Course Code:	HUL306	Course Title:	The Role of Leadership and Social Change			
Category	OC	Credit Assigned	L	T	P	C
			3	0	0	3
Pre-Requisite (if Any)	Nil	Type of Course	Humanities			

Course Outcomes:

After completion of this course, the students will be able to:

1. Develop an understanding of the concepts of leadership and other aspects of leadership.
2. Elaborate the sphere of personality and study the issues of context, contingency, transaction and transformation.
3. Interpret the role of Leadership as a group process and perceive the importance of groups, social identity, prototypically and leadership effectiveness.
4. Discuss the role and importance of values and ethics in leadership development.
5. Illustrate the relationship between leadership and social change.

Course Contents:

Module 1: Introduction to Leadership - Basics to understand the role of leadership, its meaning, concept and importance, Qualities of leadership, Characteristics of leadership, Leadership styles, Leadership Theories.

Module 2: Great man and the sphere of personality - Background, Characteristics of personality sphere, The role of mass media and social media, States and systems with personality cult, Charismatic leadership, Issues of context, contingency, transaction and transformation.

Module 3: Groups, social identity and leadership - Leadership as a group process, Borders and barriers between groups and identities, Identity complexity and identity threat, Leadership and social fragmentation, Proto typicality and leadership effectiveness, Gender and Leadership.

Module 4: Ethical leadership – Meaning and concept of ethical leadership, Role and importance of ethics in leadership, Traits of ethical leadership, A look at Followership, Leaders as entrepreneurs of identity and emotion, Case studies and examples of ethical leadership.

Module 5: Leadership and Social Change – Meaning and concept of social change, Dynamics of social change, Role of leadership in social change, The social change model of leadership**,** Understanding leadership as identity management, Leadership and transformation of social reality.

Text Books:

1. Haslam, S. Alexander, Stephen D. Reicher, and Michael J. Platow. The new psychology of leadership: Identity, influence and power. Routledge, 2020.

Reference Books:

1. Messick, David M., and Roderick M. Kramer, eds. The psychology of leadership: New perspectives and research. Psychology Press, 2004.
2. Leonard, H. Skipton, Rachel Lewis, and Arthur M. Freedman. The Wiley-Blackwell handbook of the psychology of leadership, change and organizational development. John Wiley & Sons, 2013.
3. Mangal, Shubhra, and Shashi Mangal. Essentials of Social Psychology: An Indian Perspective. Routledge, 2022.
4. Hogg, Michael A. "Social psychology of leadership." Social psychology: Handbook of basic principles (2007): 716-733.

10.Mathematics in Data Science (MAL 301):

<table>
<tr><td>Course Code</td><td>MAL-301</td><td>Course Title:</td><td colspan="4">Mathematics in Data Science</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">OC</td><td rowspan="2">Credit Assigned</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Pre Requisite (if Any)</td><td>MAL 201</td><td>Type of Course</td><td colspan="4">Open</td></tr>
<tr><td colspan="7">Course Outcomes:</td></tr>
<tr><td colspan="7">The students will be able

1. Interpretation and visualization of quantitative data using open source tool like R and Python.
2. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for prediction and forecasting.
3. Formulate an appropriate null and alternative hypothesis.
4. Perform test of Hypothesis for decision making and validation.
5. Apply these tools and techniques to real world problems/case studies in the areas of data science and machine learning etc.</td></tr>
<tr><td colspan="7">Course Contents:</td></tr>
<tr><td colspan="7">Module 1
Descriptive Statistics: graphical representation of the data, measures of locations and variability.

Module 2
Regression analysis: Simple linear regression, multivariate regression, Reminder on probability, The regression model with one variable, The general linear model, Inference in the linear model, Regression diagnostics tools, One factor ANOVA.

Module 3

Sampling Distributions: Distributions of the sample mean and the sample variance for a normal population, Chi-Square, t and F distributions, problems.

Module 4</td></tr>
</table>

Testing of Hypotheses: Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, the most powerful test, tests for proportions.

Module 5

Estimation: Unbiasedness, consistency, the method of moments and the method of maximum likelihood estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions, problems.

Text Books:

- V. K. Rohatgi and A. K. M. Ehsanes Sateh, An Introduction to Probability and Statistics, John Wiley & Sons.
- M. R. Spiegel, Theory and problems of Probability and statistics; McGraw-Hill.

Course Code	MAL 303	Course Title	Optimization Techniques			
Category	Open	Credit Assigned	L	T	P	C
			3	0	0	3
Pre Requisite (if Any)	MAL 103/ MAL 105/ MAL 108	Type of Course	Basic Sciences			

Course Outcomes

At the end of the course, students will be able to

1. Analyze and solve linear programming problems by different methods.
2. Solve dual and dual simplex problems.
3. Use various techniques to solve different transportation and assignment problems.
4. Apply the concept of game theory in diverse fields.
5. Solve sequencing problems arising in management and industry with its vast computer applications.

