3">Theory</td><td colspan="2">Practical</td><td rowspan="2">Total Marks</td></tr>
<tr><td>ES</td><td>MS</td><td>Assignment / Quiz</td><td>ES</td><td>LW</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>70</td><td>20</td><td>10</td><td>30</td><td>20</td><td>150</td><td>2</td><td>0</td><td>2</td><td>3</td></tr>
</table>

Course Objectives:

1. Understanding of useful chemical concepts
2. Applying chemical principles to engineering problems
3. Developing experimental skills
4. Understanding sustainability issues
5. Promoting awareness of environmental issues

UNITS	Descriptions
Unit-1	**Water Chemistry and treatment:** Hardness & its units, Determination of hardness by EDTA method, Alkalinity & It's determination and related numerical problems. Boiler troubles (Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods) and related numerical problems.
Unit-2	**Lubricants and Corrosion:** Introduction & Functions of Lubricants, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points. Aniline Point, Acid Number, Saponification Number, Steam Emulsification Number. Corrosion: Causes, Types, Mechanisms & prevention.

Dr Ranjana Singh Tomar

Dr. Dipti Kaushal

(Aftab Baig)

(Dr. Y.K. Agrawal)

(Bhavna Sharma)

Dr. Amit Dubey

Unit-3	**Polymer Chemistry:** Introduction, types of polymerisation, Classification, mechanism of polymerisation (Free radical & Ionic polymerization). Thermoplastic &Thermosetting polymers, Elementary idea of live polymers, Biodegradable polymers. Preparation, properties & uses of polymers - PVC, Polythene, Teflon, Nylon 6, Nylon 6:6, Phenol formaldehyde, Buna N, Buna S, Vulcanization of Rubber.

Unit-4	**Electrochemistry :** Quantitative aspects of Faraday's laws of electrolysis, applications of electrolysis in metallurgy and industry. Chemical cells, reversible and irreversible cells with examples. Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining (i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinine - hydroquinone, glass electrodes.
Unit-5	**Energy Science & Sustainability:** Introduction to energy resources, Energy sustainability & environment, Energy transformations, efficiency and storage, Fossil fuels (coal, oil, oil bearing shale and sands, coal gasification), Remedies and alternatives for fossil fuels – biomass, wind, solar, and hydrogen. **Sustainability**: Sustainable energy sources, reducing waste and adoption of sustainable technologies, Disaster management: floods, earthquake, cyclone and landslides. Climate change, global warming and acid rain.

Reference Books-

1. Chemistry in Engineering and Technology - Vol.1 &2 Kuriacose and Rajaram , McGraw Hill Education
2. Engineering Chemistry – B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
3. Basics of Engineering Chemistry – S.S. Dara & A.K. Singh, S. Chand & Company Ltd., Delhi.
4. Applied Chemistry – Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd. Publishers, New Delhi.
5. Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayade Sreedhar, New Age International Pvt. Ltd
6. Engineering Chemistry (NPTEL Web-book) B.L. Tembe, Kamaluddin and M.S. Krishna

List/Links of e-learning resource

1. https://libguides.lib.msu.edu/chemistry/teachonline
2. https://libguides.lib.msu.edu/c.php?g=917727&p=6613684
3. https://edu.rsc.org/resources
4. https://libraryguides.unh.edu/oer/chemistry
5. https://chemcollective.org/

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Suggestive list of experiments:

NOTE: At least 8 of the following core experiments must be performed during the session.

1. **Water testing**

(i) Determination of Total hardness by Complexometric titration method.

(ii) Determination of mixed alkalinity

a) OH & CO3

b) CO3 & HCO3

(iii) Chloride ion estimation by Argentometric method.

