AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IOIT)
ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognised by Govt. of Maharashtra
Accredited by NAAC with "A+" Grade | NBA - 5 UG Programmes

ACADEMIC COURSE STRUCTURE

AND

DETAILED SYLLABUS OF

SECOND YEAR

INFORMATION TECHNOLOGY

B.TECH 4 YEAR UG COURSE
(Applicable for the batches admitted from 2022-2023)

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY
Kennedy Road, Near RTO,
Pune – 411 001, Maharashtra State, India
Email: principal@aissmsioit.org, Website:
https://www.aissmsioit.org

Institute Vision & Mission

Vision

To be recognized amongst top 10 private engineering colleges in Maharashtra by the year 2026 by rendering value added education through academic excellence, research, entrepreneurial attitude, and global exposure.

Mission

- To enable placement of 150 plus students in the 7 lacs plus category & ensure 100% placement of all final year students.
- To connect with 10 plus international universities, professional bodies, and organizations to provide global exposure students.
- To create conducive environment for career growth, prosperity, and happiness of 100% staff.
- To be amongst top 5 private colleges in Pune in terms of admission cut off.

Quality Policy

We commit ourselves to provide quality education & enhance our students quality through continuous improvement in our teaching and learning processes.

Department Vision & Mission

Vision

To be a leader in preparing technically competent and skilful IT Graduates to address the needs of industry and society.

Mission

- To prepare students for employment/entrepreneurship/higher studies through curricular, extracurricular and extension activities.
- To promote research and professional activities through industry involvement and professional bodies
- To instil professional ethics and lifelong learning skills with concern for the society.

Program Educational Objectives (PEOs)

Graduates will

- Excel in diverse career paths with core professional skills.
- Engage in multi domain research/professional activities.
- Cater to the needs of society with IT solutions/applications.

Program Outcomes(POs)

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. [Engineering knowledge]
2. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. [Problem analysis]
3. 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. [Design/development of solutions]
4. 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. [Conduct investigations of complex problems]
5. 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. [Modern tool usage]
6. 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. [The engineer and society]
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. [Environment and sustainability]
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. [Ethics]
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. [Individual and team work]
10. 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. [Communication]
11. 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. [Project management and finance]
12. 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. [Life-long learning]

Program Specific Outcomes (PSOs)

Graduates will be able to

1. Use database, networking and programming technologies for solving real life problems.
2. Develop applications in the field of computing, networking, security and analytics.

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week 2 Hours Practical (Lab)/week	**0.5** credits 1 credit

B. Range of credits –

A range of credits from 150 to 160 for a student to be eligible to get Undergraduate degree in Engineering. A student will be eligible to get Undergraduate degree with Honors or additional Minor Engineering, if he/she completes an additional 20 credits.

C. Credit for Undergraduate Degree in Information Technology

Sr. No.	Year	Semester	Credits
1	First Year	I	24
2		II	22
3	Second Year	III	23
4		IV	25
5	Third Year	V	23
6		VI	25
7	Final Year	VII	16
8		VIII	16
Total Credits			**174**

D. Structure of Undergraduate Engineering program

Sr. no.	Domains	Code	Credits	AICTE Suggested
1	Humanities and Social Sciences including Management courses	HSMC	16	12
2	Basic Science courses	BSC	25	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	ESC	31	24
4	Professional core courses	PCC	50	48
5	Professional Elective courses relevant to chosen specialization/branch	PEC	18	18
6	Open subjects – Electives from other technical and /or emerging subjects	OEC	19	18
7	Project work, seminar and internship in industry or elsewhere	PROJ	15	15
Total			**174**	**160**

E. Semester wise credit details for Undergraduate Engineering program

Sr. no.	Code	Credits									
		Semesters								Total	AICTE
		I	II	III	IV	V	VI	VII	VIII		
1	HSM	1	1	3	4	3	4	-	-	**16**	**12**
2	BSC	9	8	4	4	-	-	-	-	**25**	**25**
3	ESC	14	13	4	-	-	-	-	-	**31**	**24**
4	PCC	-	-	9	14	12	13	2	-	**50**	**48**
5	PEC	-	-	-	-	5	5	8	-	**18**	**18**
6	OEC	-	-	3	3	3	3	3	4	**19**	**18**
7	PRO	-	-	-	-	-	-	3	12	**15**	**15**
Total Credits		**24**	**22**	**23**	**25**	**23**	**25**	**16**	**16**	**174**	**160**
Exam Total		**700**	**700**	**725**	**725**	**725**	**725**	**700**	**700**	**5700**	-
Total Working Hours per Week		**31**	**29**	**27**	**27**	**26**	**29**	**21**	**26**		-

F. Honors[Major] Course Structure: Cyber Security

Sr. No.	Courses Name	Sem.	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1	Information Security and Audit Monitoring	5th	3	-	-	3	40#	60*	-	-	-	100
2	Information Security and Audit Monitoring Lab	5th	-	-	4	2	-	-	25	-	25	50
3	Database Security	6th	3	-	-	3	40#	60*	-	-	-	100
4	Database Security Lab	6th	-	-	4	2	-	-	25	-	25	50
5	Cloud Security	7th	3	-	-	3	40#	60*	-	-	-	100
6	Cloud Security Lab	7th	-	-	4	2	-	-	25	25	-	50
7	Cyber Crime Investigation and Digital Forensics	8th	3	-	-	3	40#	60*	-	-	-	100
8	Cyber Crime Investigation and Digital Forensics Lab	8th	-	-	4	2	-	-	25	25	-	50
Total			12	-	16	20	160	240	100	50	50	600

G. Minor Course Structure: Software Development Technologies

Sr. No.	Courses Name	Sem	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1	Data Structure and Algorithms	3rd	3	-	-	3	40#	60**	-	-	-	100
2	Data Structure and Algorithms Lab	3rd	-	-	4	2	-	-	25	-	25	50
3	Object Oriented Programming	4th	3	-	-	3	40#	60**	-	-	-	100
4	Object Oriented Programming Lab	4th	-	-	4	2	-	-	25	-	25	50
5	Software Engineering & Project Management	5th	3	-	-	3	40#	60*	-	-	-	100
6	Software Engineering & Project Management Lab	5th	-	-	2	1	-	-	25	25	-	50
7	Cloud Computing	6th	3	-	-	3	40#	60*	-	-	-	100
8	Cloud Computing Lab	6th	-	-	2	1	-	-	25	25	-	50
Total			12	-	12	18	160	240	100	50	50	600

H. Lifelong Learning Skills Courses

Lifelong Learning Skills I, II, courses introduced in 4th sem. where all the students are required to acquire 2 credits, one each from **Extracurricular Activities** and **Co-curricular Activities** respectively which will have grades as below. Activity Certificate obtained during SY B-Tech. (Sem-III or SEM-IV) will only be considered in 4th semester.

