

SYLLABUS

Uttar Pradesh Textile Technology Institute, Kanpur

Affiliated to

DR. A.P.J ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW



**PROPOSED STUDY & EVALUATION SCHEME
FOR
2ND B. TECH. TEXTILE TECHNOLOGY**

On

AICTE B.Tech Model Curriculum Structure (MCS)

(Effective from the Session: 2019-20)

Study & Evaluation Scheme (MCS)
2nd Year B. Tech TEXTILE TECHNOLOGY
Uttar Pradesh Textile Technology Institute Kanpur

Affiliated to

DR. APJ ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

2nd Year III-Semester

Effective from Session-2019-20

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KAS401	Maths IV	3	1	0	30	20	50		100		150	4
2	KVE301	Universal Human Values	3	0	0	30	20	50		100		150	3
3	KTT301	Yarn Manufacturing-I	3	1	0	30	20	50		100		150	4
4	KTT302	Fabric Manufacturing-I	3	1	0	30	20	50		100		150	4
5	KTT303	Textile Fibre-I	3	1	0	30	20	50		100		150	4
6	KTT351	Yarn Manufacturing-I Lab	0	0	2				25		25	50	1
7	KTT352	Fabric Manufacturing-I Lab	0	0	2				25		25	50	1
8	KTT353	Textile Fibre-I Lab	0	0	2				25		25	50	1
9	KTT358	Mini Project or Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	Cyber Security/ Environmental Science	2	0	0	15	10	25		50			
11		MOOCs (Essential for HonsDegree)											
		Total	15	4	8							950	23

*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.

The non credit courses (Cyber Security, Environmental Sciences, and Constitution of India & essence of Indian Traditional knowledge) shall be conducted through NPTEL@MOOCS.

1	Engineering Mechanics	To be offered to any Engg branch except ME/CE/AG and allied branches
2	Material Science	
3	Energy Science & Engineering	To be offered to any Engg branch except EE and allied branches
4	Sensor & Instrumentation	
5	Basics Data Structure & Algorithms	To be offered to any Engg branch except CSE and allied branches
6	Introduction to Soft computing	
7	Analog Electronics Circuits	To be offered to any Engg branch except EC and allied branches
8	Electronics Engineering	

Study & Evaluation Scheme (MCS)
2nd Year B. Tech TEXTILE TECHNOLOGY
Uttar Pradesh Textile Technology Institute Kanpur

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2nd Year IV-Semester

Effective from Session-2019-20

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit	
			L	T	P	CT	TA	Total	PS	TE	PE			
			L	T	P	CT	TA	Total	PS	TE	PE			
1	KOE041	Engg. Mechanics (SBOE)	3	0	0	30	20	50		100		150	3	
2	KAS301	Technical Communication	2	0	2	30	20	50		100		150	3	
3	KTT401	Yarn Manufacturing-II	3	0	0	30	20	50		100		150	3	
4	KTT402	Fabric Manufacturing-II	3	1	0	30	20	50		100		150	4	
5	KTT403	Textile Fibre-II	3	1	0	30	20	50		100		150	4	
6	KTT451	Yarn Manufacturing-II Lab	0	0	2					25		25	50	1
7	KTT452	Fabric Manufacturing-II Lab	0	0	2					25		25	50	1
8	KTT453	Textile Fibre-II Lab	0	0	2					25		25	50	1
9	KNC402/ KNC401	Environment Science/ Cyber Security	2	0	0	15	10	25		50				
10		MOOCs (Essential for Hons. Degree)												
Total			16*	2	8							900	20	

The non credit courses (Cyber Security, Environmental Sciences, Constitution of India & essence of Indian Traditional knowledge) shall be conducted through NPTEL@MOOCS.

1	Engineering Mechanics	To be offered to any Engg branch except ME/CE/AG and allied branches
2	Material Science	
3	Energy Science & Engineering	To be offered to any Engg branch except EE and allied branches
4	Sensor & Instrumentation	
5	Basics Data Structure & Algorithms	To be offered to any Engg branch except CSE and allied branches
6	Introduction to Soft computing	
7	Analog Electronics Circuits	To be offered to any Engg branch except EC and allied branches
8	Electronics Engineering	

3rd Semester B. Tech.

Textile Technology(MCS)

1. KAS 401: Mathematics-IV (L T P 3 1 0) Credit 4

Course Outcomes

The objective of this course is to familiarize the students with partial differential equation, their application and statistical techniques. It aims to present the students with standard concepts and tools at an intermediate to superior level that will provide them well towards undertaking a variety of problems in the discipline.

The students will learn:

- The idea of partial differentiation and types of partial differential equations
- The idea of classification of second partial differential equations, wave , heat Equation and transmission lines
- The basic ideas of statistics including measures of central tendency, correlation, regression and their properties.
- The idea s of probability and random variables and various discrete and continuous probability distributions and their properties.
- The statistical methods of studying data samples, hypothesis testing and statistical quality control, control charts and their properties.