2. **Fuels & Lubricant testing:**

(i) Flash & fire points determination by

a) Pensky Martin Apparatus,

b) Abel's Apparatus

c) Cleveland's open cup Apparatus

(ii) Viscosity and Viscosity index determination by

a) Redwood viscometer No.1

b) Redwood viscometer No.2

(iii) Proximate analysis of coal

a) Moisture content

b) Ash content

c) Volatile matter content

d) Carbon residue

(iv) Steam emulsification No & Anline point determination

(v) Cloud and Pour point determination of lubricating oil

TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENTOF ELECTRICAL & ELECTRONICS ENGINEERING

Semester/Year		I & II	Program		B.Tech				
Subject Category	ESC	Subject Code:	ES-103	Subject Name	Elements of Electrical & Electronics Engineering				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
70	20	10	30	20	150	2	-	2	3

Course Objective:

To provide comprehensive idea in the field of Electrical& Electronics Engineering and to deliver the fundamental knowledge which will be useful in the engineering fields.

1. Familiarize with various laws and theorems to solve electric and electronic circuits
2. Provide an overview on working principle of machines
3. Excel the concepts of semiconductor devices and digital circuits

UNITs	Descriptions
UNIT 1	**Introduction to Electrical & Electronics Engineering** Active & passive elements, voltage & current sources, dependent and independent sources, Source Conversion, Kirchhoff's Law. Generation of alternating voltages, AC circuit terminologies, Phasor Representation of an alternating quantity, definition of average value, R.M.S. value, form factor and peak factor of AC quantity. Introduction to Semiconductors, Diodes, V-I characteristics, Diode Equation, Special diodes: Zener Diode, operation, V-I characteristics, Photo diode, working principle, LED symbol and principle. Half-wave Rectifier, Full-wave and Bridge Rectifier, derivation of Ripple factor, efficiency of Half-wave, full-wave and Bridge rectifiers. Merits and demerits of Half-wave, full-wave and Bridge rectifiers, Comparisons of rectifiers.
Unit 2	**D.C.& A.C. Circuits** **D.C. Circuits:** Mesh and Nodal analysis. Star-Delta transformation, Superposition theorem, Thevenin's theorem, Norton's theorem. **Single phase AC circuits:** Behavior of AC circuit containing pure R, L, and C; Impedance and admittance concept; Concepts of active, reactive and apparent power, power factor, Analysis of R-L, R-C, R-L-C circuits. **Three phase AC Circuits:** Generation of three phase voltages, Advantages of three phase system, Phase sequence, Relationship between line and phase quantities for balanced star

Dr. M.S. DASH (Devendra Sharma) (Dr. S. Jain) (Prof S.C. Choubey) Prakash Chouby Aftab Beig Vishwajeet Verma.

	and delta connected loads and Power measurement in three phase circuit.
Unit 3	**Transformer & Rotating Electrical Machines** **Transformer:** Concepts of M.M.F, flux, flux density, reluctance, permeability and field strength, their units and relationship. Comparison between electrical and magnetic circuits. Concept of self and mutual inductance, Classification, construction and working principle of transformer, E.M.F. equation, Equivalent circuits, phasor diagram, Voltage regulation, Losses and efficiency, Open circuit and short circuit test. **Rotating Electrical Machines**: Classification, construction, working principle and applications of DC machines, Three phase Induction machines and Synchronous machine.

Unit- 4	**Bipolar junction transistors** Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations, different configurations and modes of operation of BJT. Number Systems: Number systems & Their conversion used in Digital Electronics, Demorgan's theorem, Logic Gates.
Unit- 5	**Microprocessor Basics** 8085-Architecture, Operation, Pin configuration and Functions, Bus organization, control signal generation for external operations- fetch, IO/M, Read/Write, Machine cycles and Bus timings. Addressing mode, Instruction set, Overview/concept of peripheral interfacing devices

Course Outcomes:
CO1: Understand the basic terminology & definitions of Electrical and Electronics Engineering
CO2: Evaluate DC and AC circuit parameters using various laws and theorems
CO3: Select the electrical machines for different applications
CO4: Analyze the characteristics and applications of BJT.
CO5: Apply Microprocessor basics and digital circuits.