Course Contents

Module 1: Linear Programming Problem

Formulation of the Linear Programming Problem (LPP), Graphical methods for solving LPP, Initial basic feasible solution, Simplex method, Artificial variable technique for initial basic feasible solution, Big M method, two phase method

Module 2: Duality

Duality in LPP, Primal Dual method, Dual simplex method, Sensitivity, or post optimality analysis

Module 3: Transportation and Assignment Problems

Transportation:North-west corner method, Matrix minima method, Vogel's approximation method, UV method for optimization. Travelling salesman problem. Assignment Problem: Introduction, Hungarian method

Module 4: Game Theory

Two-person zero sum games, Maximin-Minimax principle, Graphic solution of $2 \times n$ and $m \times 2$ games, Dominance property

Module 5: Sequencing Problem

Sequencing Problem: sequencing problem, Jonhson's algorithm for processing N-jobs through two machines, N-jobs through three machines

Text Books:

1. Panneerselvam, Operation Research, Prentice Hall of India.
2. Hamdy, A. Taha, Operation Research: An Introduction, Prentice Hall of India.

Reference Books:

1. B. E. Gillett, Introduction to Operation Research – A Computer Oriented Algorithmic Approach, McGraw Hill.
2. Kanti Swarup, P. K. Gupta, Man Mohan, Operations Research, Sultan Chand & Sons.
3. N. D. Vohra, Quantitative Techniques in Management, TMH.
4. R. K. Gupta, Operational Research, Krishna Prakashan Mandir, Meerut.

7. Applied Linear Algebra (MAL 302):

Course Code	MAL 302	Course Title	Applied Linear Algebra			
Category	Open	Credit Assigned	L	T	P	C
			3	0	0	3
Pre-Requisite (if Any)	MAL 103 / MAL 105 / MAL 108	Type of Course	Basic Science			

Course Outcomes:

After the completion of the course, students will be able to:

1. Solve scientific problems by applying matrix theory.
2. Use the linear transformations in the computer graphics.
3. Apply the concepts of inner product spaces for obtaining least square solution.
4. Solve engineering problems into optimization framework and solve them using efficient optimization techniques.
5. Apply basic importance of linear algebra and its applications in engineering.

Course Contents:

Linear Algebra and Matrices:
Module 1: Vector spaces, subspaces, linear dependence/independence, basis and dimension. Matrix norms and condition number.

Module 2: Linear transformation, range space and rank, null space and nullity, rank nullity theorem, matrix representation of a linear transformation, change of basis, applications of linear transformations in computer graphics: translation, rotation, reflection, shear, scaling. Four fundamental subspaces (i.e. the column space, the null space, the row space and the left null space).

Module 3: Inner product spaces and applications: norm, dot products and inner products, orthonormal sets, Gram Schmidt orthogonalisation process, orthogonal projections and least squares. Bessel's inequality, Parseval's identity, and Cauchy Schwartz Inequality.

Optimization:
Module 4: Classification and general theory of optimization; Linear programming (LP): formulation and geometric ideas, Simplex algorithm (Big M and Two phase method), duality and primal dual method, sensitivity analysis.

Module 5:Some Practical Applications of linear algebra and optimization in engineering, for instance Image Processing, Machine learning, etc.

Text Books:

1. Kenneth Hoffman and Ray Kunze; *Linear Algebra*, Prentice Hall of India limited, New Delhi, 1971.

2.Gilbert Strang; *Linear Algebra And Its Applications* (Paperback) , Nelson Engineering (2007).

3. S. Kumaresan; *Linear Algebra: A Geometric Approach*, Prentice-Hall of India, 2000.
4. Erwyn Kreuzig; *Advanced Engineering Mathematics*, John Wiley and Sons, 8th Edition.
5. Kanti Swaroop et all; *Operation Research*, Jain Brothers, New Delhi.

References:

1. Gilbert Strang; *Introduction to Linear Algebra*, Wellesley- Cambridge Press, Fourth Edition, 2011.
2. Jin Ho Kwak and SungpyoHong;*Linear Algebra*, Springer, Second edition, 2004.
3. V. Krishnamoorthy et. al.;*An introduction to linear algebra*, Affiliated East West Press, New Delhi.
4. D. G. Luenberger and Y. Ye;*Linear and Nonlinear Programming*, 3rd Ed., Springer India, 2008.
5. N. S. Kambo; *Mathematical Programming Techniques*, East-West Press, 1997.
6. K. G. Murty; *Linear Programming*, Wiley, 1983.

