

B.Tech ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CURRICULUM 2020-2021

(CHOICE BASED CREDIT SYSTEM)

Department of Computer Science and Engineering

FACULTY OF ENGINEERING



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act 1956)

Pollachi Main Road, Eachanari Post

Coimbatore-641201

List of PEOs, POs and PSOs

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- I. To perform well in their professional career by acquiring enough knowledge in the domain of Artificial Intelligence and Data Science.
- II. To improve communication skills, follow professional ethics and involve in team work in their profession.
- III. To update with evolving technology and use it for career advancement.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

- a) **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- b) **Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c) **Design/ Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- d) **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- e) **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- f) **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g) **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of

the engineering practice.

i) **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

j) **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

k) **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

l) **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

The ability to apply, analyse, design and develop the application software that meet the automation needs of society and industry.

The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success, real world problems and meet the challenges of the future.

DEPARTMENT ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
FACULTY OF ENGINEERING (FOE)
UG PROGRAM (CBCS)-B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
(2020-2021 Batch and Onwards)

COURSE CODE	NAME OF THE COURSE	CATEGORY	Objectives and Outcomes		Instruction hours/week			Credit(s)	Maximum Marks			Page No.
			PEOs	Pos	L	T	P		CIA	ESE	TOTAL	
SEMESTER I												
20BTAD101	Technical English – I	HS		(j,l)	3	1	0	4	40	60	100	1
20BTAD102	Mathematics-I (Matrices and Calculus)	BS		(a,b, c,d)	4	1	0	5	40	60	100	4
20BTAD103	Environmental Studies	MC		(a,b, f,g)	3	0	0	3	40	60	100	7
20BTAD141	Engineering Physics	BS		(a,b, c)	3	1	2	5	40	60	100	10
20BTAD142	Programming Logic and Design	ES		(a,b, c,d,e)	3	0	4	5	40	60	100	14
20BTAD111	Engineering Practices for Computer Sciences	ES		(a,b, e)	0	0	4	2	40	60	100	17
SEMESTER TOTAL					16	3	10	24	300	300	600	
SEMESTER II												
20BTAD201	Mathematics-II (Vector Calculus and Integral Transforms)	BS		(a,b, c,d)	4	1	0	4	40	60	100	19
20BTAD202	Fundamentals of Data Science	ES		(a,b, c,d,e)	3	0	0	3	40	60	100	21
20BTAD241	Technical English – II	HS		(j,l)	3	0	2	4	40	60	100	23
20BTAD242	Object Oriented Programming with Python	ES		(a,b, c,d)	3	0	2	5	40	60	100	27
20BTAD243	Data Preparation and Data Handling	ES		(a,b, c,d,e)	3	0	2	5	40	60	100	30
SEMESTER TOTAL					16	1	6	21	200	300	500	

SEMESTER III												
20BTAD301	Mathematical Foundations of Computing Sciences	BS			4	1	0	5	40	60	100	
20BTAD341	Database Management Systems	PC			3	0	4	5	40	60	100	
20BTAD342	Data Structures	PC			3	0	4	5	40	60	100	
20BTAD343	Fundamentals of Artificial Intelligence	ES			3	0	2	4	40	60	100	
20BTAD344	R Programming	ES			3	0	2	4	40	60	100	
20BTAD351	Internship – I	MC			-	-	2	1	100	-	100	
SEMESTER TOTAL					16	1	14	24	300	300	600	
SEMESTER –IV												
20BTAD401	Probability and Statistics	BS			4	1	0	5	40	60	100	
20BTAD402	Data Visualization	PC			3	0	0	3	40	60	100	
20BTAD441	Statistical Learning and its Applications	PC			3	0	2	4	40	60	100	
20BTAD442	Operating Systems	PC			3	0	2	4	40	60	100	
20BTAD443	Advanced Data Science	PC			3	0	2	4	40	60	100	
20BTAD4E xx	Elective I	PE			3	0	2	4	40	60	100	
SEMESTER TOTAL					19	1	8	24	240	360	600	
SEMESTER –V												
20BTAD501	Applied Linear Algebra	BS			4	1	0	5	40	60	100	
20BTAD502	Soft Computing in Data Science	PC			3	0	0	3	40	60	100	
20BTAD541	Machine Learning Techniques	PC			3	0	4	5	40	60	100	

20BTAD5E xx	Elective II	PE			3	0	4	4	40	60	100	
20BTAD551	Soft Skills	MC			-	-	3	-	100	-	100	
20BTAD552	Internship – II	MC			0	0	2	1	100	-	100	
SEMESTER TOTAL					13	1	13	18	360	240	600	
SEMESTER –VI												
20BTAD641	Deep Learning Methods	PC			3	0	2	4	40	60	100	
20BTAD642	Natural Language Processing	PC			3	0	2	4	40	60	100	
20BTAD643	Big Data Analytics	PC			3	0	2	4	40	60	100	
20BTAD6E xx	Elective III	PE			3	1	0	3	40	60	100	
20BTAD6E xx	Elective IV	PE			3	0	4	5	40	60	100	
20BTAD691	Mini Project – I	MC			-	-	2	1	100	-	100	
SEMESTER TOTAL					15	1	12	21	300	300	600	
SEMESTER –VII												
20BTAD741	Robotics and Automation	PC			3	0	2	4	40	60	100	
20BTAD7E xx	Elective V	PE			3	0	0	4	40	60	100	
20BTAD7E xx	Elective VI	PE			3	0	0	4	40	60	100	
---	Open Elective I	OE			3	1	0	4	40	60	100	
20BTAD751	Comprehension	MC			-	-	-	-	-	-	-	
20BTAD791	Project Work – Phase I	PW			0	0	4	2	40	60	100	
SEMESTER TOTAL					12	1	6	18	200	300	500	
SEMESTER –VIII												
20BTCC801	Principles of Management and	HS			3	0	0	3	40	60	100	

	Engineering Ethics											
----	Open Elective II	OE			4	0	0	4	40	60	100	
20BTAD891	Project Work – Phase II	PW			0	0	20	10	80	120	200	
SEMESTER TOTAL					7	0	20	17	160	240	400	
PROGRAM TOTAL								164				