Reference Books-

1. V.N.Mittal andArvindMittal;"BasicElectricalEngineering"McGrawHill
2. VincentDelToro,"ElectricalEngineeringFundamentals",PHIsecondedition2011
3. Bolestaad:"Electronics DevicesandCircuitsTheory",PearsonEducationIndia
4. EdwardHughes,"ElectricalTechnology,",PearsonEducation
5. D.P.KothariandNagrath"TheoryandProblemsinelectricalEngineering",PHIedition2011
6. S.N. Singh, Basic Electrical Engineering, P.H.I.,2013
7. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
8. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012
9. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
10. B.L. Theraja & A.K Theraja Textbook of Electrical Technology - Vol. 1, S. Chand Publication

List/Link self-learning resource

1. https://nptel.ac.in
2. http://www.digimat.in/nptel/courses/video/108105112/L01
3. https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/
4. https://www.electronics-tutorials.ws/
5. https://www.allaboutcircuits.com/textbook/
6. www.tinkercad.com/circuits
7. https://www.indiabix.com/

Suggestive list of experiments:

1. V.N.Mittal andArvindMittal;"BasicElectricalEngineering"McGrawHill
2. VincentDelToro,"ElectricalengineeringFundamentals",PHIsecondedition2011
3. Bolestaad:"Electronics DevicesandCircuitsTheory",PearsonEducationIndia
4. EdwardHughes,"ElectricalTechnology,",PearsonEducation
5. D.P.KothariandNagrath"TheoryandProblemsinelectricalEngineering",PHIedition2011
6. S.N. Singh, Basic Electrical Engineering, P.H.I.,2013
7. 3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
8. 4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012
9. 5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
10. 6. B.L. Theraja & A.K Theraja Textbook of Electrical Technology - Vol. 1, S. Chand Publication

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	2	-	1	-	-	-	-	-	-	-	1
CO-2	3	3	2	2	2	3	-	1	2	-	-	2
CO-3	3	2	2	2	3	3	2	1	3	2	2	2
CO-4	3	3		2	3	2	2	-	2	-	1	2
CO-5	3	3	2	2	3	2	2	-	2	-	2	2

TECHNOCRATS INSTITUTE OF TECHNOLOGY

(An Autonomous Institute Affiliated to RGPV Bhopal)

B. Tech. First Year (I/II Semester)
Branch: Common to All Disciplines

Semester/Year		I/II	Program		B.Tech				
Subject Category	BSC	Subject Code:	104-B	Subject Name	Engineering Graphics & Modelling Through Autocad				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
0	0	0	30	20	50	0	0	6	3

Course Objective:

The objective of this course is to familiarize prospective engineers with all phases of manufacturing and construction that require converting new ideas and design concepts into the fundamental graphic language of engineering drawings. Proficiency in Computer-Aided Design (CAD) is critical in many engineering disciplines—including civil, mechanical, electrical, architectural, and industrial fields—where CAD technicians and engineers play a vital role in the design and development of new products, systems, and structures. This course is designed to:

- Introduction to engineering design and its place in society
- Enable students to communicate engineering ideas effectively through clear, precise technical drawings and documentation.
- Train students to use modern engineering tools and techniques, with a focus on industry-standard CAD software for engineering graphics practice.
- Exposure to creating working drawings.Promote awareness of industry standards and best practices in engineering graphics to ensure quality, safety, and efficiency in design and manufacturing

UNITs	Descriptions
1	Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, Introduction to Computer Aided Drafting, Basic principles of engineering drawing, Standards and conventions, lettering and types of lines, Introduction to drafting software, standard tool bar/menus, navigational tools. Co-ordinate system and reference planes. Creation of 2 dimensional drawing environment. Selection of drawing size and scale. Sketching of 2D simple geomentries, editing and dimensioning of 2Dgeomentries
2	Orthographic Projections covering, Principles of Orthographic Projections- Conventions - Projections of Points and lines inclined to both planes; Projection of Planes – Types of planes, projection of planes, various positions of planes w.r.t reference palnes (Use First angle method of projection) Projections of planes inclined Planes – Auxiliary Planes. The entire above topic practice through AutoCAD.