A. Extracurricular Activities:

Sr. No.	Activity	Level	Achievement	Grade	Achievement	Grade
1.	Sports	Inter collegiate	Participation	P	Prize winner	C
		University	Participation	C	Prize winner	B
		Zonal	Participation	B	Prize winner	B+
		State	Participation	B+	Prize winner	A
		National	Participation	A	Prize winner	A+
		International	Participation	A+	Prize winner	O
2.	NSS/NCC	Camp	Attended	B		
		Camp + 5 Activities	Attended	B+		
		Camp + 10 Activities	Attended	A		
		Camp + 15 Activities	Attended	A+		
		Camp + 20 Activities	Attended	O		
3.	Cultural	Inter collegiate	Participation	B	Prize winner	B+
		State	Participation	B+	Prize winner	A
		National	Participation	A	Prize winner	A+

		International	Participation	A+	Prize winner	O
4.	Community Engagement	Certified by NGO/Authorities with report and geo-tagged photograph	1 Activity	B		
			2 Activities	B+		
			3 Activities	A		
			4 Activities	A+		
			5 Activities	O		

B. Co-curricular Activities:

Sr. No	Activity	Level	Achievement	Grade	Achievement	Grade
1.	Conference	National	Participation	B	Prize winner	A
		International	Participation	B+	Prize winner	A+
		International (Scopus indexing)	Participation	A+	Prize winner	O
2.	Journal Publication	Non-refereed but recognized and reputed journal/ periodical, having ISSN number.	Publication	B		
		Refereed Journal - As listed by UGC	Publication	A		
		Refereed Journals- As listed by Scopus	Publication	A+		
		Refereed Journals - As listed by SCI/ SCIE	Publication	O		
3.	Hackathon		Participation	A+	Prize winner	O
4.	Professional Body	National	Membership	P	3rd Prize	A
			Activities/participation	B	2nd Prize	A+
			5 participations	B+	1st Prize	O
5.	Internship	1 week	Completed	C		
		2 week	Completed	B		
		3 week	Completed	B+	Sponsored Project	A+
		4 week	Completed	A	Job through internship	O
6.	Entrepreneurship	Awareness camp	Attended	A	Product Developed	A+
					Own Startup	O
7.	Project/Technical events	Inter collegiate	Participation	P	Prize winner	C
		University	Participation	C	Prize winner	B
		Zonal	Participation	B	Prize winner	B+
		State	Participation	B+	Prize winner	A
		National	Participation	A	Prize winner	A+
		International	Participation	A+	Prize winner	O

Any activity other than listed above but having equal weightage should be considered for getting additional credit.

Information Technology - Second Year (Semester –III)

Sr. No.	Code	Course Title	Hours per week			Credits	Examination scheme					
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	Total
1	ITHSM301	Democracy, Election and Governance	2	-	-	2	-	-	25	-	25	50
2	ITBSC302	Discrete Mathematics	3	1	-	4	40#	60*	-	-	-	100
3	ITESC303	Digital Electronics & Computer Organization	3	-	-	3	40#	60*	-	-	-	100
4	ITPCC304	Data Structure and Algorithms	3	-	-	3	40#	60**	-	-	-	100
5	ITPCC305	Database Management System	3	-	-	3	40#	60*	-	-	-	100
6	ITOEC306	Human Computer Interaction [MOOCs]	3		-	3	40$	60$$	-	-	-	100
7	ITESC307	Digital Electronics & Computer Organization Lab	-	-	2	1	-	-	25	25	-	50
8	ITPCC308	Data Structure and Algorithms Lab	-	-	4	2	-	-	25		25	50
9	ITPCC309	Database Management System Lab	-	-	2	1	-	-	25	25		50
10	ITHSM310	Audit course - Vedic Mathematics	1	-	-	1	-	-	25	-	-	25
Total			**18**	**01**	**08**	**23**	**200**	**300**	**125**	**50**	**50**	**725**

* **End Semester Examination (ESE)** based on subjective questions.

** **Practical or Activity based Evaluation.**

\# **In Semester Evaluation(ISE)** based on Presentation/Group Discussion/Laboratory Work/Course Project/Home Assignment/Comprehensive Viva Voce/Blog Writing/Case Study/Survey/Multiple-Choice Question (MCQ) examination/Subjective Examination

$ **For MOOCs:** Assignments marks will be converted on the scale of 40 marks.

$$ **For MOOCs:** Score of examination conducted by the respective authority of MOOC or Score of ESE Conducted by Institute will be converted on the scale of 60 marks.

MOOC: Design & Implementation of Human-Computer Interfaces: (12 weeks)

https://onlinecourses.nptel.ac.in/noc22_cs125/preview

Information Technology - Second Year (Semester –IV)

Sr. No.	Code	Course Title	Hours per week			Credits	Examination scheme					
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	Total
1	ITHSM401	Management Information System	1	1	-	2	-	-	25	-	25	50
2	ITBSC402	Probability and Statistics	3	1	-	4	40#	60*	-	-	-	100
3	ITPCC403	Object Oriented Programming	3	-	-	3	40#	60**	-	-	-	100
4	ITPCC404	Processor Architecture and Interfacing	3	-	-	3	40#	60*	-	-	-	100
5	ITPCC405	Computer Graphics and Animation	3	-	-	3	40#	60*	-	-	-	100
6	ITOEC406	Organizational Behavior [MOOCs]	3	-	-	3	40$	60$$	-	-		100
7	ITPCC407	Object Oriented Programming Lab	-	-	4	2	-	-	25	-	25	50
8	ITPCC408	Processor Architecture and Interfacing Lab	-	-	2	1	-	-	25	25		50
9	ITPCC409	Computer Graphics and Animation Lab	-	-	2	1	-	-	25	25	-	50
10	ITHSMEC1	Lifelong Learning Skills -I	-	-	-	1	-	-	-	-	-	@
11	ITPCCCC1	Lifelong Learning Skills -II	-	-	-	1	-	-	-	-	-	@
12	ITHSM410	Audit course- Sustainable Development Goals	1	-	-	1	-	-	25	-	-	25
Total			**17**	**02**	**08**	**25**	**200**	**300**	**125**	**50**	**50**	**725**

* **End Semester Examination (ESE)** based on subjective questions.

** **Practical or Activity based Evaluation.**

\# **In Semester Evaluation(ISE)** based on Presentation/Group Discussion/Laboratory Work/Course Project/Home Assignment/Comprehensive Viva Voce/Blog Writing/Case Study/Survey/Multiple-Choice Question (MCQ) examination/ Subjective Examination.

$ **For MOOCs:** Assignments marks will be converted on the scale of 40 marks.

$$ **For MOOCs:** Score of examination conducted by the respective authority of MOOC or Score of ESE Conducted by Institute will be converted on the scale of 60 marks.

@ Refer Sub heading H Lifelong Learning Skill courses for grades.

MOOC: Organizational Behaviour (12 weeks)
https://onlinecourses.nptel.ac.in/noc20_mg51/preview

Second Year Information Technology (2022 Course) Democracy, Election and Governance			
Course Code:	**ITHSM301**	**Credit**	**2**
Contact Hours:	2 Hrs/week (L)	**Type of Course:**	Lecture
Examination Scheme	Term-work 25 marks	Oral 25 marks	

Pre-requisites:

-

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term-work	Internal	25
2.	Oral	Internal	25

Course Objectives	
1	To introduce the students meaning of democracy and the role of the governance.
2	To help the understand the various approaches to the study of democracy and governance

Course Outcomes : Students will be able to	
301.1	Know the meaning of democracy and the role of the governance in life.
301.2	Understand the various approaches to the democracy and governance

Topics covered:

UNIT-I: DEMOCRACY-FOUNDATIONANDDIMENSIONS (5 hrs.)

a. Constitution of India
b. Evolution of Democracy-Different Models
c. Dimensions of Democracy-Social, Economic, and Political

UNIT-II: DECENTRALIZATION (5 hrs.)

a. Indian tradition of decentralization
b. History of panchayatRaj institution in the lost independence period
c. 73rdand74thamendments
d. Challenges of caste, gender, class, democracy and ethnicity

UNIT-III: GOVERNANCE (5 hrs.)

a. Meaning and concepts
b. Government and governance
c. Inclusion and exclusion

ACTIVITY:

1. Individual Student will prepare poster on governance and democracy based on current affairs.
2. Student will participate in Model of United Nation (MUN) activity conducted in class under the supervision of teacher.