LIST OF PROFESSIONAL ELECTIVES

COURSE CODE	NAME OF THE COURSE	CATEGORY	Objectives and Outcomes		Instruction hours/week			Credit(s)	Maximum Marks			Page No.
			PEOs	Pos	L	T	P		CIA	ESE	TOTAL	
Professional Electives for semester-IV Elective I												
20BTAD4E01	Advanced Data Structures	PE			3	0	4	4	40	60	100	
20BTAD4E02	Cloud Computing Techniques	PE			3	0	0	4	40	60	100	
20BTAD4E03	Mobile and Pervasive Computing	PE			4	0	0	4	40	60	100	
20BTAD4E04	Advanced Java Programming	PE			3	0	4	4	40	60	100	
20BTAD4E05	Design and Analysis of Algorithms	PE			3	0	4	4	40	60	100	
Professional Electives for semester-V Elective II												
20BTAD5E01	Information Storage and Management	PE			3	1	0	4	40	60	100	
20BTAD5E02	Dot Net Technologies	PE			3	0	0	4	40	60	100	
20BTAD5E03	Mobile Application Development	PE			3	0	2	4	40	60	100	
20BTAD5E04	Business Intelligence	PE			3	0	0	4	40	60	100	
20BTAD5E05	Internet of Things	PE			3	0	2	4	40	60	100	
Professional Electives for semester-VI Elective III & Elective IV												
20BTAD6E01	Enterprise Application	PE			3	0	0	3	40	60	100	
20BTAD6E02	Service Oriented	PE			3	0	0	3	40	60	100	

	Architecture											
20BTAD6E03	Open Source Technologies	PE			3	0	2	3	40	60	100	
20BTAD6E04	Cyber Forensics	PE			3	0	0	3	40	60	100	
20BTAD6E05	Human Computer Interaction	PE			3	0	0	3	40	60	100	
20BTAD6E06	Agile Methodologies	PE			3	0	0	3	40	60	100	
20BTAD6E07	Software Project Management	PE			3	0	0	3	40	60	100	
20BTAD6E08	Web Application Development Using Java	PE			3	0	4	5	40	60	100	
20BTAD6E09	Web Application Development Using Python	PE			3	0	4	5	40	60	100	
20BTAD6E10	DevOps in Java	PE			3	0	4	5	40	60	100	
20BTAD6E11	DevOps in Python	PE			3	0	4	5	40	60	100	
20BTAD6E12	Advanced Algorithms	PE			3	0	4	5	40	60	100	

Professional Electives for semester-VII Elective V & Elective VI

20BTAD7E01	Advanced Python Programming	PE			3	0	4	4	40	60	100	
20BTAD7E02	Advanced Database Management Systems	PE			3	0	4	4	40	60	100	
20BTAD7E03	Ethics for AI Engineers	PE			3	1	0	4	40	60	100	
20BTAD7E04	Software Quality Assurance and Testing	PE			3	0	0	4	40	60	100	
20BTAD7E05	E – Commerce Technology	PE			3	0	0	4	40	60	100	

20BTAD7E06	Practical Reinforcement Learning	PE			3	0	2	4	40	60	100	
20BTAD7E07	Drones Technology and its Applications	PE			3	0	2	4	40	60	100	
20BTAD7E08	Industry 4.0	PE			3	0	0	4	40	60	100	
20BTAD7E09	Blockchain and Cyber Security	PE			3	1	0	4	40	60	100	
20BTAD7E10	Bio Informatics	PE			4	0	2	4	40	60	100	
20BTAD7E11	Computer Vision	PE			3	0	2	4	40	60	100	
20BTAD7E12	Optimizations for Machine Learning	PE			3	0	2	4	40	60	100	

LIST OF OPEN ELECTIVES OFFERED BY OTHER DEPARTMENTS

COURSE CODE	NAME OF THE COURSE	CATEGORY	Objectives and Outcomes		Instruction hours/week			Credit(s)	Maximum Marks			Page No.
			PEOs	Pos	L	T	P		CIA	ESE	TOTAL	
Electrical & Electronics Engineering												
20BEEEOE01	Electric Hybrid Vehicles	OE	I	(a,b,c)	3	0	0	3	40	60	100	
Electronics & Communication Engineering												
20BEECOE05	Principles of Modern Communication System	OE	I,II	(a,d,g,h,j)	3	0	0	3	40	60	100	
Open Elective Courses Offered to other Departments												
20BTADOE01	Internet Programming	OE	I,III	(a,b,c,g,h)	3	0	0	3	40	60	100	
20BTADOE02	Machine Learning	OE	I,II	(a,b,g,h)	3	0	0	3	40	60	100	
LIST OF VALUE ADDED COURSES												

i) CATEGORY

1. BS-Basic Sciences
2. ES-Engineering Sciences

3. HS-Humanities and Sciences
4. PC-Professional Course
5. PE- Professional Elective
6. OE- Open Elective
7. PW-Project Work
8. MC-Mandatory Course

ii) PEOs -Programme Educational Objectives.

iii) PO-Programme Outcomes.

SEMESTER-I

20BTCC101

TECHNICAL ENGLISH – I

4H-4C

Instruction Hours/week: L:3 T:1 P:0

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

COURSE OBJECTIVES:

The goal of this course is for the students

- To recall the usage of grammar and understand the basic reading and writing skills.
- To emphasize on listening and develop speaking skills
- To engage in formal writing.
- To enrich the receptive and productive skills.
- To develop fluency in language.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- recall the usage of grammar and understand and implement reading and writing skills.
- know precise transition between sentences, ideas and paragraphs.
- apply the linguistic parameters in everyday speaking and listening effectively.
- detect the errors and restructure paragraphs and compose, compile and synthesize documents for various purposes.
- critically listen and interpret ideas and make effective presentation and participate in discussion

UNIT I

9

Grammar: Parts of Speech – Gerunds and infinitives

Reading: Reading comprehension : (vocabulary, referents, and inferences/conclusions).