(Dr. R. Khedle) (Dr. Vimlesh Soni) (Dr. Vipin Tripathi NITTTR) (C. Shrivastava) (Dr. Nitin Shrivastava)

3	Types of solids, projection of solids in simple position, projection of solids with axis inclined to one reference plane and parallel to other. (Use First angle method of projection). The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids].Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.

4	Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. The entire above topic practice through AutoCAD.
5	Theory of isometric projection, isometric view, isometric views from orthographic views for simple objects. Conversion of Isometric Views to Orthographic Views, Conventions. (Use First angle method of projection).Computer-aided design (CAD) software modelling, Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling.

Course Outcomes:

CO1: Understand the engineering drawing standards and their usage

CO2: Interpret engineering drawings

CO3: Construct and dimension 2-D geometries using CAD software

CO4:: Improve coherent visualization skills

CO5: Understand the concepts of orthographic projections and isometric projections on traditional and modern methods.

(Dr. R. Wheedle)

(Dr Vimlesh Soni)

[C. Srivastava]

(Dr. Vipin Tripathi)

(Dr. Hitun Shrivastava)

Suggestive list of experiments: All Topics Should Prepare On Autocad Software

Reference Books-

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, CharotarPublishing House.
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics,Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, ScitechPublishers
5. (Corresponding set of) CAD Software Theory and User Manuals

List/Links of e-learning resource

1. nptel/courses/video/112102304/L05.html
2. nptel/courses/video/105104148/L13.html
3. https://www.youtube.com/watch?v=EgKc9L7cbKc
4. https://www.youtube.com/watch?v=0lgOapAtauM
5. https://www.youtube.com/watch?v=QuR-VKis3jU

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO_{11}	PO_{12}
CO-1	2	2	2	2	0	1	2		1	2		2
CO-2	2	2	2	2		1	2	1	1	2		2
CO-3	2	2	2	2	2	1	2		1	2		2
CO-4	2	2	2	2		1	2	1	1	2		2
CO-5	2	2	2	2	2	1	2		1	2		2

(Dr. R. Khedle) (Dr. Vimlesh Soni) [C. Shrivastava]

(Dr. Vipin Tripathi) (Dr. Nitin Shrivastava)

TECHNOCRATS INSTITUTE OF TECHNOLOGY

(An Autonomous Institute Affiliated to RGPV Bhopal)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Semester/Year		I / I	Program		B.Tech (All Branches)				
Subject Category	ESC	Subject Code:	ES-105	Subject Name	Basic Computer Programming Level-1				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
-	-	-	30	20	50	-	-	6	3

Course Objective:

1. Features of C++ language
2. Language components.
3. Develop middle level application
4. OOP concepts
5. How to define and use class, object, inheritance, and encapsulation.
6. How to develop programs using exception handling, templates, Generics
7. Understand basics of data structure