Module I: Partial Differential Equations

Origin of Partial Differential Equations, Linear and Non Linear Partial Equations of first order, Lagrange's Equations, Charpit's method, Cauchy's method of Characteristics, Solution of Linear Partial Differential Equation of Higher order with constant coefficients, Equations reducible to linear partial differential equations with constant coefficients.

Module II: Applications of Partial Differential Equations:

Classification of linear partial differential equation of second order, Method of separation of variables, Solution of wave and heat conduction equation up to two dimension, Laplace equation in two dimensions, Equations of Transmission lines.

Module III: Statistical Techniques I:

Introduction: Measures of central tendency, Moments, Moment generating function (MGF) , Skewness, Kurtosis, Curve Fitting , Method of least squares, Fitting of straight lines, Fitting of second degree parabola, Exponential curves ,Correlation and Rank correlation, Regression Analysis: Regression lines of y on x and x on y, regression coefficients, properties of regressions coefficients and non linear regression.

Module IV: Statistical Techniques II:

Probability and Distribution: Introduction, Addition and multiplication law of probability,

Conditional probability, Baye's theorem, Random variables (Discrete and Continuous Random variable) Probability mass function and Probability density function, Expectation and variance, Discrete and Continuous Probability distribution: Binomial, Poission and Normal distributions.

Module V: Statistical Techniques III:

Sampling, Testing of Hypothesis and Statistical Quality Control: Introduction, Sampling Theory (Small and Large) , Hypothesis, Null hypothesis, Alternative hypothesis, Testing a Hypothesis, Level of significance, Confidence limits, Test of significance of difference of means, T-test, F-test and Chi-square test, One way Analysis of Variance (ANOVA).Statistical Quality Control (SQC) , Control Charts , Control Charts for variables (\bar{X} and R Charts), Control Charts for Variables (p , np and C charts).

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
3. S. Ross: A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.

Reference Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2. T.Veerarajan : Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi.
3. R.K. Jain and S.R.K. Iyenger: Advance Engineering Mathematics; Narosa Publishing House, New Delhi.
4. J.N. Kapur: Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.
5. D.N.Elhance,V. Elhance& B.M. Aggarwal: Fundamentals of Statistics; Kitab Mahal Distributers, New Delhi.

2. KVE401: Universal Human Values (L T P 3 0 0) credits 3

Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they ‘really want to be’ in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes:

On completion of this course, the students will be able to

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society

2. Distinguish between the Self and the Body; understand the meaning of Harmony in the Self the Co-existence of Self and Body.
3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
4. Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Catalogue Description:

Every human being has two sets of questions to answer for his life: a) what to do? and, b) how to do?. The first set pertains to the value domain, and the other to the skill domain. Both are complimentary, but value domain has a higher priority. Today, education has become more and more skill biased, and hence, the basic aspiration of a human being, that is to live with happiness and prosperity, gets defeated, in spite of abundant technological progress. This course is aimed at giving inputs that will help to ensure the right understanding and right feelings in the students in their life and profession, enabling them to lead an ethical life. In this course, the students learn the process of self- exploration, the difference between the Self and the Body, the naturally acceptable feelings in relationships in a family, the comprehensive human goal in the society, the mutual fulfillment in the nature and the co- existence in existence. As a natural outcome of such inputs, they are able to evaluate an ethical life and profession ahead.

Unit 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration—what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit2: Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha, Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of I’ and harmony in ‘I’, Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity indetail, program to ensure Sanyam and Swasthya.

Unit 3: Understanding Harmony in the Family and Society- Harmony in human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction , Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship, Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitvaas* comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to worldfamily!.

Unit 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Unit 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identifythescopeandcharacteristicsofpeople-friendlyandeco-friendlyproduction systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Books:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &

Engineers , Oxford University Press

10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted2008.

3. KTT301: YARN MANUFACTURE-I (L T P 3 1 0) Credit 4

Course Outcome: After completing the course student will be able to:

CO1	Understand objectives of various spinning systems, process of ginning & its importance
CO2	Understand and explain the importance of mixing & blending, methods of mixing
CO3	Understand the importance of opening & cleaning, determine cleaning efficiency, explain the principles of opening & cleaning, calculate the production at blow room
CO4	Be able to explain principles of modern blow room and carding machines & their working
CO5	Apply the aerodynamic principles in designing carding and be explain its role in cotton cleaning in card

UNIT I: Process flow chart for carded & combed yarn manufacturing. **Cotton Ginning:-** Introduction of ginning process, Functions of ginning machines, Types of Ginning machines, Pre and post ginning machines used and their objects, Factors affecting ginning performance, Influence of ginning on fibre, yarn and fabric quality, Pressing and bailing of Indian and foreign cotton, dimensions. Objects of mixing, different types of mixing & blending, Difference between mixing & blending.

UNIT II: Objects of Blow room for natural and synthetic fibres, Principles of opening and cleaning, Principles of various opening and cleaning machines of blow room line, evolution of opening and cleaning principles. Various components & zones of blow room machines, Conventional blow room machines. Lap forming mechanism, Reasons of developments in blow room, machinery, Research findings and developments of modern blow room.