Text books

1. Banerjee-Dube, I. (2014). A history of modern India. Cambridge University Press.
2. Basu, D. D. (1982). Introduction to the Constitution of India. Prentice Hall of India.
3. Bhargava, R. (2008). Political theory: An introduction. Pearson Education India.

4. Bhargava, R., Vanaik, A. (2010) Understanding Contemporary India: Critical Perspective. New Delhi: Orient Blackswan.
5. Chandhoke. N., Proyadardhi.P, (ed) (2009), 'Contemporary India: Economy, Society, Politics', Pearson India Education Services Pvt. Ltd, ISBN 978-81- 317-1929-9.
6. Chandra, B. (1999). Essays on contemporary India. Har-Anand Publications.
7. Chaterjee, P. (1997). State and Politics in India.
8. Dasgupta. S., (ed) (2011), 'Political Sociology', Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in south Asia. ISBN: 978-317-6027- 7.
9. Deshpande, S. (2003). Contemporary India: A Sociological View, New Delhi:Viking Publication.
10. Guha, R. (2007). India After Gandhi: The History of the World's Largest. Democracy, HarperCollins Publishers, New York.
11. Guha, R. (2013). Gandhi before India. Penguin UK.
12. Jayal. N.G. (2001). Democracy in India.New Delhi: Oxford University Press.
13. Kohli, A. (1990). Democracy and discontent: India's growing crisis of governability. Cambridge University Press.
14. Kohli, A., Breman, J., & Hawthorn, G. P. (Eds.). (2001). The success of India's democracy (Vol. 6). Cambridge University Press.
15. Kothari, R. (1989). State against democracy: In search of humane governance. Apex Pr.
16. Kothari, R. (1970). Politics in India. New Delhi: Orient Blackswan.
17. Kothari, R. (1995). Caste in Indian politics. Orient Blackswan.
18. Sarkar, S. (2001). Indian democracy: the historical inheritance. the Success of India's Democracy, 23-46.

मराठी संदर्भ ग्रंथ:

१. राही श्रुती गणेश., आवटे श्रीरंजन, (२०१९), *'आपलं आयकार्ड'*, सुहास पळशीकर द युनिक अकॅडमी पब्लिकेशनप्रा.लि.,.

२. व्होरा राजेंद्र., पळशीकर, सुहास.(२०१४). *भारतीय लोकशाही अर्थ आणि व्यवहार.* पुणे : डायमंड प्रकाशन.

३. सुमंत, यशवंत.(२०१८). *प्रा. यशवंत सुमंत यांची तीन भाषणे.* पुणे : युनिक अँकॅडमी पब्लिकेशन्स प्रा.लि

४. भोळे. भा.ल. (२०१५). *भारतीय गणराज्याचे शासन आणि राजकारण.* नागपूर: पिंपळापुरे बुक प्रकाशन

५. कसबे. रावसाहेब. (२०१०)डॉ. आंबेडकर आणि भारतीय राज्यघटना. पुणे: सुगावा प्रकाशन

Note: The assessment for the subject shall be based on presentation and report submission.

Second Year Information Technology (2022 Course) Discrete Mathematics			
Course Code:	**ITBSC302**	**Credit**	**4**
Contact Hours:	3 Hrs/week (L) 1 Hr (Tutorial)	**Type of Course:**	Lecture/Tutorial
Examination Scheme	In-sem. Evaluation 40 Marks	End-sem. Examination 60 Marks	

Pre-requisites:

- Engineering Mathematics-I
- Engineering Mathematics-II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-Sem. Evaluation	Internal	40
2.	End Semester Examination	External	60

Course Objectives

1	To gain sound knowledge to formulate and solve problems with sets and Sequences.
2	To solve counting problems by applying elementary counting techniques to solve problems of discrete probability.
3	To apply Graph and Tree terminologies in real life problems.
4	To recognize types of relation, formulate and solve problems with relations and functions.
5	To describe basics of number theory and its applications.
6	To describe the various types' algebraic structures and its applications.

Course Outcomes: Students will be able to

302.1	Use numbers and set theory to solve mathematical problems.
302.2	Apply the probability theory to solve combinatorial problems.
302.3	Apply the concepts of tree and graph theory to devise mathematical models.
302.4	Apply relations and functions to provide solution to computational problems.
302.5	Use techniques of number theory and its application.
302.6	Explain algebraic structure.

Topics covered:

UNIT I: SETS AND SEQUENCES: DATA MODELS (6 hrs.)
Finite Sets, Power Set, Cardinality of finite sets, Cartesian Product, Properties of Sets, Vector Implementations of Sets.

UNIT II: COMBINATORICS AND DISCRETE PROBABILITY (6 hrs.)
Combinatorics: Rules of Sum and Product, Permutations, Combinations, Discrete Probability: Discrete Probability, Conditional Probability, Bayes Theorem, Information and Mutual Information, Applications of Combinatorics and Discrete Probability.

UNIT III: TREES AND GRAPH THEORY(6 hrs.) Tress:- Minimum Spanning Tree using Krushkals and prims approach Introduction to graphs, Graph Terminology, Representing graphs and graph Isomorphism, Connectivity, Eulers and Hamilton paths, Planar Graph, Graph Coloring.
UNIT IV: RELATION AND FUNCTION (6 hrs.) Relations: Properties of Binary Relations, Closure of Relations, Warshall's Algorithm, Equivalence Relations, Partitions, Partial Ordering Relations, Lattices, Chains and Anti Chains. Functions: Functions, Composition of Functions, Invertible Functions, Pigeonhole Principle, Discrete Numeric Functions
UNIT V-INTRODUCTION TO NUMBER THEORY (6 hrs.) Divisibility of Integers: Properties of Divisibility, Division Algorithm, Greatest Common Divisor GCD and its Properties, Euclidean Algorithm, Extended Euclidean Algorithm, Prime Factorization Theorem, Congruence Relation, Modular Arithmetic, Euler Phi Function, Euler's Theorem, Fermat's Little Theorem, Additive and Multiplicative Inverses, Chinese Remainder Theorem.
UNIT VI-ALGEBRAIC STRUCTURES (6 hrs.) Structured sets with respect to binary operations. Groups, Semigroups, Monoids. Rings, and Fields. Vector Spaces, Basis.
Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):* GATE: All units

Text Books:

1. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", 4th Edition, McGraw-Hill.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", & 7th edition, McGraw-Hill.

Reference Books:

1. Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, "Discrete mathematical structures", 6th edition, Prentice Hall of India.
2. Edgar G. Goodaire, Michael M. Parmenter, "Discrete Mathematics with Graph Theory", 3rd Edition, Pearson Education.
3. Tremblay J. S., "Discrete mathematical structures with application", 3rdEdition, Tata McGraw Hill.