UNITs	Descriptions
I	**'C' Basics:** C Fundamentals, C character set, Identifiers, Keywords, Constants, Variables, Comments, escape sequences, Instructions, Program, C++ Program Structure, Compilation, Input/Output Operation **Operators:** Operators and operands, Types of operators, Arithmetic Operations, Relational Operators, Logical Operators, Increment and decrement Operators, Bitwise Operators, Conditional Operators, sizeof() Operators, Assignment Operators, Order of Precedence (priority), Associativity, Data type conversion, Automatic or implicit, Explicit or casting, **Control Statements: Selection,** The if statement, nested if, if-else-if ladder, The? Operator, The switch statement, nested switch **Looping & Iteration:** The for Statement, declaring variables within, for loop. The while Statement, The do-while Statement **Jump:** The break, goto and continue statement, return and exit
II	**Arrays:** One and Multi-Dimensional Arrays, Array Declaration And Accessing, Using char, int, float arrays, Variable length arrays, Array initializations, unsized array initialization **Functions:** Function Basics, Function prototyping, Parameter Passing, Recursive Functions **Strings:** Strings declaration, Strings functions, Array of strings **Pointers:** Pointer Basics, Pointer Declarations, Pointer Operations, Pointer Arithmetic, assignment, comparisons, Pointers and Arrays, Equivalence Between Pointers and Arrays, Arrays and Pointers as Function Arguments, Call by value and call by reference, Returning pointers from function, functions of void type, Multiple indirections (Pointer to pointer), References, Reading Command Line Arguments

III	**Object oriented programming concepts:** Object concepts, definitions & examples, OO Programming and Structured Programming, Introduction to oops, advantages of oops, Object-Oriented Terminology, Object-Oriented Paradigm, Abstract Data Types, **Classes and Objects:** Defining Classes in C++, Classes and Encapsulation, Member Functions, Instantiating and Using Classes, accessing object members using dot (.) operators **Structure,** Defining Structure, Advantages and Disadvantages, accessing members of the structure, Passing a structure to a function, Friend functions, Use of the "this" pointer, Default Arguments, Inline Functions **Constructors and Destructor:** Constructor Overloading, Default Constructor, Copy Constructor
IV	**Inheritance:** Defining Base and Derived Classes, Constructor and Destructor Calls, Access controls, Constructors for derived classes, Use of pointers with base/derived classes, Friend Class **Polymorphism:** Function overloading, Operator overloading, Virtual Functions, Pure Virtual, Functions, Abstract Class **Encapsulation:** Access control, public, private, protected
V	**Advanced C++ programming and Introduction to Data structure** **Storage Management:** Dynamic Allocation: new and delete **File I/O** **Exception Handling: E**xceptions, Try, catch, throw keywords **Templates: M**ethod Template, Class templates, Standard Template Library Containers **Namespace:** Defining namespace, properties of namespace, Namespace and version control, Restrictions on namespace, Using namespace **Generic programming and Standard Templates Library:** Containers, Iterators, Algorithm, Functions objects, Adaptors, Allocators, Specialized and Associative Containers **Introduction to data structure:** Arrays, stack, queue, linked list, tree, graph, searching, and sorting **Projects**

Course Outcomes:

CO1: Understand the fundamentals of C and C++ programming including syntax, operators, control structures, loops, and functions to develop basic programs.

CO2: Demonstrate proficiency in handling arrays, strings, pointers, and function concepts including recursion and pointer arithmetic for modular and efficient program design.

CO3: Apply object-oriented programming principles such as classes, objects, encapsulation, constructors, destructors, and friend functions to build structured C++ programs.

CO4: Analyze and implement advanced OOP features including inheritance, polymorphism, operator overloading, and encapsulation to design reusable and maintainable code.

CO5: Develop programs using advanced C++ features like dynamic memory management, templates, namespaces, file I/O, exception handling, and implement basic data structures for real-time applications.

Reference Books-

1. "Programming in ANSI C", Author: E. Balagurusamy, Publisher: McGraw Hill Education
2. "Object-Oriented Programming with C++", Author: E. Balagurusamy, Publisher: McGraw Hill Education
3. "Data Structures and Algorithms in C++", Author: Adam Drozdek, Publisher: Cengage Learning

List/Links of e-learning resource

CodeChef – Data Structures & Algorithms Practice

Link: https://www.codechef.com/practice/tags/datastructures

LeetCode https://leetcode.com/explore/

- Practice problems grouped by data structures. Great for hands-on coding.

HackerRank – Data Structures Track

https://www.hackerrank.com/domains/tutorials/10-days-of-data-structures

- Covers arrays, linked lists, stacks, queues, trees, etc.