Writing: Letter Writing (Formal and Informal) – Email Writing

UNIT II

9

Grammar: Tenses – Simple Present and Present continuous – Types of Sentences – Direct and Indirect – Connectives.

Reading: Identifying main and secondary information, transferring and interpreting information.

UNIT III **9**

Writing: Resume writing with cover letter – Check lists – Building Itineraries – Paragraph writing.

Speaking: Describing people, places, jobs and things – Self Introduction – Asking questions.

Listening: Listening comprehension – Telephone conversation – Job description

UNIT IV **9**

Grammar: Tenses: Perfect and Perfect continuous tenses – Reported speech – Active Passive - Identifying common errors.

Listening: Critical listening – Listening and Interpretation of ideas.

UNIT V **9**

Reading: Reading comprehension: Cause and effect identification, reconstruction, rewording.

Writing: Business letters – Creative writing – Memo – Notice – Agenda.

Speaking: Oral presentations – Group discussions.

TOTAL: 45+15

TEXT BOOKS:

1. Jack C Richards with Jonathan Hull and Susan Proctor I, Interchange Student's Book 1, Cambridge University Press, Fourth Edition, 2016.
2. Barun K Mitra, Effective Technical Communication, Oxford University Press, First Edition, 2017

REFERENCE BOOKS:

1. Jack C Richards, Interchange Student's Book 1, Cambridge University Press, Fourth Edition, 2015.
2. Raymond Murphy, Essential English Grammar, Cambridge University Press, Second Edition, 2016.
3. Ashraf Rizvi M, Effective Technical Communication, McGraw Hill Education, First Edition, 2013.
4. University of Cambridge BEC Preliminary 1 (Exam Papers with answers), Cambridge University Press, 2010.

WEB SITE:

1. www.onestopenglish.com
2. www.britishcouncil.org
3. www.learnenglishtoday.com
4. www.talkenglish.com
5. www.bogglesworldesl.com

SEMESTER-I**20BTAD102****MATHEMATICS - I**
(MATRICES AND CALCULUS)**5H-5C**

Instruction Hours/week: L:4 T:1 P:0**Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****COURSE OBJECTIVES:**

The goal of this course is for the students

- To compute eigenvalues and eigenvectors of real symmetric matrix.
- To acquaint the students with the concepts of functions of several variables and optimizing multivariate function.
- To make the students acquire sound knowledge in techniques of solving linear ordinary differential equations.
- To impart knowledge in definite integrals and Beta, Gamma integrals.
- To develop the knowledge in multiple integrals and its applications.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- identify a real symmetric matrix and diagonalize it by orthogonal transformation.
- solve extreme value problems with or without constraints.
- apply the knowledge of solving linear differential equations in order to solve engineering problems.
- make use of concept of definite integrals and Beta, Gamma functions in appropriate context of engineering problems.
- apply the concept of multiple integrals to find area and volume of any definite shape.

UNIT I**12**

Matrices: Eigenvalues and eigenvectors of a real matrix – Properties of eigenvalues – Statement and applications of Cayley-Hamilton theorem – Diagonalization by orthogonal reduction – Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II**12**

Functions of several variables: Partial derivatives – Total differential coefficients – Implicit functions – Jacobian – Properties – Maxima and minima of functions of two variables – Lagrange's method of constrained maxima and minima.

UNIT III**12**

Ordinary linear differential equations : Linear differential equation of second and higher order with constant coefficients – Euler-Cauchy linear differential equation – Method of variation of parameters.

UNIT IV**12**

Definite integrals: Properties of definite integrals – Applications – Bernoulli's extension formula – Beta and Gamma integrals – Properties – Applications.

UNIT V**12**

Multiple integrals: Evaluation of double integrals – Sketch the region of integration – Change of order of integration – Change of variables – Area using double integrals – Evaluation of triple integrals – Volume of solids.

TOTAL: 60+15**TEXT BOOKS:**

1. Ramana B V, Higher Engineering Mathematics, McGraw Hill Education, Twenty Ninth Reprint, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, Tenth Edition, 2017.

REFERENCE BOOKS:

1. Kandasamy P, Thilagavathy K and Gunavathy K, Higher Engineering Mathematics, S Chand and Co., First Edition, 2016.
2. Grewal B S, Higher Engineering Mathematics, Khanna Publishers, Forty Forth Edition, 2017.
3. Veerarajan T, Engineering Mathematics (For Semesters I and II), McGraw Hill Education, First Edition, 2017.
4. George Brinton Thomas and Ross L Finney, Calculus and Analytic Geometry, Pearson Publishers, Ninth edition, 2002.

WEB URLS:

1. www.nptel.ac.in/courses/122104018/
2. www.nptel.ac.in/courses/122101003/31
3. www.nptel.ac.in/courses/111107098/11
4. www.nptel.ac.in/courses/122101003/16
5. www.nptel.ac.in/courses/122104017/28

SEMESTER-I**20BTAD103****ENVIRONMENTAL STUDIES****3H-3C**

Instruction Hours/week: L:3 T:0 P:0**Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****COURSE OBJECTIVES:**

The goal of this course is for students to:

- Create the awareness about environmental problems among people.
- Develop an attitude of concern for the environment.
- Motivate public to participate in environment protection and improvement.
- Relate critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

- Demonstrate core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Identify concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Distinguish the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Analyse the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.

UNIT I – INTRODUCTION - ENVIRONMENTAL STUDIES & ECOSYSTEMS**9**

Environment Definition, Scope and importance; Ecosystem, Structure and functions of ecosystem. Energy flow, Food chains and food webs, Ecological succession. Classification of ecosystem. Forest ecosystem, Grass and Ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT II - NATURAL RESOURCES - RENEWABLE AND NON RENEWABLE RESOURCES 9

Natural resources - Renewable and Non – Renewable resources. Land resources and land use change, Land degradation, soil erosion and desertification. Forest resources - Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water resources - Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water. Use of alternate energy sources, growing energy needs, case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III - BIODIVERSITY AND ITS CONSERVATION 9

Levels of biological diversity - genetic, species and ecosystem diversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value. Biogeographical classification of India. Biodiversity patterns (global, National and local levels). Hot-spots of biodiversity. India as a mega-diversity nation. Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT IV - ENVIRONMENTAL POLLUTION 9

Definition, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution. Nuclear hazards and human health risks. Solid waste management and control measures of urban, industrial and e-wastes. Role of an individual in prevention of pollution. Case studies.