Course Code	ASL 302	Course Title	Nanoscience and Nanotechnology			
Category	Elective	Credit Assigned	L	T	P	C
			3	0	0	3
Pre-Requisite (if Any)		Type of Course	Departmental elective offered for ECE-IoT and CSE-AI&ML, CSE-DS, CSE - HCIGT			

Course Outcomes:

After the successful completion of the course, the students will able to:

1) Recall the fundamentals of Quantum Mechanics that will serve as a foundation to quantum properties of materials.
2) Illustrate the fundamental principles of nanoscience and nanotechnology and to learn nanomaterials synthesis methods and various nanostructures.
3) Learn about advanced characterization techniques used to analyse and study nanomaterials and its applications in various fields.
4) Develop a clear understanding of the fundamental principles behind nanosensors, including the interaction of nanomaterials with analyses, transduction mechanisms, and the underlying physics
5) Develop understanding of MEMS and NEMS and the fundamental principles that govern Nano-electronics, including electron behaviour at the nanoscale, and the unique properties of nanomaterials.

Course Contents:

Module I: Introduction to Quantum Mechanics

Introduction of Quantum Mechanics, Failure of classical mechanics, Black Body radiation, Dual nature of matter, de-Broglie Hypothesis, phase velocity and group velocity, their relations, wave function & its physical significance, probability density, Schrodinger's wave equation, Eigen values & Eigen functions, applications. Quantum information & quantum computing, evolution of quantum theory, quantum computer.

Module II: Overview of Nanoscience and Nanotechnology

The significance of nanoscale, Generation of Nanotechnology, Bottom up approach, top down approach, Nanomaterials Synthesis methods- Solid State synthesis, Sol-Gel, Thin films deposition techniques – PVD: Thermal evaporation, electron beam evaporation, pulsed laser deposition, Sputtering, Chemical vapour deposition, Lithography techniques.

Size dependence properties of nanomaterials. Nanostructured Materials with High Application Potential: Carbon Nanomaterials- Fullerene, Carbon Nanotubes, Nanowires, Quantum Dots, Dendrimers.

Module III: Tools to Characterize Nanomaterials: X-ray Diffraction (XRD), Scanning electron microscopy, Transmission Electron Microscopy (TEM), Scanning Tunneling Electron microscopy, Atomic force microscopy, Applications of Nanomaterials.

Module IV: Nano-sensors: Introduction to sensors, Carbon nanotube-based sensors, Nanowire sensors, Sensor based on polymeric nanofibers and nanocomposites, Nanoparticles, Plasmonic-based nanoprobes, Optical nano sensors, Electromagnetic sensor, Semiconductor quantum interference devices (SQUID) -based magnetic nano-sensors, Biosensors, Microcantilever-based sensors, Electronic nose, Electronic tongue.

Module V: Nanoelectronics: Fundamentals of Semiconductor Devices, Metal oxide semiconductor field effect transistor, Single electron transistor, Solid-state quantum effect devices, Hybrid micro-nano-electronic resonant tunneling transistors, Molecular electronics devices, Novel opto-electronic devices, Micro and nano electromechanical systems.

Text Books:

1. Avadhanulu M. N. and P.G. Kshirsagar, A text Book of Engineering Physics, (7th Edition) 2004.
2. Thomas Varghese and K.M. Balakrishna, Nanotechnology: An Introduction to Synthesis, Properties and Applications of Nanomaterials, Atlantic Publishers and Distributors (P) Ltd, 2023.
3. Kenneth S. Krane, Modern Physics, Wiley publication (2016 - Edition).
4. Vladimir V. Mitin, V. A. Kochelap, and Michael A. Strocio, Introduction to Nanoelectronics (South Asian Edition), Cambridge University Press, 2009.
5. Rathi Rakesh: Nanotechnology: Technology Revolution of 21st Century, S. Chand & Company PVT LTD, New Delhi
6. B. S. Murty, P Shankar, Baldev Raj, B. B. Rath, James Murday: Textbook of Nanoscience and Nanotechnology; Universities Press (India) Pvt. Ltd. 2012

References:

1. T. Pradeep et al.: A Textbook of Nanoscience and Nanotechnology ; McGraw Hill Education (India) Pvt. Ltd. 2017.
2. K. K. Chattopadhyay, A. N. Banerjee: Introduction of Nanoscience and Nanotechnology; PHI Learning Pvt. Ltd. 2014.