Suggestive list of experiments:

1. Write a program in C to demonstrate all types of operators (arithmetic, relational, logical, bitwise, conditional, sizeof, assignment).
2. Write a program in C to accept a number and check whether it is even or odd using if-else.
3. Write a C program to find the largest among three numbers using if-else-if ladder.
4. Write a C program to demonstrate use of switch-case and nested switch (e.g., calculator menu).
5. Write a program using different loop structures (for, while, do-while) to print prime numbers between 1 and 100.
6. Write a program using break, continue, and goto statements to control loop flow.
7. Write a program to perform matrix addition, subtraction, and multiplication using 2D arrays.
8. Write a program in C to demonstrate call-by-value and call-by-reference using functions.
9. Write a program in C to implement recursive functions (e.g., factorial, Fibonacci series).
10. Write a program to perform various string operations using standard string functions (strlen, strcpy, strcat, strcmp, etc.).
11. Write a program to demonstrate pointer arithmetic and pointer with arrays.
12. Write a program in C++ to define a class, create objects, and access member functions using the dot operator.
13. Write a C++ program to demonstrate constructor overloading and use of destructors.
14. Write a program in C++ to implement single, multilevel, and multiple inheritance using base and derived classes.
15. Write a C++ program to demonstrate function overloading and operator overloading.

TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENTOFHUMANITIES

Semester/Year		I / I	Program		B.Tech (All Branches)				
Subject Category	HSMC	Subject Code:	HS-106	Subject Name	Business Communication: Level-1				
MaximumMarksAllotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
70	20	10	30	20	150	2	-	2	3

CourseObjective:
1. To develop basic grammar and vocabulary to frame correct sentences 2. To explain basic behavioral skills to enhance an impactful personality 3. To define the process of speaking and listening skills to build up good confidence level

UNITS	Descriptions
UNIT I – Basic Grammar	Parts of speech: appropriate application and usage of Noun, Pronoun, Verb, Adjective, Adverb, Preposition, Conjunction, Interjection, Grammar Usage, Articles, Subject-Verb-Agreement, Tenses
UNIT II – Vocabulary	Root words, Give one word, Prefix, Suffix, Synonyms, Antonyms, Analogy
Unit-III: Writing Skills	Paragraph Writing (100-120), Poster Writing, Self-introduction, Business Letter Writing, Writing Application, Technical Description, Precis writing
Unit-IV: Behavioral Skills	Basic Behavioral Skills: Etiquettes & manners in Professional life, Basics of Communication, Process of Communication, Types of Communication,7 C'S Of Communication, Barriers to Communication, Non-verbal Communication
Unit-V: Speaking & Listening	Introducing self and others, Role play, Situation based conversation, Impromptu, JAM, Listening skills: Active & passive listening, Stages of LS, Barriers to effective listening skill, Non-verbal cues in listening, role of listening in different scenarios

(Dr. Indira Jawed)

(Aftab Baig)

(Bhasha Sharma)

ReferenceBooks-
Business Communication by K.K.Sinha &Ruchi Sehgal Mohindra The Ultimate Business communication Book by Martin Manser, David Cotton, Matt Avery, DiMcLanachan, Martin Manser
List/Linksofe-learningresource

TECHNOCRATS INSTITUTE OF TECHNOLOGY

(AnAutonomousInstituteAffiliatedtoRGPVBhopal)

DEPARTMENT OF MATHEMATICS

Semester/Year		I/I	Program		B.Tech (All Branches)				
Subject Category	BSC	Subject Code:	BS-107	Subject Name	Critical Reasoning & Cognitive Ability: Level-1				
MaximumMarksAllotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
70	20	10	-	-	100	2	-	-	2

CourseObjective:

The student will be able to

1. Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests.
2. Solve questions related to Number system and Ratio etc. from company specific and other competitive tests.
3. Develop critical thinking which is required for company specific and other competitive tests.