E- Books / E- Learning References:

1. https://discrete.openmathbooks.org/pdfs/dmoi3-tablet.pdf
2. https://home.iitk.ac.in/~arlal/book/mth202.pdf
3. https://mathworld.wolfram.com/topics/CalculusandAnalysis.html
4. https://www.javatpoint.com/discrete-mathematics-tutorial
5. https://www.tutorialspoint.com/discrete_mathematics/index.htm

Second Year Information Technology (2022 Course) Digital Electronics & Computer Organization			
Course Code:	**ITESC303**	**Credit**	**3**
Contact Hours:	3 Hrs./week (L)	**Type of Course:**	Lecture
Examination Scheme	In-sem. Evaluation 40 Marks	End-sem. Examination 60 Marks	

Pre-requisites:

- Basic Electronics Engineering

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-Sem. Evaluation	Internal	40
2.	End Semester Examination	External	60

Course Objectives	
1	To explain the basics of digital circuits.
2	To provide the design of a combinational circuit.
3	To explain the design of a sequential circuit.
4	To describe the basic structure of a computer.
5	To explain the central processing unit and instruction set.
6	To make students understand the register transfer process and micro operations.

Course Outcomes: Students will be able to	
303.1	Draw the kmap to reduce the logical function
303.2	Draw logical diagram for given combinational circuit.
303.3	Draw logical diagram for given sequential circuit.
303.4	Compare Von Neumann and Harvard architecture and draw different bus structures.
303.5	Describe the instruction format and its addressing mode
303.6	Explain the micro-operations using the bus and memory transfer concepts

Topics covered:

UNIT-I: INTRODUCTION TO DIGITAL ELECTRONICS (6 hrs.)
Introduction, Number System, Boolean Algebra, Universal gates, Standard Representation of logic function, K-map reduction technique upto 4-variable, Quine Mc-Clusky minimization technique.

UNIT-II: COMBINATIONAL CIRCUITS (6 hrs.)
Introduction, Multiplexer, Demultiplexer, Decoder, Adder circuits:Half adder, Full adder, BCD adder, Half subtractor, Full subtractor, Code converters, Parity generator and checker, Comparator.

UNIT-III: SEQUENTIAL CIRCUITS (6 hrs.)
Introduction, Flip flops: Types and conversion of flip flops, Application of Flip flops: Registers-Types, Ring counter, Twisted ring counter, Counters-Ripple counters, Synchronous counters, MOD N counter.

UNIT-IV: BASIC STRUCTURE OF COMPUTERS (6 hrs.) History of the development of the digital computer,Recent trends computers with processing & memory capacities, Von Neumann Architecture, Harvard Architecture, Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement.
UNIT-V: CENTRAL PROCESSING UNIT(6 hrs.) Introduction, General Register Organization, Stack Organization, Instruction format. Addressing Modes, Data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC).
UNIT-VI: REGISTER TRANSFER AND MICRO-OPERATIONS (6hrs.) Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.
Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):* GATE: All units

Text Books:

1. Modern Digital Electronics by R.P.Jain, Fourth Edition, Tata McGraw-Hill Education.
2. Computer Organization: By Stallings.

Reference Books:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India
2. Digital Fundamentals by Morris and Mano, PHI Publication
3. Fundamental of digital circuits by A.Anandkumar,PHI Publication
4. Fundamentals of Logic Design by Charles H. Roth Thomson
5. Structured Computer Organization: By Tanenbaum.

E- Books / E- Learning References:

1. https://de-iitr.vlabs.ac.in/
2. https://nptel.ac.in/courses/108105132
3. http://vlabs.iitkgp.ernet.in/coa/
4. https://nptel.ac.in/courses/106105163

Second Year Information Technology (2022 Course) Data Structure and Algorithms				
Course Code:	**ITPCC304**	**Credit**	**3**	
Contact Hours:	3 Hrs/week(L)	**Type of Course:**	Lecture	
Examination Scheme	In-sem. Evaluation 40 Marks	Practical/Activity based Evaluation 60 Marks		

Pre-requisites:

- Programming and Problem Solving I
- Programming and Problem Solving II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-sem. Evaluation	Internal	40
2.	Practical or Activity Based Evaluation	External	60

Course Objectives	
1	To explain basics of data structures and algorithms
2	To explain basic data structures like 1-D arrays ,2-D arrays and Strings
3	To describe Linked lists and its types
4	To explain different searching and sorting techniques.
5	To explain Stack data structure and its application
6	To describe Queue Data structures and it's applications

Course Outcomes: Students will be able to	
304.1	Describe the types and complexity analysis of data structures
304.2	Use arrays and strings to perform various operations
304.3	Apply searching and sorting algorithm on given data
304.4	Solve problems using linked lists data structure
304.5	Solve interconversion of expressions using stack data structure
304.6	Describe the queue data structure and perform its operations for given problem

Topics covered:

UNIT-I: INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS (6 Hrs.)

Introduction to Data Structures: Concept of data, Data object, Data structure, Concept of Primitive and non-primitive, linear and Nonlinear, static and dynamic, persistent and ephemeral data structures, Definition of ADT

Analysis of algorithm: Frequency count and its importance in analysis of an algorithm, Time complexity & Space complexity of an algorithm Big 'O', 'Ω' and 'Θ' notations,

Modular programming: Function definition, Function call and Function prototype, Data access using pointers(addresses/reference), Recursive functions (Demonstrate at least 3-4 examples, like factorial, summation of integers etc)

UNIT-II: BASIC DATA STRUCTURS (6 Hrs.)
Single, multidimensional array, address calculation. Operations on arrays Representation of polynomials using arrays, Dynamic Array,Use of arrays to represent/store strings and their manipulation (string comparison, finding a substring and reversing strings)

UNIT-III: SEARCHING AND SORTING(6Hrs.)
Need of searching and sorting, Concept of internal and external sorting, sort stability, Searching methods: Linear and binary search algorithms, Fibonacci Series.
Sorting methods: Bubble, insertion, Quick, Merge, shell and comparison of all sorting methods. Analyse Best, Worst and Average case for searching and sorting algorithms

UNIT-IV: LINKED LISTS (6 Hrs.)
Concept of linked organization, Singly Linked List, Doubly Linked List, Circular Linked List (Operations: Create, Display, Search, Insert, Delete).

UNIT-V: STACK DATA STRUCTURE AND IT'S APPLICATIONS (6Hrs.)
Concept of stack, Concept of implicit and explicit stack, stack as an ADT using sequential and linked organization, Applications of stack: Use of stack for recursive calls, converting expressions from infix to postfix or prefix form, evaluating postfix or prefix form.

UNIT VI: QUEUE DATA STRUCTURE AND IT'S APPLICATIONS (6Hrs.)
Concept of queues as ADT, Implementation of queue using array and linked organization, Concept of circular queue, double ended queue, priority queue. Applications of queue:

Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):*
GATE*:* Unit-I to Unit-VI(All)

PRACTICAL OR ACTIVITY BASED EVALUATION

1. Based on unit III to VI practical oriented problems will be assigned by teacher during End Sem Examination.
2. Three hours will be given to students for End Sem Examination.
3. From each unit two problems will be allotted to students and student will provide solution for any one problem per unit. Within 3 hrs. student will solve 4 problems.
4. Evaluation of each problem carries 15 marks where 10 marks is for successful execution and 5 marks is for QA.