UNIT V - SOCIAL ISSUES AND THE ENVIRONMENT 9

Concept of sustainability and sustainable development. Water conservation - Rain water harvesting, watershed management. Climate change, global warming, ozone layer depletion, acid rain and its impacts on human communities and agriculture. Environment Laws (Environment Protection Act, Air Act, Water Act, Wildlife Protection Act, Forest Conservation Act). International agreements (Montreal and Kyoto protocols). Resettlement and rehabilitation of project affected persons. Disaster management (floods, earthquake, cyclones and landslides). Environmental Movements (Chipko, Silent valley, Bishnois of Rajasthan). Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). Human population growth: Impact on environment, human health and welfare.

Total : 45

SUGGESTED READINGS:

1. Anonymous. 2004. A text book for Environmental Studies, University Grants Commission and Bharat Vidypeeth Institute of Environmental Education Research, New Delhi.
2. Anubha Kaushik., and Kaushik, C.P. 2004. Perspectives in Environmental Studies. New Age International Pvt. Ltd. Publications, New Delhi.
3. Arvind Kumar. 2004. A Textbook of Environmental Science. APH Publishing Corporation, New Delhi.
4. Daniel, B. Botkin., and Edward, A. Keller. 1995. Environmental Science John Wiley and Sons, Inc., New York.
5. Mishra, D.D. 2010. Fundamental Concepts in Environmental Studies. S.Chand&CompanyPvt. Ltd., New Delhi.
6. Odum,E.P., Odum, H.T. and Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
7. Rajagopalan, R. 2016.Environmental Studies: From Crisis to Cure, Oxford University Press.
8. Sing, J.S., Sing. S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand & Publishing Company, New Delhi.
9. Singh, M.P., Singh, B.S., and Soma, S. Dey. 2004. Conservation of Biodiversity and Natural Resources.Daya Publishing House, New Delhi.
10. Tripathy. S.N., andSunakar Panda. (2004). Fundamentals of Environmental Studies (2nd ed.). Vrianda Publications Private Ltd, New Delhi.
11. Verma, P.S., and Agarwal V.K. 2001. Environmental Biology (Principles of Ecology).S.Chand and Company Ltd, New Delhi.
12. Uberoi, N.K. 2005. Environmental Studies. Excel Books Publications, New Delhi.

WEBSITES:

1. www.mit.edu
2. www.nptel.com

SEMESTER-I**20BTAD141****ENGINEERING PHYSICS****6H-5C****(Theory & Lab.)****Instruction Hours/week: L:3 T:1 P:2****Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****(i)Theory****COURSE OBJECTIVES**

The Goal of this course is for students to

- Inculcate the basics of properties of matter, sound and its applications.
- Basics of laser and optical fiber with appropriate applications.
- Disseminate the fundamentals of thermal physics and their applications.
- Introduce the concepts of quantum mechanics for diverse applications.
- Impart the basic knowledge of crystal and its various crystal structures.

Course COURSE OUTCOMES

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

- Understand the elastic nature of materials.
- Infer the characteristics of laser for various engineering applications.
- Extend the knowledge on optical fiber for communication purposes.
- Illustrate the thermal properties of materials through various methods.
- Develop the idea of quantum mechanics through applications.
- Identify the different atomic arrangements of crystals and its defects.

UNIT I – PROPERTIES OF MATTER AND SOUND**9**

Elasticity – basic definitions, stress - strain diagram - factors affecting elastic modulus and tensile strength – Poisson’s ratio – Twisting couple - Torsion pendulum- bending of beams – bending moment – young’s modulus – cantilever method, uniform and non-uniform bending – I- shaped girders.

Loudness, decibel, echo, reverberation, Sabine’s formula, Ultrasonic – Production, Industrial and medical applications.

UNIT II – LIGHT, LASER AND FIBER OPTICS**9**

Light – interference – reflection, refraction – Air wedge - LASER- Principle – characteristics - emission and absorption process - Einstein’s coefficients derivation. Types of LASER - Nd:YAG, CO₂, Semiconductor LASER- Applications of LASER in industry and medicine.

Fiber optics: Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle – types of optical fibers (Material, refractive index and

mode) – fiber optical communication system (block diagram) - Fiber optic sensors: pressure and displacement.

UNIT III – THERMAL PHYSICS

9

Introduction– thermal expansion of solids and liquids – expansion joints – bimetallic strips – Mode of heat transfer - heat conduction in solids – thermal conductivity – derivation, Phonons - Forbe’s and Lee’s disc method: theory and experiment – conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV – QUANTUM PHYSICS

9

Merits of quantum theory, Demerits of classical theory – Black body radiation, Photo electric effect – Compton scattering: experimental description, dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – Schrödinger’s wave equation – time dependent and time independent equations – particle in one dimensional box- physical significance of wave function, Scanning Electron Microscope, Transmission Electron Microscope.

UNIT V – CRYSTAL PHYSICS

9

Crystalline materials – types - unit cell, primitive cell, intercepts, interfacial angle - crystal systems, Bravais lattices, Miller indices – determination of inter-planar distances - Coordination number and packing factor for SC, BCC, FCC, HCP structures-crystal imperfections: point defect, line defect, surface and volume defect. Crystal growth techniques: Czochralski and Bridgman method.