UNITs	Descriptions
I	**NUMBER SYSTEM-I** 1.1 CLASSIFICATION OF NUMBERS: Natural Number, Whole Number, Integer Number, Rational and Irrational Number, Real Number, Complex Number, Prime Number, Co-prime Number, Semi Prime Number, Composite Number, Even and Odd Number, Perfect Square Number, Perfect Cube Number. 1.2 SIMPLIFICATION: BODMAS Rule, Surds-Definition, properties and problems, Indices-Rules of indices-power rule, Multiplication rule, Division rule, problems on indices, Find square root of perfect square number, Approximate square root of Non Perfect Square number, Find cube root of perfect cube number, Approximate cube root of non- perfect cube number. 1.3 PRIME FACTORIZATION: Definition, Prime factorization methods - Division method, Factor tree method. 1.4 APPLICATION OF PRIME FACTORIZATION: To find Total Factors, Total Even & Odd Factors, Total Perfect Square, Perfect Cube Factors, Euler Number, sum of factors, Product of factors, Express composite number as product of two number, two co-prime numbers.
II	**NUMBER SYSTEM –II** 2.1 DIVISIBILITY RULE: For Natural Numbers From 1 to 15, General rule for Composite Numbers. 2.2 LCM & HCF: Definition of Factors, Multiples, LCM & HCF, Prime Factorization Method for LCM & HCF, Division Method for LCM & HCF, LCM & HCF of Decimal numbers, LCM & HCF of Rational numbers, Relation between LCM & HCF, Properties of LCM and HCF, Applications based problem.

Dr. Hariom Pandey
Dr. Jyoti Gupta
(Dr. Manoj JLV)
(Dr-C-K-Verma)
(Aftab Baig)
Bhasha Sharma

	2.3 POWER Of PRIME: Power of Prime in Factorial Number, Power of (Prime)^N in Factorial Number, Power of composite number in Factorial number. 2.4 REMAINDER CONCEPTS: Definition, Concept of negative remainder, Remainder of sums, Remainder of product, Remainder Theorems- Euler theorem, Fermat's Theorem, Wilson theorem, Binomial theorem, Chinese theorem, Euler's theorem.
III	**RATIO, PROPORTION & VARIATION** 3.1 RATIO: Definition, Types of ratio-Duplicate ratio, Triplicate ratio, Sub-duplicate ratio, Sub triplicate ratio, Inverse ratio, Compound ratio, combined ratio, properties of ratio, Ratio based word problems. 3.2 PROPORTION: Definition, Types of proportion-Fourth proportion, Third proportion, Mean proportion, Properties of proportion, proportion based word problems. 3.3 VARIATION: Direct variation, Indirect Variation, How to identify Direct variation, Indirect Variation, word problems.
IV	**APPLICATIONS OF RATIO** 4.1 PROBLEM ON AGES: Basic concepts, Age problems based on ratio, age problems based on average. 4.2 PROBLEM ON PARTNERSHIP: Partner, Types of Partner, Working Partner or Active Partner, Sleeping Partner, Types of Partnership, Simple Partnership, Compound Partnership 4.3 MIXTURE & REPLACEMENT PROBLEMS: Mixture of two elements, mixture of more than two elements - mixture containing 3 ingredients, mixture containing 4 ingredients, mixing without replacement, mixing with replacement - When the quantity withdrawn and the quantity replaced are of the same volume, When the quantity withdrawn and the quantity replaced are of the same volume, but the total volume before replacement does not remain the same, When the quantity withdrawn and the quantity replaced are not of the same volume, mixing of two different mixtures. 4.4 ALLEGATION: Concept of allegation, the allegation situation, graphical representation of allegation, Mixture of two elements or mixtures, Mixture of three elements and mixtures.
V	**LOGICAL REASONING** 5.1 Coding Decoding – Simple alphabet shifting i.e. moving the letters one or more step forward or backward. Analogical letter coding (Direct Coding). Letters of the given word are written (partly or wholly) or interchanges. Replacement of the letters in original alphabet series by the same positioned letters in reverse alphabet series. Substitution of digits / Symbols for letters or vice-versa. Coding based on matrix. Column coding. Conditional coding. Decoding Message words / codes. Decoding of number / symbol. 5.2 Direction and sense- Turns and Rotations. Distance and Displacement. Shadow based (At the time of sunrise; At the time of sunset; At 12.00 Noon) . Coded Direction and Distance. Direction Puzzle. 5.3 Cube and Dice: Cubes- find number of pieces when number of cuts are given, find Minimum Number of Pieces when total numbers of cuts are given, find Maximum Number of Pieces when total number of cuts is given, find Number of cuts when total numbers of pieces are given, Painted Cube (Same Color), Painted Cube (Different Color), opening a cube, cube net patterns, Dice. 5.4 Water Image, Mirror Image, paper cutting & Folding