Course Code	HUL 305	Course Title	Engineering Economics			
Category	Open	**Credit Assigned**	**L**	**T**	**P**	**C**
			3	0	0	3
Pre-Requisite(if Any)	Nil	**Type of Course**	Humanities and Social Sciences			

Course Outcomes:

After the successful completion of the course, the students will be able to:

1) Analyze the scope of economics in engineering decision making
2) Get an idea on the nature of markets
3) Equip themselves to make decisions regarding money as capital
4) Acquaint themselves with depreciation methods and evaluation of public alternatives
5) Understand about the bank policies and Public-Private partnership for development

Course Contents:

Introduction to Engineering Economics: The Art and Science of Economic Analysis; Tools of Economic Analysis; Engineering Efficiency; Meaning and Scope of Engineering economics; Elementary Engineering Analysis

Behavior of Profit Maximizing Firms: Production Function: Law of variable Proportion; Law of returns to scale; Profit Maximization of commutative firm -Cost and revenue concepts; Types of Markets-Monopoly, Oligopoly, and Monopolistic Competition

Time Value of Money: Interest - Simple and compound; nominal and effective rate of interest; Cash flow diagrams; Principles of economic equivalence; Internal rate of return; Cost benefit analysis for public projects

Depreciation: Depreciation of capital asset, causes of depreciation, Methods of calculating depreciation (Straight line method, Declining balance method), After tax comparison of project. Evaluation of public alternatives- introduction; Inflation adjusted decisions and procedure to adjust inflation; comparison of alternatives and determination of economic life of asset

Banking and Development: The functions of commercial and central bank : Foreign Direct Investment : Free trade vs. Protectionism; Capital formation; Recession and stagnation; Inclusive growth; Public-Private partnership for development; Basics of National Income Accounting

Text Books:

1. Engineering Economics, by R. Paneer Seelvan; PHI
2. Principle of Microeconomics, by McEachern W.A. and Kaur Simrit
3. Industrial Economics, by Ranjana Seth; Ane Book Pvt Ltd.
4. Modern Economic Theory, by K.K. Dewett; S.Chand.
5. Money, Banking and International Trade, by R. R. Paul

Reference Books:

1. Business Economics, by K.Rajgopalchar; Atalantic Publishers.
2. Microeconomics, by Robert Pindyk
3. Business Economics, by H.L. Ahuja,H. L. Ahuja, Louis Prof. De Broglie; S.Chand.
4. Entrepreneurship and innovation, by Rabindra N. Kanungo; Sage Publications, NewDelhi, 1998.
5. Financing Small Scale Industries in India, by K.C.Reddy; Himalaya
6. Industrial Economics, by Jagdish Sheth; Pearson Publication.
7. Management of Entrepreneurship, by, N.V.R. Naidu; I.K. International Pvt Ltd.
8. Entrepreneurial Development, by S. Anil Kumar; New Age International.
9. Small-Scale Industries and Entrepreneurship, by Dr. Vasant Desai; Himalaya Publication.

Annexure - A

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, NAGPUR

DEPARTMENT OF BASIC SCIENCES

COURSE OUTLINE

Department	**:**	**Basic Sciences**
Course code	**:**	**HUL 307**
Course Title	**:**	**Digital Wellness – *Stabilize your mind to Utilize your brain***
Course Type	**:**	**Open Course**
Course Credits	**:**	**L : 3 T : 0 P : 0 Credits : 3**

I. Course description:

Basics of Attention, How Digital Devices are impacting our mind, brain, and body, How to harness the power of brain, How to harness the power of mind, How to become a digitally responsible person and how to overcome various types of digital addictions are discussed in detail in the course.

II. Pre-requisites: None

III. Objectives:

Based on the topics discussed in the class, Student shall be able to understand how overuse of digital devices, especially for social media, is impacting their studies and health and student should also be able to come up with their own digital detox program and follow it.

IV. Course Outcomes: On successful completion of the course, student would

1. Understand the basics of Digital Wellness
2. Describe the various attention enhancers and disruptors
3. Identify the various means of harnessing the power of brain and mind
4. Apply and experience various digital detox techniques
5. Practice good sleep hygiene, exercise routine and improve mental health
6. Become a responsible digital gadget user

V. Expanded Course description:

UNIT - 1 (Basics of Digital Wellness)

Digital Devices - What is Wellness - What is Digital Wellness - Digital Calories - Basics of Brain - Difference between Traditional Entertainment and Digital Entertainment - Difference between Relaxation and Stimulation - Importance of Relaxation - What is Attention - Benefits of Attention - Attention Disruptors - Cost of Distraction - Power of Attention - Attention Economy – Attention from Yoga perspective

UNIT - 2 (Impact on Brain)

Neuroplasticity - Harnessing the Power of Neuroplasticity - Brain's Switching Penalty - Multitasking - Neuro-associative-conditioning - Pleasure Circuit - Pain Circuit - Thinking Brain - Emotional Brain - Science of Learning and Memory - Digital Reading vs Print Reading - Digital Mindset - Learning using Audio and Video - Biliteracy Model - Creativity - Design Thinking - Improving Brain Health and Benefits of Brain's Downtime

UNIT - 3 (Impact on Mind)

What is Social Media - Impact of Social Media - What is Overthinking - Techniques to overcome Overthinking - Various Mental Health issues (anxiety, depression, comparison, low self-esteem, etc) - Virtual Relationships - Impact of Loneliness - Dangers of Social Media - Positive Self Talk - Science of Sleep - Impact of Digital Devices on Sleep - Negative impact of Lack of Sleep

UNIT - 4 (Science of Addiction)

What is Addiction - Stages of Addiction - Neuroscience behind Addiction - Impact of Internet on Brain - Various Digital Addictions (Games, Shopping Online, Binge Watching, Social Media, Porn, etc) - Overcoming Addictions.