UNIT III: Automation and concept of modern blow room line, Latest developments in Blow room machines, Automatic bale opener, Mild openers– Maxi-flow/ Uni-clean/Vario-clean, modern Blenders, Intensive openers, cleanomat, flexiclean, Waste extracted at various openers and beaters, Cleaning efficiency of different machines, nep generation.

UNIT IV: Principle and concept of chute feed to card. Advantages and limitations, study of design details of different types of chute feeding systems, Objects of carding, detailed description of various parts of carding machine, Carding Theory–Opening of fibre mass–Carding actions, –Web formation and fibre configuration – Blending – Leveling action – Fibre breakage. Calculation.

UNIT V: Stripping and grinding, Stripping action and carding action, Card Clothing, evolution and Metallic wire details — Card wire mounting, wave defects, carding related draft and Production, Tandem carding, Auto-leveller used in carding, Modern development in carding made by various renewed carding machine manufacturers, Blow room & card related calculations.

References:

1. The Textile Institute Publication - Manual of Textile Engineering – Short Staple Spinning Series by W. Klein
2. ‘The Characteristics of Raw Cotton’ by P. Lord. The Textile Institute Publication, Manual of Cotton Spinning Vol. II, Part-I.
3. ‘Opening and Cleaning’ by Shirley. The Textile Institute Publication, Manual of Cotton Spinning Vol. II, Part-II.
4. ‘Opening Cleaning and Picking’ by Dr. Zoltan S. Szaloki, Institute of Textile Engineering, Virginia.
5. ‘Cotton Ginning’ Textile Progress, The Textile Institute Publication.
6. Blow-room and Carding- Training Programme conducted by NCUTE, IIT, Delhi.
7. Essential calculations of practical cotton spinning by TK Pattabhiraman.

4. KTT302-FABRIC MANUFACTURE-I (L T P 3 1 0) Credit 4

Course Outcome: After completing the course student will be able to:

CO1	Understand and explain the objectives of winding, warping & Sizing
CO2	Be able to explain the principles of winding, sectional warping, beam warping
CO3	Able to calculate the production of winding, warping & sizing machines & material balance
CO4	Be able to understand the concepts of stop motions, cutters, control systems in different machine
CO5	Be able to decide the size recipe for different types of fibres and yarn, developments in sizing machines

UNIT I: Objects of winding process, classification of winding, (manual & automatic), various latest winding machines with detailed construction and working, Description of various winding accessories.

UNIT II: Geometrical aspects: - Cone angle, angle of wind, wind per double traverse, surface speed, traverse speed, winding speed, calculations: winding speed, production/spindle & per machine, and efficiency.

UNIT III: Objectives of pirn winding, its advantage over rewound weft, Details semi-automatic and automatic pirn winding machines w. r. t drive to spindles, traverse, tensioning yarn path. Pirn build: - length of wind, chase length, diameter, bunch, tail ends etc. their importance during weaving process. Calculations: Average pirn diameter, winding speed, production / spindle / & per machine, efficiency, number of looms fed by spindle.

UNIT IV: Objectives of warping, precautions to be considered in the process, classification of warping process- (beam warping, sectional warping, ball warping), Latest Warping machine: - construction and working, Creel: - framing (requirements, length, height, pitch, etc.) pegs, tensioning arrangements guides, blow fan, types of creels (parallel, V, V-nose etc.), Principles of operation of beam warping and sectional warping. Sectional warping machines, Waxing attachment, computerized warping machines.

UNIT V: Objectives of sizing and sizing terminology, achieving the objectives through sizing paste constituents, concepts of sizing process: hank sizing, ball warp sizing, cold sizing, hot-melt sizing, Slasher sizing, multi- cylinder sizing, description of sizing ingredients, lapper, migration and stretch study, Latest developments in sizing process by various sizing machine manufacturers.

References:

1. Principles of weaving By Marks A.T.C. & Robinson.
2. Weaving By Prof. DB Ajgaonkar, Prof. Sriramalu & Prof. MK Talukdar.
3. Weaving Mechanism by K.T. Aswani.
5. Winding &Warping by Talukdar MK. 5.Yarn Preparation-Vol-I by Sengupta.
4. Industrial practices in weaving preparatory by M.K. Singh, Woodhead Publication.
5. Textile Mathematics-Vol. I by J.E. Booth.
6. Fibre to Fabric by PR Lord

5 KTT303: TEXTILE FIBRE-I (L T P 3 1 0) Credit 4

Course Outcome: After completing the course student will be able to:

CO1	Able to understand the desirable properties of textile fibres, textile fibre classification,
CO2	Able to understand the cultivation of cotton, different cotton varieties, morphological structure of cotton, jute & other natural fibres
CO3	Be able to understand the important properties of wool fibres, their structure & their uses
CO4	Be able to understand & explain the properties of silk fibres, its structure & uses

UNIT I:Introduction: various definitions related to textile fibres, classification of textile fibres, difference between staple & filament, essential & desirable properties of textile fibres, advantages & disadvantages of natural and man made fibres.