Text Books

1. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928
2. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.

Reference Books

1. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach using C++", Cengage Learning, 5th Edition, ISBN 978-8131504925
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++ ", Pearson Education India, 3 edition (2007), ISBN 978-8131714744
3. Hemant Jain, "Problem Solving in Data Structures & Algorithms using C++", CreateSpace Independent Publishing Platform (2017), ISBN 978-1542396479
4. G A V Pai, "Data Structures and Algorithms Concepts, Techniques and Applications", McGraw Hill (2017), ISBN 978-0070667266
5. E Balagurusamy, "Object-Oriented Programming with C++", McGraw Hill Education; Seventh edition (2017), ISBN 978-9352607990

E- Books / E- Learning References:

1. https://www.geeksforgeeks.org/
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3. https://www.codechef.com/certification/data-structures-and-algorithms/prepare

Second Year Information Technology (2022 Course) Database Management System			
Course Code:	**ITPCC305**	**Credit**	**3**
Contact Hours:	3 Hrs/week(L)	**Type of Course:**	Lecture
Examination Scheme	In-sem. Evaluation 40 Marks	End-sem. Examination 60 Marks	

Pre-requisites:

- Data Structure and Algorithms
- Discrete Mathematics

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-Sem. Evaluation	Internal	40
2.	End Semester Examination	External	60

Course Objectives	
1	To discuss database management system concepts
2	To explain relational model and its uses.
3	To describe the use of SQL and PL-SQL.
4	To discuss transaction management and concurrency control in databases.
5	To explain parallel and distributed database architectures
6	To describe the concept of data warehouse and mining.

Course Outcomes: Students will be able to	
305.1	Draw E-R diagram for enterprise database
305.2	Write relational algebraic queries
305.3	Solve the queries using SQL and PL/SQL on enterprise database
305.4	Illustrate the concept of transaction and concurrency control mechanism in databases
305.5	Categories different types of parallel and distributed databases
305.6	Explain the concept of datawarehouse and data mining

Topics covered:

UNIT-I: INTRODUCTION TO DBMS (6 hrs.)

Basic concept of database, Advantages of DBMS over file systems, Data abstraction, Database languages, Data independence, Components of a DBMS, Overall architectureof DBMS, Multi-user DBMS architecture, ER Model: Basic concepts, Entity, attributes, relationships, constraints, keys.ER and EER diagrams: Components of ER model, Conventions, Converting ER diagrams into tables

UNIT-II: RELATIONAL MODEL (6 Hrs.)

Basic concepts, Attributes and Domains, Codd's rules. Relational Integrity: Nulls, Entity, Referential integrities. Relational Algebra: Basic Operations, Selection, projection, joining. Functional Dependency, Normalization: 1NF, 2NF, 3NF, BCNF.

UNIT-III: SQL –PL/SQL (6Hrs.)

Introduction to SQL: Characteristics and advantages SQL Data Types, Literals, DDL, DML, SQL Operators Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updation using Views, Indexes, Nulls.

SQL DML Queries: SELECT query and clauses, set operations, Tuple Variables, set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update, Delete Queries, Stored Procedure, Triggers.

UNIT-IV: TRANSACTIONS and CONCURRENCY CONTROL (6Hrs.)

Transaction: Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Cascaded Aborts.

Concurrency Control: Need, Locking Methods, Deadlocks, Time-stamping Methods. Recovery Methods: Shadow-Paging and Checkpoints.

UNIT-V: DATABASE ARCHITECTURES (6Hrs.)

Database Architectures: Centralized and Client-Server Architectures, 2 Tier and 3 Tier Architecture, Introduction to Parallel Databases, Key elements of Parallel Database Processing, Architecture of Parallel Databases, Introduction to Distributed Databases, Architecture of Distributed Databases, Distributed Database Design.

UNIT-VI: ADVANCE DATABASE CONCEPTS(6Hrs.)

Data Warehousing: Introduction, Characteristics and Limitations of Data Warehousing, Architecture of Data Warehouse, Data Mart, OLAP.

Data Mining: Process, Knowledge Discovery, Goals of Data Mining, Data Mining Tasks, Association, Classification.

Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):*

GATE: All units

Text Books

1. Silberschatz A., Korth H., Sudarshan S, Database System Concepts, McGraw Hill Publication, ISBN-0-07-120413-X, Sixth Edition.
2. G. K. Gupta "Database Management Systems" , Tata McGraw Hill.

Reference Books

1. Kristina Chodorow, Michael Dirolf, MongoDB: The Definitive Guide, O'Reilly Publications.
2. Jiawei Han, MichelineKamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier.
3. Bill Schmarzo, Big Data: Understanding How Data Powers Big Business, Wiley, 978-81-265-4545-2.
4. Helen Morris, Introduction to Database Systems, PEARSON INDIA, 1st Edition.
5. Raghu Ramakrishnan, Johannes , Database Management Systems, McGraw Hill, Indian 3rd Edition.
6. AtulKahate, Introduction to Database Management System, PEARSON INDIA, 5th Edition.

E- Books / E- Learning References:

1. https://www.pdfdrive.com/dbms-korthpdf-e46256085.html
2. https://www.db-book.com/db6/slide-dir/
3. https://www.octawian.ro/fisiere/situri/asor/build/html/_downloads/1fcab53a6d916e39c715fc20a9a9c2a8/Silberschatz_A_databases_6th_ed.pdf
4. https://www.bmc.com/blogs/dbms-database-management-systems/
5. https://www.techtarget.com/searchdatamanagement/definition/database-management-system
6. https://www.geeksforgeeks.org/dbms/

Second Year Information Technology (2022 Course) Human Computer Interaction				
Course Code:	**ITOEC306**	**Credit**	**3**	
Contact Hrs.:	3 Hrs/week (L)	**Type of Course:**	Lecture	
Examination Scheme	40$	60$$		

Pre-requisites:

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Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	MOOCs Assignments	External	40
2.	MOOCs Examination	External	60

Course Objectives	
1	To introduce to the field of human-computer-interaction study.
2	To gain an understanding of the human part of human-computer-interactions.
3	To learn to do design and evaluate effective human-computer-interactions.
4	To study HCI models and theories.
5	To understand HCI design processes.
6	To apply HCI to real life use cases

Course Outcomes: Students will be able to	
306.1	Explain importance of HCI study and principles of user-centered design (UCD) approach.
306.2	Describe human factors in HCI design.
306.3	Explain models, paradigms, and context of interactions.
306.4	Discuss the user-interfaces through structured and organized UCD process.
306.5	Choose different evaluation techniques of a user-interface design.
306.6	Explore the future trends in human-computer-interactions.

Topics covered:

UNIT-I: WHAT IS HCI?

Disciplines involved in HCI, Why HCI study is important? The psychology of everyday things Donald A. Norman, Principles of HCI, User-centered Design. Measurable Human factors.

UNIT-II: INPUT-OUTPUT CHANNELS,

Human memory, Human emotions, Individual differences, Psychology.
Ergonomics, Human errors, Models of interaction, Paradigms of Interactions, Interaction styles, Interactivity, Context of interaction, User experience.

UNIT-III: USER PROFILES

Categorization of users, Goal and task hierarchy model, Linguistic model, Physical and device models, GOMS, Norman's 7 stage model, Cognitive architectures, Hierarchical task analysis (HTA), Uses of task analysis, Diagrammatic dialog design notations.