UNIT - 5 (Digital Detox Techniques)

Digital Hygiene - Tools for Self-Reflection - Impact of Exercise on Physical and Mental health - Digital Wellness Plan

Documentaries

Social Dilemma (by Netflix), Negative Impact of Internet (by PBS), Brain Fitness – I, II (by PBS), Brain that Changes itself

VI. Text Books:

1. Digital Wellness book published by Brahma Kumaris, 2024
2. Singhal, Aditi; Singhal, Sudhir & Kishore, Bala., How to Improve Concentration, Penguin eBury Press, 2020

VII. Reference Books:

1. James Clear., Atomic Habits, Random House Business Books, 2018
2. Naomi. S. Baron., How do we Read Now, OUP USA Publishing, 2021.
3. Cal Newport., Deep Work: Rules For Focused Success In A Distracted World, Piatkus Publishers, 2016

VIII. Class Schedule

Three 55-minute sessions per week.

IX. Relationship of Course Outcomes to Program Outcomes:

Course Outcomes	Program outcomes										
	a	b	c	d	e	f	g	h	i	j	k
1	**3**	**-**	**-**	**1**	**-**	**-**	**3**	**3**	**-**	**-**	**3**
2	**2**	**-**	**2**	**1**	**-**	**-**	**2**	**1**	**-**	**2**	**-**
3	**2**	**-**	**2**	**1**	**3**	**3**	**2**	**2**	**1**	**2**	**1**
4	**3**	**-**	**2**	**1**	**-**	**-**	**2**	**3**	**-**	**-**	**-**
5	**3**	**1**	**-**	**1**	**3**	**3**	**1**	**2**	**2**	**-**	**-**

X. Evaluation scheme

Component	Duration	Weightage
Sessional 1 & 2	1 hour each	15 + 15
Class tests/Assignments/Quiz etc. (TA)	-	20
End Semester Exam	3 hours	50

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, NAGPUR

Survey No. 140,141/1 behind Br. Sheshrao Wankhade Shetkari Sahkari Soot Girni,
Village - Waranga, Tahsil- Nagpur (Rural), District Nagpur, Maharashtra - 441108

Course Code:	**HUL 304**	**Course Title:**	**Professional Ethics**			
Category	**Core/ Elective**	**Credit Assigned**	**L**	**T**	**P**	**C**
			3	0	0	3
Pre-Requisite (if Any)	**Nil**	**Type of Course**	**Humanities/Social Sciences**			
Branch: CSE-DSA/OE **Semester: I/V**		**Course Coordinator: Mr. Vikrant Dhenge** **Email: vdhenge@iiitn.ac.in** **Contact: 8600949029**				

Course Outcomes:

After the successful completing of this course the students will be able to:

1. Define professional ethics associated with engineering profession.
2. Identify various types of ethics
3. Recognize the complimentary nature of ethics and human-machine interactions.
4. Illustrate the workplace responsibilities and ethical dilemmas associated with the engineering profession.
5. Demonstrate broad framework of responsible technology development and social impact of engineering solutions.

Course Contents:

Module 1: Basic concepts to understand Professional Ethics: Society, Social organization and Disorganization, Tradition and Modernization, Power and Social Justice, Values, Morality, Ethics, Human actions, Approaches to ethics.

Module 2: Types of Ethics: General ethics, Professional ethics**,** Legal ethics, Environmental ethics, Duty ethics and Right ethics, Corporate/Business ethics, Professional ethics in engineering profession, Code of Ethics in Engineering profession, Ethical Competency.

Module 3: Professional Responsibility and Ethical Dilemmas: Professional Responsibility, Social Responsibility, Corporate Social Responsibility, Ethical dilemmas, Resolving the ethical dilemmas, The conflict of interests, Whistle- blowing, ethical relativism, safety at work-place

Module 4: Technology Development and Professional Ethics: Appropriate Technology, Technology transfer and global justice, Surveillance, Issue of Privacy, Social impact of technology development and engineering solutions.

Module 5: Interactions between human and internet, Computer, data, and ethics, Data and sustainable development.

Case studies on corresponding modules for practical experiences.