UNIT II: Cotton cultivation and harvesting, development of cotton fibres in seed, cotton varieties and grading, morphological structure, physical and chemical properties of cotton fibre and its applications.

UNIT III: Jute cultivation, retting and extraction process, structure of jute fibre, physical and chemical properties of jute fibre and its applications, Introduction to other natural bast fibres like flax, hemp, ramie, banana, bamboo fibre etc. and their applications.

UNIT IV: Types of wool and its grading, Morphological structure, chemical composition, physical & chemical properties, varieties of wool fibres and their applications, introduction to other animal fibres like angora fibres, camel hair fibre, goat fibre etc. and their applications.

UNIT V: Types of silk and its production, chemical composition and morphological structure of silk, physical & chemical properties of silk and its applications.

References:

1. W.E. Morton & JWS Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and Technology Vol.-2 by Dr. VK Kothari, IIT Delhi.
3. Hand book of textile fibres by J. Gordon Cook
4. Fibre Science and Technology, S P Mishra

6. KTT351: YARN MANUFACTURE-I LAB (0 0 2) Credit 1

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, calculating speed of different machine parts, Blows per inch of Krishner beater, Production calculation of blow room, various controls points and changes places, Practice in checking the quality of laps, Study of driving mechanism and calculation of speed of different parts & production of card, Study of different setting points on card.

7. KTT352: FABRIC MANUFACTURE-I LAB(0 0 2) credit 1

1. Study of weaving preparatory and weaving Processes
2. Study of loom drive, loom timing, passage of material and primary motions.
3. Study of precision and drum winding machine.
4. Study of cheese winding machine.
5. Study of autoconer its functions
6. Study of pirn winding machine
7. Study of sectional warping machine
8. Study of beam warping machine

8. KTT353: TEXTILE FIBRE-I LAB(0 0 2) Credit 1

Principle of microscopy, microscopic identification of natural fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis.

9. KTT354 Mini project/Internship Assessment

10. Non Credit Courses:

10.1KNC 302:ENVIRONMENTAL SCIENCE(L T P 2 0 0) Non credit

Unit 1: Definition, scope & Importance, Need for public awareness- Environment definition,

Eco system- Balanced Ecosystem, Human activities- Food, Shelter, Economic and Society Security

Ethics of human activities on environment- Agriculture, Housing Industry, Mining and transportation activities, Basics of Environmental impact assessment, Sustainable development

Unit 2: Resources, Water resources- Availability and Quality aspects. Water borne diseases, Water induces diseases, Fluoride problem In drinking water. Mineral resources. Forest wealth, Material cycles, Carbon, Nitrogen and Sulphur Cycles.

Energy- Different types of energy, Electro-magnetic radiation, Conventional and Non-conventional sources- Hydro Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Biogas. Hydrogen as an alternative future source of Energy.

Unit 3: Environmental Pollution and their effects. Water pollution, Land Pollution, Noise pollution, Public health aspects, Air Pollution, Solid waste management, e-waste management
Current environment issues of importance: Population Growth, Climate Change and global warming- Effects, Urbanization, Automobile pollution-Acid rain, Ozone layer depletion, Animal Husbandry

Unit 4: Environmental Protection- Role of Government, Legal aspects, Initiatives by Non-governmental organizations (NGO), Environmental Education, Woman Education

Text Books

1. Environmental Studies- Benny Joseph- Tata McGraw Hill-2005
2. Environmental Studies- Dr. D.L. Manjunath, Pearson Education-2006
3. Environmental studies- R Rajagopalan- Oxford Publication-2005
4. Text book of Environmental Science & Technology- M. Anji Reddy- BS Publication

Reference Books

1. Principles of Environmental Science and Engineering- P. Venugopalan Rao, Prentice Hall of India
2. Environmental Science and Engineering- Meenakshi, Prentice Hall of India

10.2 KNC301: CYBER SECURITY (L T P 2 0 0) Non credit

Unit 1: Introduction- Introduction to Information Systems, Types of Information Systems, Development of Information Systems, Introduction to Information Security, Need for Information Security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis

Unit 2: Application Security- (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail Viruses, Macro Viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards. Digital Signature, Public Key Cryptography

Unit 3: Developing Secure Information Systems- Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and Intrusion Detection Systems, Backup Security Measures.

Unit 4: Security Policies- Development of Policies, WWW Policies, Email Security Policies, Policy Review Process-Corporate Policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Evolving Technology Security – Mobile, Cloud, Outsourcing, SCM.