Total Hours : 45

SUGGESTED READINGS

1. Bhattacharya D.K. & Poonam T., Engineering Physics, Oxford University Press, 2015.
2. Gaur R.K. and Gupta S.L, Engineering Physics, Dhanpat Rai Publications, 2012.
3. Pandey .B.K. & Chaturvedi .S, Engineering Physics, Cengage Learning India, 2012.
4. Halliday.D., Resnick R. & Walker. J, Principles of Physics, Wiley, 2015.
5. Charles Kittel, Kittel's Introduction to Solid State Physics, Wiley India Edition, 2019.
6. P.M. Mathews, K.Venkatesan, A text book of Quantum Mechanics, 2/e, Mc Graw Hill Education, 2017.
7. Laser Fundamentals, William T Silfvast, Cambridge Univ Press. 2012.
8. Fiber Optics and Optoelectronics, R P Khare, Oxford, 2012.
9. Daniel V.Schroeder, An Introduction to Thermal Physics, Pearson, 2014.
10. D.S. Mathur, Elements of properties of matter, S.Chand, 2010.

JOURNALS

1. Nature Physics.
2. Journal of Applied Mechanics (ASME).
3. Ultrasonics and sonochemistry (Elsevier).
4. Journal of Light wave Technology (IEEE).
5. Optics and Laser Technology (Elsevier).
6. Applied Thermal Engineering (Elsevier).

7. Physical Review B (American Physical Society).

WEBLINKS

1. <https://nptel.ac.in/courses/122/103/122103011/>
2. <https://nptel.ac.in/courses/113/104/113104081/>
3. <http://hyperphysics.phy-astr.gsu.edu/hbase/optmod/lascon.html>

(ii) Laboratory

Course Objective:

The goal of this course is for the students

- To learn the basic concepts in physics relevant to different branches of Engineering and Technology.

Course Outcome:

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

- To familiarize the properties of material and basic concepts in physics.

LIST OF EXPERIMENTS – PHYSICS (Any 10 Experiments)

1. Torsional pendulum – Determination of rigidity modulus of wire and moment of inertia of disc
2. Uniform bending (or) Non-uniform Bending – Determination of young's modulus.
3. Viscosity of liquids-Determination of co-efficient of viscosity of a liquid by Poiseuille's flow .
4. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
5. Laser- Determination of the wave length of the laser using grating, Acceptance angle of optical fiber.
6. Spectrometer- Determination of wavelength using grating.
7. Air wedge – Determination of thickness of a thin sheet/wire.
8. Lee's disc – Determination of thermal conductivity.
9. Determination of Band gap of a semiconductor.
10. Potentiometer – Determination of thermo emf of a thermo couple.
11. Characteristics of photo diode.
12. Particle size determination using LASER.

Total Hours: 30

SEMESTER-I**20BTAD142****PROGRAMMING LOGIC AND DESIGN****7H-5C****(Theory & Lab.)**

Instruction Hours/week: L:3 T:0 P:4**Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****i) Theory****COURSE OBJECTIVES:**

The goal of this course is for the students

- To understand the method of developing an algorithm and to understand the simple program design
- To analyse the loop structures
- To apply the concept of console I/O and arrays
- To learn the working of two dimensional arrays
- To evaluate the modularization concepts and storage classes

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- design programs with required logic and solve problems in engineering
- identify the working of loop structure.
- develop the programs in console I/O and arrays
- solve the programs using two dimensional array
- determine the working of modules and storage classes in real time applications

UNIT I**9**

Logic and Scenarios – Steps in program development – An introduction to algorithm and pseudocode – Structure of C program – Basic data types and sizes – Constants – Variables – Operators – Input/output statements – Algorithms using selection – If and else statements – The CASE Structure – Switch statement – Goto statement, an Introduction to SCRATCH tool .

UNIT II**9**

Loop -while-do while- for - break – continue – Types of I/O – Formatted I/O – Unformatted I/O functions – Header files – #include – Preprocessor directive – Macros.

UNIT III**9**

Conditional compilation statements – #line – #error – The minimum field width specifier – Scanset – Arrays – Declaration – Array operations – Declare array size using macro – Index range checking. Two dimensional – Multi-dimensional arrays – Application of arrays

UNIT IV**9**

Functions – Types – Reusability – User defined functions – Standard library functions. Function calls – Parameter passing – Call by value – Return statements – Arrays and functions – Recursive functions – Indirect – Direct – Tail – Recursion Vs iteration – Storage classes.

UNIT V**9**

Structures – initialization - nested structures – structures and arrays – structures and pointers - union – typedef and enumeration types - bit fields - File Management in C – Files and Streams – File handling functions – Sequential access file- Random access file – Command line arguments.

TOTAL: 45**TEXT BOOKS:**

1. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Prentice Hall, Second Edition, 2015.
2. Jeri R Hanly, Elliot B Koffman, Problem Solving and Program Design in C, Pearson Education , Eighth Edition, 2015.

REFERENCE BOOKS:

1. Herbert Schildt, C: The Complete reference, McGraw Hill, Fourth Edition , 2013.
2. David Griffiths and Dawn Griffiths, Head First C O'Reilly Media , First Edition, 2012.
3. Bryon S Gottfried, Programming with C, McGraw Hill, Second Edition, 2010.

WEB SITE:

1. www.hackerrank.com
2. www.codechef.com
3. www.learn-c.org
4. www.udemy.com
5. www.hackearth.com

ii) Laboratory

LIST OF EXPERIMENTS:

1. Programs on ranges of data types
2. Programs on constants and variables
3. Programs on operators
4. Programs on selection control structure
5. Programs using looping statements
6. Programs on console I/O functions
7. Programs using pre-processor directive
8. Programs on array operation
9. Programs using two dimensional array
10. Programs using inbuilt Functions
11. Programs using User Defined function and recursive function
12. Programs using storage classes

SEMESTER-I**20BTAD111 ENGINEERING PRACTICES FOR COMPUTER SCIENCES 4H-2C**

Instruction Hours/week: L: 0 T: 0 P:4 Marks: Internal:40 External:60 Total:100**End Semester Exam:3 Hours****COURSE OBJECTIVES:**

The goal of this course is for the students

- To check and measure Personal Computer's power supply voltage.
- To study the mother boards and various types of interface cards.
- To study and replaces hard disk.
- To study the different network cables and network devices.
- To assemble a Personal Computer.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- identify hardware components in a computer system
- evaluate non working computer system and suggest for repair.
- disassemble and reassemble a working computer.
- connect the computer in LAN environment.
- identify the network components.