UNIT-IV: DESIGN RULES Principles that support usability, Design standards, Design Guidelines, What is interaction design?, The software design process, User focus, Scenarios, Navigation Design, Screen Design, Prototyping techniques, Wire-Framing, Understanding the UI Layer and Its Execution Framework, Model- View-Controller(MVC) Framework
UNIT V-: USING TOOLKITS User interface management system (UIMS), Goals of evaluation, Categorization of Evaluation techniques, Choosing an Evaluation Method. DECIDE, Heuristic Evaluation, cognitive walk through, Usability testing
UNIT-VI: UBIQUITOUS COMPUTING Design thinking, finding things on web, Augmented Reality, Virtual Reality, Challenges in designing interfaces for smart homes, smart devices, handheld devices, smart wrist watch, Future of HCI
Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):Nil*

Text Books:

1. Alan Dix (2008). Human Computer Interaction. Pearson Education. ISBN 978-81-317-1703-5.
2. Ben Shneiderman; Catherine Plaisant; Maxine Cohen; Steven Jacobs (29 August 2013) Designing The User Interface: Strategies for Effective Human-Computer Interaction. Pearson Education Limited. ISBN 978-1-292-03701-1.

Reference Books:

1. Gerard Jounghyun Kim (20 March 2015). Human–Computer Interaction: Fundamentals and Practice. CRC Press. ISBN 978-1-4822-3390-2.
1. Donald A. Norman (2013). The Design of Everyday Things Basic Books. ISBN 978-0-465-07299-6.
2. Jeff Johnson (17 December 2013). Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines. Elsevier. ISBN 978-0-12-411556-9.
3. Alan Cooper; Robert Reimann; David Cronin; Christopher Noessel (13 August 2014). About Face: The Essentials of Interaction Design. Wiley. ISBN 978-1-118-76658-3.
4. Alan Cooper (1 January 1999). The Inmates are running the Asylum, Sam's. ISBN 978-0-672-31649-4.
5. John M. Carroll (21 May 2003). HCI Models, Theories, and Frameworks: Toward a Multidisciplinary Science. Morgan Kaufmann. ISBN 978-0-08-049141-7.
6. Alan Cooper, Robert Reimann, David Cronin, Christopher Noessel, About Face: The Essentials of Interface Design, Wiley India, ISBN: 9788126559718,4th Ed
7. Rogers, Sharp, Preece, Interaction Design: Beyond Human Computer Interaction, Wiley India, ISBN:11. 9788126544912,3ed
8. Wilbert O. Galitz, The Essential Guide to user Interface Design, Wiley India, ISBN: 9788126502806

E- Books / E- Learning References:

1. https://www.interaction-design.org/literature/topics/user-centered-design
2. http://www.glenbrook.k12.il.us/GBSSCI/PHYS/Class/sound/u11l2d.html
3. http://www.individual-differences.com/

Second Year Information Technology (2022 Course) Digital Electronics & Computer Organization Lab				
Course Code:	**ITESC307**	**Credit**	**1**	
Contact Hours:	2 Hrs./week(P)	**Type of Course:**	Practical	
Examination Scheme	Term-work 25 Marks	Practical 25 Marks		

Pre-requisites:

- Basic Electronics Engineering

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25
2.	Practical	External	25

Course Objectives	
1	To explain the implementation of digital circuits.
2	To explain the implementation of sequential circuits.
3	To demonstrate computer organization related operations using simulation tool

Course Outcomes: Students will be able to	
307.1	Draw and implement combination circuits
307.2	Draw and implement sequential circuits
307.4	Perform computer organization related operations using simulation tool

List of Experiments:

1. Implementation of the given Boolean function using logic gates in both SOP and POS forms.Realize
   (a) 4:1 multiplexer using gates.
   (b) 3-variable function using IC 74151(8:1MUX).
2. Implementation and verification of decoder/de-multiplexer and encoder using logic gates.
3. Design and implement half adder, full adder using basic gates.
4. To design a 4 bit Binary to Gray code Converter, 4-bit Gray to Binary code Converter.
5. Design and implement 4-bit binary adder using IC 7483.
6. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
7. Design and implement MOD-N Counter using IC7490.
8. Design of Ripple carry adders on Virtual Lab.
9. Design and simulate single bit ALU with 4 functions(AND,OR,XOR,ADD)
10. Design and simulate single bit RAM cell or 4 address * 2 bit memory using 8single bit RAM cell.
11. Design and develop a mini project using Sequential and combinational logic circuits.

Text Books:

1. Modern Digital Electronics by R.P.Jain, Fourth Edition, Tata McGraw-Hill Education.

2. Computer Organization: By Stallings.

Reference Books:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India
2. Digital Fundamentals by Morris and Mano, PHI Publication
3. Fundamental of digital circuits by A.Anandkumar,PHI Publication
4. Digital Fundamentals by FLOYD & JAIN, Pearsons Pub
5. Fundamentals of Logic Design by Charles H. Roth Thomson
6. Structured Computer Organization: By Tanenbaum.

E- Books / E- Learning References:

1. https://de-iitr.vlabs.ac.in/
2. https://nptel.ac.in/courses/108105132
3. http://vlabs.iitkgp.ernet.in/coa/
4. https://nptel.ac.in/courses/106105163

Second Year Information Technology (2022 Course) Data Structure and Algorithms Lab				
Course Code:	**ITPCC308**	**Credit:**	**2**	
Contact Hours:	4 Hrs/week(P)	**Type of Course:**	Practical	
Examination Scheme	Term-work 25 Marks	Oral 25 Marks		

Pre-requisites:

- Programming and Problem Solving I
- Programming and Problem Solving II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25
2.	Oral	External	25

Course Objectives	
1	To demonstrate the use of arrays and linked list
2	To make use of array and link list for implementation of applications.
3	To explain interconversion of expressions using array and linked list
4	To explain different types of queues and demonstrate its operations.

Course Outcomes: Students will be able to	
308.1	Write programs to store data and perform operations using arrays.
308.2	Write programs to store data and perform operations using link list.
308.3	Perform interconversion of expressions using array and linked list
308.4	Implement different types of queues and demonstrate its operations.

List of Experiments:

1. Create an array to store N integers and find min and max using function
2. Create a Dynamic array to store N integers and write a menu driven C++ program to perform following operations.
   a) Quick Sort
   b) Merge Sort

   (Note: Analyze and provide comparative study of both the algorithms)
3. Create a 2-D array to store names of N students and write a menu driven C++ program to perform following operations.
   a) Linear search
   b) Insertion Sort(Alphabetical order)
   c) Binary search

   (Note: Analyze and provide comparative study of both the search algorithms)
4. Create Singly linked list to store details of company , like Name, location and number of employees . Write a menu driven C++ program to perform following operations.
   a) Create a list of N companies
   b) Append a new company to the list
   c) Add a company to the beginning of list

d) Find no. of Employees, if company name is specified
e) Find Location if company name is specified

(Note: Define a C++ class to represent a List and define member functions for the listed operations)

5. Create doubly linked list to store details of Doctor , like Name, specialization and phone number . Write a menu driven C++ program to perform following operations.
   a) Create a list by appending a node
   b) List all the Doctors with phone numbers for given specialization.
   c) Reverse the List , such that the last Doctor, should be first in the List.