Unit 5: Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law. Case Study – Corporate Security

References:

1. Charles P. Pfleeger, Shari Lawrance Pfleeger, “Analysing Computer Security”, Pearson Education India.
2. V.K. Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
3. Sarika Gupta & Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing House
4. Anshul Kaushik, Cyber Security, Khanna Publishing House
5. Dr.Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla, ”Introduction to Information Security and Cyber Law” Willey Dreamtech Press.
6. Michael E. Whitman and Herbert J Mattord "Principle of Information Security" Cengage
7. Mike Chapple and David Seidl "Cyberwarfare: Information operations in a connected world" Jones & Bartlett Learning
8. Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.
9. CHANDER, HARISH, ” Cyber Laws And It Protection ” , PHI Learning Private Limited ,Delhi
10. V.K. Jain, Cryptography and Network Security, Khanna Publishing House, Delhi

11. MOOCSCOURSES (Essential for Hons Degree)

List of MOOCs (NPTEL) based recommended Courses for B. Tech Students (AICTE Model Curriculum)

- | | |
|---|--------------------|
| 1. Developing Soft Skills and personality | 8 Weeks-3Credits |
| 2. Enhancing Soft Skills and personality | 8 Weeks-3Credits |
| 3. Speaking Effectively | 8 Weeks-3Credits |
| 4. Introduction to Industry 4.0 and Industrial Internet of Things | 12 Weeks-4Credits |
| 5. Emotional Intelligence. | 8 Weeks-3Credits |
| 6. Patent Law for engineers and Scientist. | 12 Weeks-4 Credits |

Note:

After successful completion of 160 credits, a student shall be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours only, if he/she completes additional university recommended courses only (Equivalent to 20 credits; NPTEL Courses of 4 Weeks, 8 Weeks and 12 Weeks shall be of 2, 3 and 4 Credits respectively) through MOOCs. For registration to MOOCs Courses, the students shall follow NPTEL Site <http://nptel.ac.in/> as per the NPTEL policy and norms. The students can register for these courses through NPTEL directly as per the course offering in Odd/Even Semesters at NPTEL. These NPTEL courses (recommended by the University) may be cleared during the B. Tech degree program (not necessary one course in each semester). After successful completion of these Moocs courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through their college of study only. The student shall be awarded Hons. Degree (on successful completion of MOOCS based 20 credit) only if he/she secures 7.50 or above CGPA and passed each subject of that Degree Programme in single attempt without any grace marks.

4th Semester B. Tech.
Textile Technology(MCS)

1. KOE031: ENGINEERING MECHANICS (SBOE): (L T P 3 0 0) Credit 3

Objectives: To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

Course Outcomes: After completing this course, the students should be able to understand the various effect of force and motion on the engineering design structures.

UNIT-I:

Two-dimensional force systems: Basic concepts, Laws of motion, Principle of transmissibility of forces, transfer of a force to parallel position, resultant of a force system, simplest resultant of two dimensional concurrent and non-concurrent force systems, distribution of force systems, free body diagrams, equilibrium and equations of equilibrium.

Friction: Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction.

UNIT-II:

Beam: Introduction, shear force and bending moment, different equations of equilibrium, shear force and bending moment diagram for statically determined beams.

Trusses: Introduction, simple truss and solution of simple truss, methods of F-joint and methods of sections.

UNIT-III:

Centroid and moment of inertia: Centroid of plane, curve, area, volume and composite bodies, moment of inertia of plane area, parallel axis theorem, perpendicular axis theorem, principle moment of inertia, mass moment of inertia of circular ring, disc, cylinder, sphere, and cone about their axis of symmetry.

UNIT-IV:

Kinematics of rigid body: Introduction, plane motion of rigid body, velocity and acceleration under translational and rotational motion, relative velocity.

Kinetics of rigid body: Introduction, force, mass and acceleration, work and energy, impulse and momentum, D'Alembert's principle and dynamic equilibrium.

UNIT-V:

Simple stress and strain: Introduction, normal and shear stresses, stress-strain diagrams for ductile and brittle material, elastic constants, one-dimensional loading of members of varying cross sections, strain energy.

Pure bending of beams: Introduction, simple bending theory, stress in beams of different cross sections.

Torsion: Introduction, torsion of shafts of circular cross sections, torque and twist, shear stress due to torque.

Books and References:

1. Beer, F.P and Johnston Jr. E.R., “Vector Mechanics for Engineers (In SI Units): Statics and Dynamics”, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Vela Murali, “Engineering Mechanics”, Oxford University Press (2010).
3. A Textbook of Engineering Mechanics, R.K. Bansal, Laxmi Publications.

2. **KAS301: TECHNICAL COMMUNICATION (L T P 2 0 2) Credit 3**

Course Outcomes

1. Students will be enabled to **understand** the nature and objective of Technical Communication relevant for the work place as Engineers.
2. Students will **utilize** the technical writing for the purposes of Technical Communication and its exposure in various dimensions.
3. Students would imbibe inputs by presentation skills to **enhance** confidence in face of diverse audience.
4. Technical communication skills will **create** a vast know-how of the application of the learning to promote their technical competence.
5. It would enable them to **evaluate** their efficacy as fluent & efficient communicators by learning the voice-dynamics.

Unit -I Fundamentals of Technical Communication:

Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.

Unit - II Forms of Technical Communication:

Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Key-Note Speech: Introduction & Summarization; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration.

Unit - III Technical Presentation: Strategies & Techniques

Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear: Confident speaking; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Unit - IV Technical Communication Skills:

Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis;

Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

Unit - V Kinesics & Voice Dynamics:

Kinesics: Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation; Pronunciation; Articulation; stress & accent; Linguistic features of voice control: Vowel & Consonant Sounds.