LIST OF EXPERIMENTS**PC Hardware Servicing**

1. Demonstration of power supply requirement of Personal Computer.
2. Demonstration of Mother Boards.
3. Demonstration of various cards used in a Computer System viz. Display Card, Ethernet Card etc
4. Installation of I/O devices, interfacing and device driver.
5. Hard disk partition, defragmentation and installation.
6. Installation of OS (operating System), Software packages and programming development kits installation along with it.

7. Assembling a Personal Computer.

8. Assembling a Laptop.

Networking and configuring Networks

1. Demonstration of different types of network cables.

2. Demonstration of network devices in detail.

3. Assigning IP address to the PC.

4. Connects the computer in Local Area Network.

5. Study of basic network commands and configuration commands.

6. WiFi configuration in the PC

SEMESTER-II**20BTAD201****MATHEMATICS -II****5H-4C****(VECTOR CALCULUS AND INTEGRAL TRANSFORMS)**

Instruction Hours/week: L:4 T:1 P:0**Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****COURSE OBJECTIVES:**

The goal of this course is for the students

- To familiarize the concept of vector differential operator and its applications.
- To make the students to understand the concept of periodic function and represent them in Fourier series.
- To introduce the concept of Fourier transform techniques.
- To provide knowledge about the Laplace transform and their properties.
- To afford different techniques of finding inverse Laplace transform, which are useful in solving problems in basic engineering sciences.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- make use of concept of vector calculus in appropriate context in engineering fields.
- utilize Fourier series in appropriate context of engineering problems.
- build the solution of differential equations related to engineering fields with the help of Fourier transforms.
- use Laplace transform of standard functions in an appropriate context.
- apply inverse Laplace transform techniques and solve linear differential equations.

UNIT I**12**

Vector calculus: Vector differential operator – Gradient, divergence and curl – Identities (Statement only) – Directional derivative – Irrotational and solenoidal vector fields –Conservative vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving square, rectangle, cubes and rectangular parallelepipeds.

UNIT II**12**

Fourier series: Dirichlet’s conditions – Odd and even functions – Half range sine and cosine series – Parseval’s identity – Harmonic analysis.

UNIT III**12**

Fourier transforms: Statement of Fourier integral theorem – Complex Fourier transform – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity of Fourier transform.

UNIT IV**12**

Laplace transform: Transforms of standard functions – Transform of unit step function – Dirac-Delta function – Properties of Laplace transform – Transforms of derivatives and integrals – Initial and final value theorem – Transforms of periodic functions.

UNIT V**12**

Inverse Laplace transform : Inverse Laplace transforms of standard functions – Inverse Laplace transform using second shifting theorem – Method of partial fractions – Convolution theorem– Solution of ordinary differential equations with constant coefficients using Laplace transforms.

TOTAL: 60+15**TEXT BOOKS:**

1. Ramana B V, Higher Engineering Mathematics, McGraw Hill Education, Twenty Ninth Reprint, 2017.
2. Grewal B S, Higher Engineering Mathematics, Khanna Publishers, Forty Forth Edition, 2017.

REFERENCE BOOKS:

1. Kandasamy P, Thilagavathy K and Gunavathy K, Higher Engineering Mathematics, S Chand and Co., First Edition, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, Tenth Edition, 2017.
3. Veerarajan T, Transforms and Partial Differential Equation, McGraw Hill Education, Third Edition, 2016.
4. Manish Goyal and Bali N P, A textbook of Engineering mathematics, Laxmi publications, Eighth edition, 2011.

WEB URLS:

1. www.nptel.ac.in/courses/122104017/29
2. www.nptel.ac.in/courses/122107037/24
3. www.nptel.ac.in/courses/122107037/28
4. www.nptel.ac.in/courses/111105035/22
5. www.nptel.ac.in/courses//111105035/24

SEMESTER-II**20BTAD202****FUNDAMENTALS OF DATA SCIENCE****3H-3C**

Instruction Hours/week: L:3 T:0 P:0**Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****COURSE OBJECTIVES:**

The goal of this course is for the students

- To study the basic concepts of Data Science and data life cycle
- To understand the theoretical and mathematical aspects of Data Science models
- To learn common random variables and their uses, and with the use of empirical distributions
- To obtain the knowledge in data management tools
- To explore the major techniques for data science

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- Understand the key concepts in data science, including tools and approaches.
- Understand the concepts in data collection, sampling and probabilistic models
- Understand the various techniques in data science
- Apply the mathematical formulation of machine learning and statistical models to visualize the data in various methods.
- Apply a suitable data science technique to solve an information analytics problem.

UNIT I**9**

The Big Picture: What is Data Science? –The data life cycle: pre-processing, analysis, post-processing – Pre-processing: Data gathering, cleansing, visualization, and understanding (Mean, Variance, Standard Deviation, Percentiles.)–Data Storage (Relational databases, e.g. MySQL)

UNIT II**9**

Sampling – Probability Models for Statistical Methods: Discrete and continuous probability distributions, density functions. Random variables, expected values, variance, correlation.

UNIT III**9**

Data Normalization (z-values, transforms) –Random processes –Data Management: Tools for Data Analysis, Case Study: Data analysis using Python-Arrays, Visualization.

UNIT IV**9**

Major Techniques in Data Science: Data mining, Data warehousing, Data mining vs Data warehouse– Machine Learning- Supervised Learning, Unsupervised Learning.

UNIT V**9**

Business Intelligence –Descriptive Analytics, Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics– Cloud computing-definition, Cloud services, types of clouds, some of commercial and non commercial cloud service providers.

TOTAL: 45**TEXTBOOKS:**

1. Glenn J. Myatt, Wayne P. Johnson, Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining, John Wiley & Son Publication, Second Edition, 2014.
2. Saltz Jeffrey S, An Introduction to Data Science, Sage Publications Inc, Second Edition, 2019.