Text Books:

1. Martin, M. W., & Schinzinger, R. (1989). *Ethics in engineering*. McGraw-Hill.
2. Camenisch, P.F. (1983). Grounding Professional Ethics in a Pluralistic Society, N.Y.: Haven Publications.
3. Gaur, R. R., Sangal, R., &Bagaria, G. P. (2010). *A Foundation Course in Human Values and Professionals Ethics*. Excel Books India.
4. World Bank. World development report 2021: Data for better lives. The World Bank; 2021 Jun 15.
5. Srinivasan, S., Comini, N. and Minges, M., 2021. The Importance of National Data Infrastructure for Low and Middle-Income Countries. *Available at SSRN 3898094*.
6. Pippa Norris. Digital Divide: Civic Engagement, Information Poverty and the Internet worldwide, Cambridge University Press, 2001.

References:

1. E.F. Schumacher, (1973). *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
2. Sussan George, (1976). *How the Other Half Dies*, Penguin Press
3. PL Dhar, RR Gaur, (1990). *Science and Humanism*, Commonwealth Publishers.
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. E G Seebauer& Robert L. Berry, (2000). *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press.
6. R R Gaur, R Sangal, G P Bagaria, (2009). *A Foundation Course in Value Education.*
7. Koehn, D. (1995). *The Ground of Professional Ethics*, Routledge.
8. N. Tripathy, (2003). *Human Values*, New Age International Publishers.
9. J. Timmons Roberts and Amy Bellone Hite, Eds. The Globalization and Development Reader: Perspectives on Development and Global Change, Blackwell: London, 2007 Amartya Sen, Development as Freedom, Anchor Books: New York, 1999
10. IT Governance: How Top Performers Manage IT Decision Rights for Superior Results Kindle Edition by Peter Weill (Author), JeanneW. Ross

Course Code	HUL 302	Course Title:	Technology, Innovation and Society			
Category	Elective	Credit Assigned	L	T	P	C
			3	0	0	3
Pre-Requisite (if Any)	Nil	Type of Course	Humanities and Social Sciences			

Course Outcomes:

The students will be able to:

1. Define technology, innovation and related components.
2. Describe the interrelationship between technology development and society.
3. Recognize the role of innovation and technology development in shaping society.
4. Illustrate the integration of IPR, Innovation and society.
5. Demonstrate the role of socio-cultural system in shaping innovation.

Course Contents:

Module 1: Technology: Defining Technology, Technological Determinism vs. Social Construction of Technology (SCOT), Actor-Network Theory, and Concept of Techno-science, Techno-capitalism, and Appropriate Technology.

Module 2: Innovation: Concept of Innovation, Types of Innovation: Product, Process, Marketing, Design, Inclusive Innovation, Innovation and Bottom of the Pyramid, Indian style of Innovation: Jugad, Indicators of Innovation, Diffusion of Innovation, National Innovation System.

Module 3: Technology and Innovation shaping Society: Case Studies exploring social, ethical questions arising from innovations in areas of AI, Information and Communication Technology, and Computer, Automation and work culture will be used to explore how technology development shapes social relationships.

Module 4: Society influencing development of new technology: it is not always that technology shapes the social relations, but social configurations are also reshaped by new technology and innovations. Here the focus is on how technology development facilitated by socio-cultural obligations, values, infrastructure, and human lifestyle. How culture facilitates innovation?

Module 5: Case studies will be discussed like traditional knowledge and IPR: a global issue of turmeric and neem patents, a webcam, mobile marketing, digital technology, social media and privacy, etc.

Text Books:

1. Johnson, D. G., & Wetmore, J. M. (2009). *Technology and society building our sociotechnical future*, Cambridge, Mass.: MIT Press
2. Wenda K. Bauchspies, Jennifer Croissant, Sal P. Restivo (2006). *Science, Technology, and Society: A Sociological Approach*, Blackwell.
3. J. Schumpeter, (1989).*The Theory of Economic Development*, Oxford University Press
4. Bijker, W. E. (2006). The vulnerability of technological culture. In *Cultures of Technology and the Quest for Innovation*. Berghahn Books.

References:

1. Robin Williams and David Edge, (1996). Social Shaping of Technology, *Research Policy Vol. 25, pp. 856-899*
2. Miller, D and Sinanan, J. (2014). *Webcam,* Polity Press,
3. Trevor Pinch and Wiebe Bijker, (Mar1981). The Social Construction of Facts and ArtifactsAbbe Mowshowitz, On Approaches to the Study of Social Issues in Computing, *Communications of the ACM, 24, no. 3 pp. 146-55*
4. J. Schumpeter, (1989). *The Theory of Economic Development*, Oxford University Press,
5. Donald Norman. (2002).*Inhuman devices - The Design of Everyday Things*, Basic Books,
6. Brian Martin, (1989). Computing and war, Peace & Change, *14, no. 2 pp. 203-222*
7. Edward Castronova, (2001). Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier, *CESifo working paper 618,*
8. Walsh, J. P., Kress, J. C., &Beyerchen, K. W. (2005). CK Prahalad: The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits. *Administrative Science Quarterly*, *50*(3), 473.