ReferenceBooks-

R.S.AGARWAL,ARUN SHARMA, M.TYRA
List/Linksofe-learning resource

Dr. Harpreet Duggal

Dr. Jyoti Gupta

(Dr. Manoj Jain)

(Aftab Baig)

(Bhasha Sharma)

TECHNOCRATS INSTITUTE OF TECHNOLOGY

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DEPARTMENTOFHUMANITIES

Semester/Year		I / I	Program		B.Tech (All Branches)				
Subject Category	HSMC	Subject Code:	HS-110 (J)	Subject Name	Foreign Language Level - 1 (Japanese)				
MaximumMarksAllotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
ES	MS	Assignment/Quiz	ES	LW		L	T	P	
-	-	-	-	50	50	-	-	4	2

CourseObjective:
1. To develop basic grammar and vocabulary to frame correct sentences 2. To explain basic behavioral skills to enhance an impactful personality 3. To define the process of speaking and listening skills to build up good confidence level

UNITS	Descriptions
UNIT I	Basic Introduction, Greetings, Simple Sentences Self-introduction, polite expressions Sentence structure: NはNです, これは～です Question forms, negation Daily verbs (たべます, のみます etc.) Time expressions, days, schedule Kanji: 人, 日, 月, 火, 水, 木, 金, 土 Listening: Basic audio comprehension (introductions, greetings) Assessment: Short test + speaking role-play
UNIT II	Daily Activities and Routine Verb conjugation (ます/ません/ました) Place + movement (へいきます, にいきます) Time + frequency words Likes/dislikes using すき/きらい Kanji: 行, 来, 食, 飲, 見, 話, 書, 読 Listening: Daily routine conversations Assessment: Listening + speaking test

Unit-III	Quantity, Preferences, Descriptions ーたいです (want to do) Counting items, money, duration Adjectives (い/な) があります／います Kanji: 大, 小, 高, 安, 新, 古, 友, 名 Listening: Shopping & asking about objects Assessment: Dialogue practice + kanji quiz
Unit-IV	Past Activities, Requests, Permissions て-form introduction ～てもいいですか, ～てはいけません Joining actions (ーて、ーて) Giving and receiving Kanji: 手, 目, 耳, 口, 話, 見, 行, 来 Listening: Asking permission and requests Assessment: Group speaking activity
Unit-V	Casual speech, Modifiers, Plans Dictionary form of verbs ～と思います, ～と言いました Modifying nouns with verbs Intention: ～つもりです, ～でしょう Kanji: 思, 言, 計, 週, 今, 年 Listening: Casual conversations, future plans Assessment: Short written task + presentation

ReferenceBooks-
Minna no Nihongo 1 and 2 (Main Course Book) Kanji and Genki plus and Gokakudekiru and Renshuu Book for other characters, unseen passage and new Kanji.
List/Linksofe-learningresource

(Aftab Baig) (Dr. Indira Javed) (Bhasha Sharma)