REFERENCE BOOKS:

1. Murtaza Haider, Getting Started with Data Science: Making Sense of Data with Analytics, IBM Press, First Edition, 2015.
2. Peter Bruce & Andrew Bruce, Practical Statistics for Data Scientists, O'Reilly Publication, First Edition, 2017.
3. Dawn Griffiths, Head First Statistics, O'Reilly Publication, First Edition, 2008.

WEB SITE:

1. <https://www.inferentialthinking.com/chapters/intro>
2. <https://www.openintro.org/stat/>
3. https://swayam.gov.in/nd1_noc20_cs36/preview
4. https://swayam.gov.in/nd1_noc19_cs60/preview
5. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/>

SEMESTER-II**20BTAD241****TECHNICAL ENGLISH – II****5H-4C****(Theory & Lab.)**

Instruction Hours/week: L:3 T:0 P:2**Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****i) Theory****COURSE OBJECTIVES:**

The goal of this course is for the students

- To make students realize the importance of writing reading and Listening.
- To understand the contexts of grammar and listening accompanied by fine reading skills in Speaking.
- To emphasize speaking in English through activities.
- To develop reading and writing skills through analysis of the facts between paragraphs.
- To enhance students' ability to listen and speak effectively in formal and informal contexts.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- identify and recognize the aspects of writing reading and Listening.
- comprehend the contents and reproduce the essence of it.
- apply the English speaking and listening skills in the social milieu.
- analyse and understand grammar and reading contexts
- apply the rules of writing and Speaking in formal and informal assignments.

UNIT I**9****Grammar:** Prepositions – Adjectives – Adverbs**Reading:** Skimming – Scanning.**Writing:** Paragraph writing: Compare and Contrast – Cause and Effect**Listening:** Types of Listening – Barriers to listening**UNIT II****9****Grammar:** Tenses – Use of sequence words – Modal Verbs**Reading:** Note making – Mind map – Cohesion and Coherence in reading

UNIT III

9

Writing: Paragraph writing – Jumbled sentences – Interpreting visual materials

Speaking: Role-play – Group interaction – Speaking in formal Situations

Listening: Listening and responding to video lectures – Listening to specific tasks – Focused Listening – Note taking

UNIT IV

9

Grammar: Concord – Use of Imperatives – WH Questions – Identifying common errors

Reading: Reading and Making inference – Reading and interpreting visual materials – Critical Reading – Shifting facts from opinions

Writing: Essay writing - Report – Proposals – Free writing

UNIT V

9

Speaking: Impromptu Speeches – Making presentations on given topics – Responding to questions – Mock interviews

Listening: Watching videos or documentaries and answering – Listening to different accents – Listening to Speeches

TOTAL: 45

TEXT BOOKS:

1. Jack C Richards with Jonathan Hull and Susan Proctor, Interchange Student's Book 2, Cambridge University Press, Fourth Edition, 2016.
2. Rajesh K Lidiya, Communication Skills, Oxford University Press, Second Edition, 2017.

REFERENCE BOOKS:

1. Meenakshi Raman and Sangeeta Sharma, Fundamentals of Technical Communication, Oxford University Press, First Edition, 2015.
2. Ashraf Rizvi M, Effective Technical Communication, McGraw Hill Education, First Edition, 2013.
3. Russel Whitehead and Micheal Black, Pass Cambridge BEC Vantage (Self Study Practice tests with key), Summertown Publishing, Second Edition, 2014.
4. University of Cambridge, BEC Vantage 4 (Exam Papers with answers), Cambridge University Press, Second Edition, 2010.

WEB SITE:

1. www.nonverbal.com.
2. www.onestopenglish.com.
3. www.eslflow.com.
4. www.myenglishpages.com.
5. www.ielts.net.com.

ii) Laboratory

LIST OF EXPERIMENTS:

1. Skimming and Scanning
2. Listening and Responding
3. Listening to different Accents
4. Movie review
5. Group discussion
6. Listening and paraphrasing.
7. Mock interview
8. Listening and note making
9. Presentation
10. Report Writing.

SEMESTER-II**20BTAD242****OBJECT ORIENTED PROGRAMMING WITH PYTHON
(Theory & Lab.)****5H-5C****Instruction Hours/week: L:3 T:0 P:2****Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****i) Theory****COURSE OBJECTIVES:**

The goal of this course is for the students

- To learn about basic python language syntax and semantics, control structures and data structures in python.
- To be comfortable using the built-in functions and creating user-defined functions in python.
- To understand the object oriented programming concepts in python.
- To gain knowledge in identifying relationships among classes in python.
- To learn how to handle exception and files in python.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- understand, define and explain the fundamental concepts of python programming.
- understand the basic concepts of object-oriented programming
- apply the knowledge of python programming concepts for developing basic applications.
- apply python programming concepts and to attain the appropriate conclusions.
- conduct experiments using object-oriented concepts in python for a given problem statement.

UNIT I**9**

Python Basics: Introduction to Python – Data types – Keywords – Expressions – Comments – Operators – Command line arguments – Control Statements – Break, Continue and Pass statement. Python Data Structures: String – Mutable vs immutable types – indexing and slicing – String functions. Tuple: Tuple operations – List – List operations – List as array – List comprehension. Set – Set operations – Dictionary – Dictionary operations.

UNIT II**9**

Functions: Python built-in functions – User defined functions – Creating function – Calling functions – Types of function arguments – Recursion and lambda or anonymous functions. Packages: Defining, Creating and Accessing a Package, importing packages and user defined modules.

UNIT III**9**

OOPS: Elements of OOP-Class, Object, Inheritance, Data Abstraction, Encapsulation, Polymorphism – UML Class diagram – access specifiers – Creating classes – Creating object – Accessing members – init() method – instance, static and class methods - Importance of self – Implementing encapsulation.

UNIT IV

9

Inheritance: Implementing inheritance – Types of inheritance. Polymorphism: Implementing polymorphism – Method overloading – Method overriding – Operator overloading. Abstraction: Abstract classes – Association and aggregation.