   (Note: Define a C++ class to represent a List and define member functions for the listed operations)
6. Create Circular List to represent a polynomial for two variables. Write a menu driven C++ program to perform following operations on polynomials.
   a) Create polynomial
   b) Display a polynomial
   c) Add two polynomials
   d) Evaluate a given polynomial

   (Note: The polynomial can be evaluated by providing values for x and y variables)
7. Design and develop a Stack using sequential representation and write a menu driven C++ program to perform following operations.
   a) Input a valid infix expression and convert it to postfix expression.
   b) Input a valid infix expression and convert it to prefix expression.

   (Note: Define a C++ class to represent a Stack and define member functions for the Overflow, underflow, push and pop operations, define non-member functions for conversions)
8. Design and develop a Stack using Linked representation and write a menu driven C++ program to perform following operations.
   a) Input a valid postfix expression and evaluate it
   b) Input a valid prefix expression and evaluate

   (Note: Define a C++ class to represent a Stack and define member functions for the Overflow, underflow, push and pop operations, define non-member functions for evaluations)
9. Design and Develop a Linear queue using sequential representation having max size of 50 numbers with operations as insert/delete items to/from it. Write a menu driven C program to perform following operations.
   a) Issue a token number to customer(insert)
   b) Serve a Customer(delete)
   c) Display token numbers of Customers
10. Design and Develop a Circular queue using sequential representation having max size of 50 numbers with operations as insert/delete items to/from it. Write a menu driven C program to perform following operations.
    a) Issue a token number to customer(insert)
    b) Serve a Customer(delete)
    c) Display token numbers of Customers

    (Note: Define a C++ class to represent a Circular Queue and define member Functions insert, delete and display).
11. Design and Develop Priority queue using linked representation and demonstrate its use.
12. Design and Develop mini project using data structure concepts.

Oral Evaluation

1. Student will design and develop a mini project using data structure concepts and present the same during OR exam.

Text Books

1. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928
2. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.

Reference Books

1. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach using C++", Cengage Learning, 5th Edition, ISBN 978-8131504925
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++ ", Pearson Education India, 3 edition (2007), ISBN 978-8131714744
3. Hemant Jain, "Problem Solving in Data Structures & Algorithms using C++", CreateSpace Independent Publishing Platform (2017), ISBN 978-1542396479
4. G A V PAI, "DATA STRUCTURES and Algorithms Concepts, Techniques and Applications", McGraw Hill (2017), ISBN 978-0070667266
5. E Balagurusamy, "Object-Oriented Programming with C++", McGraw Hill Education; Seventh edition (2017), ISBN 978-9352607990

E- Books / E- Learning References:

1. https://www.geeksforgeeks.org/
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3. https://www.codechef.com/certification/data-structures-and-algorithms/prepare
4. https://www.codespaces.com/best-data-structures-and-algorithms-courses-classes.html#1-data-structures-and-algorithms-specialization-program-coursera
5. https://www.codespaces.com/best-data-structures-and-algorithms-courses-classes.html#6-javascript-algorithms-and-data-structures-masterclass-udemy

Second Year Information Technology (2022 Course) Database Management System Lab			
Course Code:	**ITPCC309**	**Credit**	**1**
Contact Hours:	2 Hrs/week (P)	**Type of Course:**	Practical
Examination Scheme	Term-work 25 Marks	Practical 25 Marks	

Pre-requisites:

- Discrete Mathematics
- Data Structure and Algorithms

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term-work	Internal	25
2.	Practical	External	25

Course Objectives	
1	To discuss the properties and installation procedure of MySQL/Oracle and SQLite
2	To explain SQL DDL/DML queries with various operators and clauses
3	To explain procedures and triggers to execute a given task
4	To provide the insight to design and draw E-R diagram for any enterprise

Course Outcomes: Students will be able to	
309.1	Study and Installation of MySQL/Oracle and SQLite tools
309.2	Solve SQL DDL/DML queries using various operators and clauses
309.3	Write procedures and triggers to execute a given task
309.4	Draw the design of enterprise database with suitable E-R diagram

List of Experiments:

1. Study of MySQL Open-source software. Discuss the characteristics like efficiency, scalability, performance and transactional properties.
2. Install and configure client and server of MySQL(Show all commands and necessary steps for installation and configuration)
3. Study of SQLite: What is SQLite? Uses of SQLite. Building and installing SQLite.
4. Design any database with at least 3 entities and relationships between them. Draw suitable ER/EER diagram for the system.
5. Design and implement a database (for assignment no 4) using DDL with primary key and foreign key constraints.
6. Perform following SQL queries on the database created in assignment 5.
   Implementation of relational operators in SQL
   1. Boolean operators and pattern matching
   2. Arithmetic operations and built in functions
   3. Group functions
   4. Processing Date and Time functions

5. Complex queries and set operator

7. Execute DDL/DML statements which demonstrate the use of views. Update the base table using its corresponding view. Also consider restrictions on updatable views and perform view creation from multiple tables.
8. Write and execute PL/SQL stored procedure and function to perform a suitable task on the database using all types of cursors.
9. Write and execute suitable database triggers. Consider row level and statement level triggers.
10. Perform case study of any organization (back end only), draw ER diagram and Database design.
11. Design a mini project to demonstrate the database for any organization using open-source tools/framework.

Text Books

1. Silberschatz A., Korth H., Sudarshan S, Database System Concepts, McGraw Hill Publication, ISBN-0-07-120413-X, Sixth Edition.
2. G. K. Gupta "Database Management Systems" , Tata McGraw Hill.

Reference Books

1. Kristina Chodorow, Michael Dirolf, MongoDB: The Definitive Guide, O'Reilly Publications.
2. Jiawei Han, MichelineKamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier.
3. Bill Schmarzo, Big Data: Understanding How Data Powers Big Business, Wiley, 978-81-265-4545-2.
4. Helen Morris, Introduction to Database Systems, PEARSON INDIA, 1st Edition.
5. Raghu Ramakrishnan, Johannes, Database Management Systems, McGraw Hill, Indian 3rd Edition.
6. AtulKahate, Introduction to Database Management System, PEARSON INDIA, 5th Edition.

E- Books / E- Learning References:

1. https://www.javatpoint.com/mysql-queries
2. https://dev.mysql.com/doc/mysql-tutorial-excerpt/8.0/en/examples.html
3. https://dev.mysql.com/doc/refman/8.0/en/entering-queries.html
4. https://www.w3schools.com/mysql/mysql_sql.asp
5. https://www.geeksforgeeks.org/mysql-common-mysql-queries/
6. https://www.databasejournal.com/mysql/the-10-most-common-mysql-queries/
7. https://www.educba.com/mysql-query-commands/
8. https://www.oreilly.com/library/view/mysql-reference-manual/0596002653/ch03s05.html

Second Year Information Technology (2022 Course) Management Information System			
Course Code:	**ITHSM401**	**Credit:**	**2**
Contact Hrs.:	1Hr./week (L) 1 Hr./week(T)	**Type of Course:**	Lecture/Tutorial
Examination Scheme	Term Work 25 Marks	Oral 25 Marks	

Pre-requisites:

-

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25
2.	Oral	Internal	25

Course Objectives	
1	To explain the foundations of management information system.
2	To classify and explain the various M-commerce facilities.
3	To introduce the enterprise management system.
4	To develop a management information system for society

Course Outcomes : Students will be able to	
401.1	Describe the basics of management information system
401.2	Explain various M-commerce strategies.
401.3	Discuss benefits of enterprise management system
401.4	Develop a management information system for society

Topics covered:

UNIT-I: INTRODUCTION TO INFORMATION SYSTEM (4Hrs)

Foundations of Information Systems: Need and objective of Information systems. Components and resources of information systems, Types of information systems: Operations support systems and Management support systems.