Reference Books

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
3. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.
4. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.
5. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
6. Skills for Effective Business Communication by Michael Murphy, Harward University, U.S.
7. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

3 KTT401: YARN MANUFACTURE-II (L T P 3 0 0) Credits 3

Course Outcome: After completing the course student will be able to:

CO1	Able to understand principle & mechanism involved in drafting & doubling & its influence on fibre orientation
CO2	Understand developments of drafting systems & different drafting systems
CO3	Able to understand the importance of preparatory process for combing, the parameters in preparatory process for combing & its influence on combing
CO4	Able to explore the concept & mechanism involved in combing & demonstrate different comber setting for different types of combing
CO5	Able to understand the role of roving process, concept of twisting & winding, building mechanism & able to calculate draft, twist, production & other parameters related to D/F, comber & roving frame

UNIT I: Functions of draw-frame, principles of drafting and doubling, Study of constructional details and design of drafting systems, weighting in draw frame, draft distribution, doubling and blending, drafting force, details of drafting system, evolution of drafting systems at draw- frame (Shirley 4/4 drafting, platts, pressure bar, Whiten accu drafting, Rieter polar drafting systems etc.

UNIT II: Coiling system and stop motion, calculations relating to speeds, drafts,

production etc, design, Suction at draw-frame. Automatic can handling, Auto leveling at draw-frame. On- line quality monitoring and control, Study of draw-frames available in the market. Blending at draw-frame, Study of maintenance aspects and design developments such as rollers, roller weightings, drafting systems etc. Developments in draw frame drafting.

UNIT III: Objects of combing process, Requirements of good lap – importance of number of passages, importance of good lap, linear density of lap, etc., Methods of comber lap preparation – Different sequences of comber lap preparation, study of sliver lap machine, ribbon lap machine, unilap machine, Developments in lap preparation machines.

UNIT IV: Constructional details of different Comber(for cotton and worsted)- feeding, nipper assembly, cylinder and detaching rollers, cylinder needles, web and sliver transport, drafting and coiling at comber, Study of combing cycle, Semi combing, normal combing, super combing and double combing., Forward and backward combing, Comber Settings, Norms for production, speed, Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality, Automatic and centralized noil extraction, Automatic materials handling. Stop motions in comber, Technical specifications of modern combers available in the worldmarket.

UNIT V: Objects of speed frame, Concepts of drafting, twisting and winding process. Constructional aspects of Speed-frame – Creel, Top arm apron drafting system, Spindle & Flyer assembly, Bobbin building, stop motions. Study of mechanisms like – differential motion, building mechanism, semi-automatic and automatic doffing, Performance assessment of Speed-frame. Materials handling. Link –mechanism, Features of modern speed-frame machines.

References:

1. W. Klein, The Textile Institute Publication –Manual of Textile Engineering-Short Staple Spinning Series Vol. I to V.
2. P. Lord, The characteristics of Raw Cotton, The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part-I.
3. Carl Lawrence, Fundamentals of Spun Yarn Technology.
4. Blow room and carding –Training program conducted by NCUTE, IIT Delhi.
5. Carding by F. Charanlay. The Textile Institute publication, Manual of cotton spinning series Vol III
6. Zoltan, S. Szaloky, Drawing, Combing and roving and speed frame, The Institute of Textile Engineering, Virginia.
7. Zoltan, S. Szaloky, Drawing, Combing and roving and speed frame, The Institute of Textile Engineering, Virginia
8. J.H. Black, Draw frame, combing and speed frame, The Textile Institute publication, Manual of cotton spinning Vol-IV Part II.

4 KTT402: FABRIC MANUFACTURE-II (L T P 3 1 0) Credits 4

Course Outcome: After completing the course student will be able to:

CO1	Understand objectives of drawing-in, limitations of knotting
CO2	Understand & able to explain primary & secondary motions involved in loom, different methods of shedding & picking, different types of let-off & take-up mechanism
CO3	Understand & explain tappet, Dobby & jacquard looms & their uses & mechanism involved in it.
CO4	Understand mechanism involved in terry, working of drop box loom, pick at will loom, various stop motions involved in loom

UNIT I: Drawing-in: Objectives, process description, reed count system, manual drawing-in, semi-automatic drawing-in process, Knotting process and its limitations. Various methods of fabric manufacture and automatic weaving: - Weaving, knitting, braiding, non-woven, brief description of all methods and processes involved in it, Different kinds of fabrics: Grey, mono-colour, multi-colour, warp or weft stripes, checksetc.

UNIT II: General description of plain power looms, introduction to weaving process, primary, secondary and auxiliary motion of plain power looms, Various ways of shedding, over and under pick motion, tappet shedding, Temples and its utility, idea about healds count and reed count in different system, Negative and positive take up motion, negative five wheel and seven wheel take up motion and positive let-off motions, Calculations: -Production and efficiency of machine.