Course Code: HUL308		Course Title: Organizational Behaviour				
Category	**OC**	**Credit Assigned**	**L**	**T**	**P**	**C**
			3	0	0	3
Pre-Requisite (if Any)	**Nil**	**Type of Course**	**Humanities**			

Course Outcomes:

After completion of this course, the students will be able to:

1. Outline the basics of organizational behaviour and its implications on organization.
2. Identify the work related attitudes and significance of individual differences related to Personality, Emotions, Abilities and Functioning in organization.
3. Evaluate the human interactions in an organization, find what is driving it and influencing it for getting better results to attain business goals.
4. Demonstrate the dynamics of Leadership, its role in conflict resolution and developing organizational behaviour.
5. Discuss the organizational ethos and culture and its impact on productivity and well-being.

Course Contents:

Module 1: Introduction to organizational behaviour, Historical development of the field and some challenges in contemporary times, Learning and perceptual processes in organizations and their implications for work-life.

Module 2: Work related attitudes- Job Satisfaction, Organizational Commitment, Organizational Justice, Organizational Citizenship Behaviour, Individual differences related to Personality, Emotions, Abilities and Functioning in organization.

Module 3: Foundations of Group Behavior**,** Group processes in organizations, Formation of groups and teams, Effective team communication in organizations, Conflict and Negotiation.

Module 4: Social influence processes in organizations, Influencing people, Power Dynamics and Politics and Impact on organizational functioning, Theories and styles of leadership in organization and their impact on organizational functioning

Module 5: Organizational ethos and culture and their impact on productivity and well- being, Various kinds of organizational structures and their effectiveness, Managing organizations in times of change, Organizational stress, Managing the organizational stress in Post-COVID scenario, Managing the work-life balance, success and failure in organizational setup.

Text Books:

1. Aswathappa, Kalupally, and G. Sudarsana Reddy. Organisational behaviour. Vol. 20. Mumbai: Himalaya Publishing House, 2009.
2. Robbins, Stephen P., and Tim Judge. "Essentials of Organizational Behavior." (2012).

Reference Books:

1. Robbins, Stephen P., Timothy A. Judge, and Neharika Vohra. Organizational behaviour by pearson 18e. Pearson Education India, 2019.
2. Colquitt, Jason, J. A. Lepine, and M. J. Wesson. Organizational Behavior: Improving Performance and Commitment in the Workplace (4e). New York, NY, USA: McGraw-Hill, 2014.
3. Organizational Behavior: A Skill-Building Approach by by Dr. Christopher P. Neck, Jeffery D. Houghton, and Emma L. Murray
4. Team of Teams: New Rules of Engagement for a Complex World by Gen. Stanley McChrystal, Tantum Collins, et al
5. The Fearless Organization: Creating Psychological Safety in the Workplace for Learning, Innovation, and Growth by Amy C. Edmondson

Course Code	HUL 303	Course Title:	Policy, Governance and Development			
Category	Elective	Credit Assigned	L	T	P	C
			3	0	0	3
Pre-Requisite (if Any)	Nil	Type of Course	Humanities/Social Sciences			

Course Outcomes:

After the successful completion of the course, the students will be able to

1. Recognize the role of policy, and governance in the development
2. Explain concepts of policy, governance, administration and development
3. Define role of policy and administration in business development.
4. Explain role of technology in governance and development in India.

Course Contents:

Module 1: Democratic state, Concept of policy, its meaning and definition, Policy Framework, Nature of Policy Document, Stages in policy development, Types of policies: Inclusive and Exclusive policies.

Module 2: Governance: Meaning, definition, Types of governance, Characteristic features of governance, Major Governance initiatives of GoI, Public Administration and Governance, Role of people, civil societies, NGOs, technologies in good governance.

Module 3: Development: Meaning and definition, Types of Development: Social, economic, and human development, Approaches to development: top-down approach and bottom-up approach, Planning and development, Indian experiments with development, social dimension of economic development, Role of state, market, and civil societies in development. Role of technology in development.

Module 4: Policy, Governance, and development relationship, technology and democracy, electronic governance, electronic voting, electronic databases (UID), web portals, community radio, surveillance, etc.

Module 5: Case studies from relevant areas.

Text Books:

1) Cochran, C. L., & Malone, E. F. Public Policy: Perspectives and Choices. Rienner publisher, USA. 2014.

2) Alvin So, Social Change & Development, SAGE, 1992.

3) Fischer, Frank, and Gerald J. Miller, eds. Handbook of public policy analysis: theory, politics, and methods. Routledge, 2017.

4) Marc Galanter. Competing Equalities: Law and the Backward Classes in, Press, 1984Rajni Kothari, State Against Democracy: In Search of Humane Governance, 1988.