UNIT V

9

Exception handling: Errors vs exceptions – Handling exceptions – Raising exception – Creating user defined exception-Introduction to Files – File Path – Opening and Closing Files – Reading and Writing Files – File Position

CASE STUDY: Analyze a study why mobile network customer switch from one network to the other network, identify the root cause for the problem and suggest a suitable or viable solution to the telecom operator.

TOTAL: 45

TEXT BOOKS:

2. Allen B Downey, Think Python: How to Think Like a Computer Scientist, O'Reilly, Second Edition, 2016.
3. Guido van Rossum and Fred L Drake Jr, An Introduction to Python Revised and updated for Python 3.2, Network Theory Ltd., First Edition, 2011.
4. Dusty Phillips, Python 3 Object-oriented Programming, Packt Publishing, Third Edition, 2018.

REFERENCE BOOKS:

1. Mark Lutz, Learning Python, O'Reilly Media, Fifth Edition 2013.
2. Mark Summerfield, Programming in Python 3, Dorling Kindersley India Pvt. Ltd., First Edition, 2009.

WEB URLS:

1. www.docs.python.org/3.5/
2. www.programiz.com/python-programming
3. www.pythonspot.com/
4. www.learnpython.org/
5. www.developers.google.com/edu/python/

ii) Laboratory

LIST OF EXPERIMENTS:

1. Programs using operators and control statements.
2. Programs using string operations.
3. Programs using tuple and list.
4. Programs using set and dictionary.
5. Programs using built-in functions.
6. Implementing user defined functions with various parameter options
7. Implementation of class and objects.
8. Implementation of inheritance and association.
9. Implementation of overloading and overriding.
10. Implementation of Exception handling and File handling

SEMESTER-II**20BTAD243****DATA PREPARATION AND DATA HANDLING
(Theory & Lab.)****5H-5C**

Instruction Hours/week: L:3 T:0 P:2**Marks: Internal:40 External:60 Total:100****End Semester Exam:3 Hours****i) Theory****COURSE OBJECTIVES**

The goal of this course is for the students

- To study the basic concepts of Visualization, Data Analysis with visualization and important of visualization role in solving complex data solutions.
- To understand the importance of Visual Analytics and explore the various charts features and techniques used for Visualization.
- To gain visualization concepts of creating simple as well as complex visualizations in various tools.
- To understanding how to establish connection with data and perform various data.
- To explore Data Analysis with charts and Dashboards.

COURSE OUTCOMES

Upon completion of this course the students will be able to:

- understand, define and explain to the process to load the dataset into the analytics tools to visualize perfectly.
- apply the various statistical and mathematics functions in the analytical tool to visualize the data for users need.
- analyze the dataset with charts and export as a dashboard, reports.
- conduct experiments to load multiple tables and perform join operation to visualize the data in different tools.
- design, visualize and create a dynamic storytelling dashboard with analytic tools.

UNIT I**9**

Introduction to Data Visualization and Visual Analytics Data Visualization - Establishing Connection - Joins - Union- Data Blending - Managing Extracts - Managing Metadata - Visual Analytics - Data Granularity using Marks Card - Visual Analytics in Depth I - Visual Analytics in Depth II – Sorting – Filtering – Grouping - Graphical Visualization – Sets – Forecasting – Clustering - Trend Lines - Reference Lines – Parameters - Mappings - Dashboard Layout - Designing Dashboard for Devices - Dashboard Interaction - Using Action,- Introduction to Story Point, Introduction to Maps – Editing Unrecognized Locations -Web Mapping Services. Background Images.

UNIT II **9**

Data Sources BI Desktop -Query Editor -Combining Data – Merging and Appending-Modelling Data-Cross Filter Direction-Matrixes and tables Slicers.

UNIT III **9**

Map Visualizations-Gauges and Single Number Cards-Modifying colors in charts and visuals -Shapes, text boxes, and images-Page layout and formatting-KPI Visuals-Z-Order-Dashboard vs. Reports-R Integration in BI

UNIT IV **9**

Data Ingestion - Report Interface – QVS, QVW and .log files - Sheet Objects - Dimensions and Expressions - Presentation/ Layout / Sort tabs - Scripting - Script Toolbar - Script Menu Commands - Variables (Set,Let) and Fields - Adding Sheet Objects - Inline table -

UNIT V **9**

Function (Sum, Avg, Count, Date, etc) - Slider Text Box, Calendar Box, Current Selections Box - Bar chart, line, combo, radar, scatter, grid, pie, funnel, block, gauge, mekko - Management console: Server, Publisher.

TOTAL : 45

TEXT BOOKS:

1. N. Milligan, Learning Tableau by Joshua, Packt, First Edition, 2019.
2. Brett Powell, Microsoft Power BI Cookbook Packt, First Edition, 2017.

REFERENCE BOOKS:

1. Kieran Healy, Data Visualization – A Practical Introduction, Paperback – Import, 2019.
2. Devin Knight, Microsoft Power BI Complete Reference: Bring your data to life with the powerful features of Microsoft Power BI, Packt First Edition, 2018.

WEB URLS:

1. www.r-bloggers.com
2. www.docs.microsoft.com/en-us/power-bi/guided-learning
3. <https://optimalbi.com/blog/2017/10/05/beginners-guide-to-learning-qlik-sense-part-1>
4. www.analyticsvidhya.com/learning-paths-data-science-business-analytics-business-intelligence-big-data/qlikview-learning-path/
5. www.data-flair.training/blogs/bi-tool-for-big-data-visualization/

ii) Laboratory

List of Experiments:

1. Multiple data Joins for different workbooks
2. Data visualization using Demonstrate Hierarchies, Data Granularity and Highlighting features
3. Create Interactive Dashboards using actions
4. Publishing Workbooks to Tableau Online
5. Create a Map and assign Geographic locations to the fields
6. By Use the KPI Visuals create a visualization for location based Data set
7. Configuring a Dashboard in Power bi
8. Downloading and Installing QlikView
9. Using QlikView Operations: Concatenate, If statement create a script to visualization
10. QlikView visualization charts: Bar, line, Combo, Radar, Scatter, Pie, Grid, Funnel & Mekko.