UNIT III: Scope & limitation of doobby, negative and positive doobby, cross border doobby, Development in doobby, Scope and limitations doobby, brief description of Crompton and Knowles doobby, cross border doobby, method of pegging for doobby, methods of pegging, heald reversing motion. Warp protective devices, side and center weft fork motion.

UNIT IV: Jacquards shedding, types of jacquards and their principle of working, size and figuring capacity of jacquard, cross border jacquards. Single lift single cylinder Jacquard, Double lift single cylinder, Double lift double cylinder, split harness, Different system of harness tie- up, terry mechanism, Recent developments in jacquard weaving.

UNIT V: Limitations of automatic loom, objectives for developing automatic loom, scope for automation, design features of automatic loom, drives- loom motions, accessories and other critical features of automatic looms, weft feelers- construction & working of side sweep, electrical & electronic weft feelers, their merits, demerits & applications.

Automatic let-off motion: Principles and requirements of automatic let-off mechanism, types of Automatic loom: pirn change, shuttle change loom, detailed study of various motions of automatic looms, warp stop motion- types, construction and working of mechanical & electrical warp stop motion, centre weft fork motion, construction and working of centre weft fork motion and its advantages.

Construction & working Multiple box motion, their types, two colours and four-colour drop box motion, brief description of pick-at will, pick and pick motion, Pick finding, heald leveling, light indicators; pick counters need, functions & use, i) Auto loom fabric defects, causes and remedies, Calculations pertaining to dobby, jacquard and automatic looms production and efficiency.

References:

1. Talukdar, Sriramalu and Ajgoanka, Weaving- Machinery, Mechanisms, management
2. R.Sengupta, Yarn preparation by
3. M.K.Talukdar, An introduction to winding & warping by
4. A. Ormerod, Modern preparation & weaving machinery, Textile Institute, U.K. 4.
5. J. E. Booth, Textile Mathematics by (Volume III).
6. Banerjee and Alagirusamy Yarn winding by (NCUTE publication).
7. Marks and Robinson, Weaving mechanism (Textile Institute).
8. Lord and Mohamed, Weaving: Conversion of Yarn to Fabric by
9. Robinson, Woven cloth construction

5. KTT403: TEXTILE FIBRE-II (L T P 3 1 0) Credits 4

Course Outcome: After completing the course student will be able to:

CO1	Explain classification of synthetic fibres, the role of degree of polymerization, molecular weight & other properties needed for fibre forming polymer
CO2	Explain the process of viscose fibre manufacture & its properties
CO3	Understand and able to explain different fibre spinning systems viz. melt spinning, solution spinning, dry spinning etc
CO4	Explain the process of forming fibres like polyester, polyamide, polypropylene & their properties
CO5	Explain the process of manufacture of PAN, & other high performance fibre

UNIT I: Classification of man made fibres, definition of regenerated and synthetic fibres, Concepts of molecular weight, Degree of polymerization, Orientation and Crystallinity, Characteristics of fibre forming polymer.

UNIT II: Introduction to methods of fibre formation by melt spinning, dry spinning, & wet spinning, Polyethylene terephthalate fibre (PET) – History of development, Brief manufacturing process, Polymer production by DMT & PTA route, Chips drying, physical & chemical properties of polyester fibres, applications.

UNIT III: Polyamide Fibres – History of development, Different types of polyamide fibres, Nylon polymer production by continuous polymerization in VK Tube, Manufacturing of Nylon 6 fibre by melt spinning, Properties of nylon 6 fibre, Polymer production of Nylon 66, Nylon 66- fibre formation by melt spinning, Physical & chemical properties and applications.

UNIT IV: Polyacrylonitrile fibres, Polyurethane fibres brief manufacturing process by wet and dry spinning, physical and chemical properties of acrylic fibres & its applications, Properties of polyethylene fibre, Type of polypropylene (PP), Properties of polypropylene fibre. Introduction of High Performance fibres.

UNIT V: Introduction to regenerated fibre, Raw material for viscose rayon, Manufacturing sequence of viscose fibre, Steeping and pressing, Cutting and shredding,

Ageing, Xanthation of sodium cellulose, Mixing and filtration, Ripening, Wet spinning of viscose rayon, Introduction to Acetate, Triacetate fibres and Lyocell fibres.

References:

1. V.A. Shenai, Textile Fibres- Vol-I Sevak Publications, Bombay, 1971
2. H V S Murthy, Textile Fibres- Textile Association Publication 1995.
3. S. P. Mishra, A text book of Fibres Science and technology, New Age International (p) Ltd 2000.
4. Gordon & Cook, Hand Book of Fibres, Vol I & II Merow Publication Ltd
5. R.W. Moncrief, Man-Made Fibres- Heywood Books

6. KTT451: YARN MANUFACTURE-II LAB(L T P 0 0 2) Credit 1

1. Study of constructional details of draw-frame,
2. Driving arrangement and calculation of speeds, draft and production of D/F.
3. Processing of Material on Draw frame and evaluating performance.
4. Study of constructional details & Driving arrangement and calculation of Speed Frame.
5. Study of sliver lap machine and calculation of speeds of different parts and production calculations of sliver lap.
6. Study of sliver lap machine and calculation of speeds of different parts and production calculations of Ribbon lap.
7. Study of sliver lap machine and calculation of speeds of different parts and production calculations of comber.