References:

1. Sugata Bose and Ayesha Jalal, Nationalism, Democracy and Development: State and Politics in India, Oxford University Press, Delhi, 1997.
2. Baxi, Upendra (eds.) (1988) Law and Poverty—Critical Essays. Bombay: N.M. TripathiPvt.Ltd
3. Frank Ackerman, David Kiron, and R. Goodwin eds. Human Well-Being and Economic Goals (Frontier Issues in Economic Thought, Vol 3), Press, , 1997
4. Pippa Norris. Digital Divide: Civic Engagement, Information Poverty and the Internet worldwide, Cambridge University Press, 2001.
5. Mehta, Prayag, A Psychological Strategy for Alternative Human Development, Sage Publications, 1998

Course Code	ASL 301	Course Title	Electronic Engineering Materials			
Category	Elective	Credit Assigned	L	T	P	C
			3	0	0	3
Pre-Requisite (if Any)	Basic concept of structure materials and Physics	Type of Course	Departmental elective offered for ECE			

Course Outcomes:

The students will be able to

1) To recall the concept of various properties of the material and their applications in designing electronic devices and components.
2) To analyse behaviour of dielectric and magnetic materials under various conditions.
3) To analyse behaviour of Conductive and superconducting materials under various conditions.
4) To identify the appropriate engineering materials considering its electrical, magnetic, other relevant properties, cost and safety factors for specific engineering applications
5) To learn to think and work like professional scientists and engineers.

Course Contents:

Module I: Dielectric Materials:

Dielectric properties of insulators in static fields, Polarization, Dielectric constant, Dielectric behavior of materials, Ferroelectric, Piezoelectric and Pyroelectric materials, Dielectric properties of insulators in alternating fields, Complex dielectric constant, Dipolar relaxation, Dielectric loss, Loss tangent, Dielectric break down, different types of capacitor and dielectric materials applications.

Module II: Magnetic Materials:

Magnetic materials classification, Soft and Hard magnetic materials, Ferrites, Magnetic cores of transformers, Relays, memory elements, Magnetic resistors and Magnetic tapes

Module III: Multiferroic Materials:

Introduction, Type of Multiferroic and few examples

Module IV: Conductive Materials:

Conductivity of pure metals and alloys, Temperature coefficient of resistivity, High conductivity materials, Fixed and variable resistors, Resistors used in electronic circuits.

Module V: Superconducting Materials:

Superconductivity, Type-I and Type-II superconductors, High temperature superconductivity, Applications of superconductivity.

Text Books:

1. Dekkar A.J.; Electrical Engineering Materials; Prentice Hall of India Publications, 1992

2. Seth S.P.; A course in Electrcal Engineering Materials; (Third edition) Dhanpatrai Publications, 2003

3. Kasap S.O.; Principles of Electronic Materials and Devices; Tata-Mcgraw-Hill, 2002

References:

1. Joshi M.A.; Electronic components and materials; SPD Publications

2. Pillai S.O.; Solid State Physics; New Age Publication, 1999

List of Lab Assignments / Experiments OR List of Tools on which the lab assignment should be based (If Any)

<table>
<tr><td>Course Code:</td><td>HUL 301</td><td>Course Title:</td><td>Technical Communication</td></tr>
<tr><td>Category :</td><td>Core</td><td>Credit Assigned</td><td><table><tr><td>L</td><td>T</td><td>P</td><td>C</td></tr><tr><td>3</td><td>0</td><td>0</td><td>3</td></tr></table></td></tr>
<tr><td>Pre-Requisite(If Any)</td><td>Nil</td><td>Type of Course</td><td>Humanities</td></tr>
<tr><td colspan="4">Course Outcomes:

After the successful completion of the course, the students will be able to:

1. Perceive the importance and objectives of technical communication and would develop understanding to effectively practice ethical principles of communication.
2. Interpret the role of the audience in effective communication.
3. Flourish the skills to carry out research and to produce effective research and workplace documents.
4. Develop skills to enhance visual appeal of documents and learn basic grammar rules/ mechanisms to bring accuracy in writing.
5. Elaborate the skills that would make them effective communicators during and after their placement.</td></tr>
<tr><td colspan="4">Course Contents:

Defining technical writing – Basics of Technical Communication – Barriers to Communication – Objectives Audience Recognition and Involvement

Correspondence: Memos - Letters – Job Search

Visual Appeal – Document Design – Graphics – Electronic Communication – Email – Online help and Websites

Technical Application: Descriptions – Instructions and User Manuals</td></tr>
</table>

Report Strategies: Research - Summary – Types of Reports

Oral Presentations and Group Discussion

Text:

1) Gersen S J and S M Gersen, Technical Writing: Process and Product, Pearson Education Asia

Reference;

1) Rutherford : Basic Communication Skills for Technology, Pearson Education Asia
2) Lesikar et al : Lesikar's Basic Business Communication, Tata McGraw Hill
3) Shirley Taylor: Communication for Business, Pearson Education Asia