7. KTT452: FABRIC MANUFACTURE-II LAB (L T P 0 0 2) Credit 1

1. General study of drop box motion.
2. General study of mechanical Jacquard and method of card cutting.
3. Study of Cam dobbie and paper card cutting.
4. Study & working of weft feeler motion.
5. Study & working of auto let-off motion.
6. Study and working of pirn change motion.
7. Study and working of shuttle change motion.
8. Study of various dobbie mechanics.
9. Study the mechanism of multiple box motion.
10. Study of various jacquard looms.

8. KTT453: TEXTILE FIBRE-II LAB (L T P 0 0 2) Credit 1

Principle of microscopy, microscopic identification of man-made fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis.

9. KNC 401Cyber Security/ KNC402Environmental Science (L T P 2 0 0) Non Credit

9.1 KNC 402: ENVIRONMENTAL SCIENCE (L T P 2 0 0) Non credit shall be done through NPTEL@MOOCS

Unit 1: Definition, scope & Importance, Need for public awareness- Environment definition, Eco system- Balanced Ecosystem, Human activities- Food, Shelter, Economic and Society Security

Ethics of human activities on environment- Agriculture, Housing Industry, Mining and transportation activities, Basics of Environmental impact assessment, Sustainable development

Unit2: Resources, Water resources- Availability and Quality aspects. Water borne diseases, Water induces diseases, Fluoride problem In drinking water. Mineral resources. Forest wealth, Material cycles, Carbon, Nitrogen and Sulphur Cycles.

Energy- Different types of energy, Electro-magnetic radiation, Conventional and Non-conventional sources- Hydro Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Biogas. Hydrogen as an alternative future source of Energy.

Unit 3: Environmental Pollution and their effects. Water pollution, Land Pollution, Noise pollution, Public health aspects, Air Pollution, Solid waste management, e-waste management

Current environment issues of importance: Population Growth, Climate Change and global warming- Effects, Urbanization, Automobile pollution-Acid rain, Ozone layer depletion, Animal Husbandry

Unit 4: Environmental Protection- Role of Government, Legal aspects, Initiatives by Non-governmental organizations (NGO), Environmental Education, Woman Education

Text Books

1. Benny Joseph, Environmental Studies- - Tata McGraw Hill-2005
2. D.L. Manjunath, Environmental Studies- Pearson Education-2006
3. R Rajagopalan, Environmental studies- Oxford Publication-2005
4. M. Anji Reddy, Environmental Science & Technology- - BS Publication

Reference Books

1. P. Venugopalan Rao, Principles of Environmental Science and Engineering-, Prentice Hall of India
2. Meenakshi, Environmental Science and Engineering-, Prentice Hall of India

9.2 KNC401: CYBER SECURITY (L T P 2 0 0) Non credit: Shall be done through NPTEL@MOOCS

Unit 1: Introduction- Introduction to Information Systems, Types of Information Systems, Development of Information Systems, Introduction to Information Security, Need for Information Security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis

Unit 2: Application Security- (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail Viruses, Macro Viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards. Digital Signature, Public Key Cryptography

Unit 3: Developing Secure Information Systems- Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and Intrusion Detection Systems, Backup Security Measures.

Unit 4: Security Policies- Development of Policies, WWW Policies, Email Security Policies, Policy Review Process-Corporate Policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Evolving Technology Security – Mobile, Cloud, Outsourcing, SCM.

Unit 5: Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law. Case Study – Corporate Security

References:

1. Charles P. Pfleeger, Shari Lawerance Pfleeger, “Analysing Computer Security”, Pearson Education India.
2. V.K. Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
3. Sarika Gupta & Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing House
4. Anshul Kaushik, Cyber Security, Khanna Publishing House
5. Dr.Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla, ”Introduction to Information Security and Cyber Law” Willey Dreamtech Press.
6. Michael E. Whitman and Herbert J Mattord "Principle of Information Security" Cengage
7. Mike Chapple and David Seidl "Cyberwarfare: Information operations in a connected world" Jones & Bartlett Learning
8. Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.
9. Chander Harish,” Cyber Laws And It Protection ” , PHI Learning Private Limited ,Delhi
10. V.K. Jain, Cryptography and Network Security, Khanna Publishing House, Delhi

10. MOOCS (Essential for Hons Degree)

List of MOOCs (NPTEL) based recommended Courses for B. Tech Students (AICTE Model Curriculum)

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|---|--------------------|
| 1. Developing Soft Skills and personality | 8 Weeks-3Credits |
| 2. Enhancing Soft Skills and personality | 8 Weeks-3Credits |
| 3. Spearing Effectively | 8 Weeks-3Credits |
| 4. Introduction to Industry 4.0 and Industrial Internet of Things | 12 Weeks-4Credits |
| 5. Emotional Intelligence. | 8 Weeks-3Credits |
| 6. Patent Law for engineer sand Scientist. | 12 Weeks-4 Credits |