Management Information Systems: Definition, role and impact of MIS, Functions of the managers: planning, organizing, staffing, coordinating and directing, MIS as a support to the management

Applications in Manufacturing Sector: HR Management, Marketing Management, Finance Management, Materials Management and Marketing Management,

Applications in service: Banking, Insurance, Airline, Hotel, Hospital, Education

UNIT-II: E-COMMERCE (2 Hrs.)

Electronic Commerce Systems (E-Commerce): Introduction, scope, B2C, B2B and C2C, C2G, G2G, Essential e-Commerce processes, Electronic Payment Processes, m commerce.

Customer Relationship Management (CRM): Introduction, What is CRM? Three phases of CRM, Benefits, challenges and trends in CRM, E-ERM

UNIT-III: ENTERPRISE MANAGEMENT SYSTEMS(2Hrs.)

Introduction, Enterprise Resource Planning (ERP) systems: Basic features, benefits, selection, implementation, EMS and MIS

ITES: Objectives of ITES, ITES Services and applications like Medical Transcription, Document Processing

PROJECT BASED ACTIVITY: (16 hrs.)

In a group student has to develop a management information system for a societal need

Guidelines:

1. There should be a team of 3 to 6 students who will work cohesively.
2. The project scope/topic can be from any field/area, but selection related to IT technical aspect is desirous.
3. The project/problem done in first year engineering could be extended further, based on its potential and significance analysis.
4. Project/problem requiring solutions through conceptual model development and use of software tools should be preferred.
5. Different alternate approaches such as theoretical, practical, working model, demonstration or software analysis should be used in solving/implementing of project/problem.
6. The project/problem requiring multi-disciplinary approach to solve it, should be preferred.
7. Problem may require in depth study of specific practical, scientific or technical domain.
8. Hands-on activities, organizational and field visits, interacting with research institutes and expert consultation should be included in the approach to make students aware of latest technologies.
9. Progress of PBL will be monitored regularly on weekly basis. Weekly review of the work is necessary.
10. During process of monitoring and continuous assessment and evaluation the individual and team performance is to be measured by mentor.
11. Students must maintain an institutional culture of authentic collaboration, self-motivation, peer learning and personal responsiveness. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services.
12. Supervisor/mentor and students must actively participate in assessment and evaluation processes. Group may demonstrate their knowledge and skills by developing a public product and/or report and/or presentation.

Recommended parameters for assessment, evaluation and weightage:

1. Idea Inception (5%)
2. Outcomes of PBL/Problem Solving Skills/Solution provided/Final product(40%) (Individual assessment and team assessment)
3. Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents (25 %)
4. Potential for the patent(10%)
5. Demonstration (Presentation, User Interface, Usability etc.) (10%)
6. Contest Participation/ publication (5%)
7. Awareness /Consideration of Environment/ Social /Ethics/ Safety measures/Legal aspects (5%).

Note: teacher will Design the rubrics based on the above parameters for evaluation of student performance

Text Books:

1. O'Brien James , "Management Information Systems" , 7th Edition, Tata McGravv-Hill Publishing Company Limited, ISBN 0 - 07 –0622003-2
2. Rober Schulthesis, Mary Sumner, "Management information system" , Tata McGraw-Hill Publishing Company Limited, 0.07.463879-3

3. Arpita Gopal, Chandrani Singh, “E-world Emerging trends in Information Technology”, Excel Books, 978-81-7446-732-4

Reference Books:

1. KC Laudon, JP Laudon, “*MIS Managing digital firm, Person Education*” , 978-81317-1413-7
2. Jawadekar W., *"Management Information Systems*", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, 2002, ISBN 0 -07 - 044575 - 3
3. Lucas Henry C., "*Information Technology for Management*" Edition, Tata McGraw-Hill Publishing Company Limited, 2004, ISBN 0 - 07- 047242- 4
4. Post J, Anderson D., "*Management Information Systems*” 3rd Edition, Tata McGraw-Hill Publications, ISBN 0 - 07 - 049940 -3
5. Gupta L., "*Management Information Systems: A Managerial Perspective*", Galgotia,ISBN 81-7515-085-8
6. Brendan Read :*Designing the Best Call Center for Your Business*, 2nd Edition , CMPBook, ISBN 1578203139, 9781578203130

E- Books / E- Learning References:

1. https://repository.dinus.ac.id/docs/ajar/Kenneth_C.Laudon,Jane_P_.Laudon_-_Management_Information_Sysrem_13th_Edition_.pdf
2. https://d3bxy9euw4e147.cloudfront.net/oscms-prodcms/media/documents/PrinciplesofManagement-OP.pdf
3. https://ebooks.lpude.in/management/mba/term_4/DMGT505_MANAGEMENT_INFORMATION_SYSTEM.pdf

Second Year Information Technology (2022 Course) Probability and Statistics			
Course Code:	**ITBSC402**	**Credit:**	**4**
Contact Hrs.:	3 Hrs/week (L) 1 hr. (Tutorial)	**Type of Course:**	Lecture
Examination Scheme	In-sem. Evaluation 40 Marks	End-sem. Examination 60 Marks	

Pre-requisites:

- Discrete Mathematics

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-Sem. Evaluation	Internal	40
2.	End Semester Examination	External	60

Course Objectives	
1	To understand the basic concepts in probability
2	To understand data distribution using probability
3	To Relate probability function to the distribution of a random variable.
4	To Apply statistical measures on data..
5	To compute regression and correlation between two variables.
6	To test hypothesis.

Course Outcomes: Students will be able to	
402.1	Use probability and its concepts with real worlds problems.
402.2	Corelate data distribution using probability.
402.3	Relate probability function to the distribution of a random variable.
402.4	Apply statistical measures on data.
402.5	Compute regression and correlation between two variables.
402.6	Test the hypothesis using statistical testing

Topics covered:

UNIT-I: PROBABILITY (6 hrs.)
Introduction, random experiments, sample space, events and algebra of events.
Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.

UNIT-II: PROBABILITY DISTRIBUTION (6 hrs.)
Probability distributions: Binomial, Poisson, Normal and Hyper geometric, Sampling distributions

UNIT-III: RANDOM VARIABLES (6 hrs.)
Discrete and continuous random variables, p.m.f., p.d.f. and c.d.f.,illustrations and properties of random variables, univariate transformations with illustrations.
Two dimensional random variables: discrete and continuous type, joint, marginal and conditional p.m.f, p.d.f., and c.d.f., independence of variables.

UNIT-IV: STATISTICS (6 hrs.) Sample variable, statistical sampling, population, frequency distribution Collection, Mean, median, mode, Measures of dispersion: range, variation, standard deviation, skewness and kurtosis
UNIT-V: REGRESSION AND CORRELATION ANALYSIS (6 hrs.) Regression - Linear Regression · Logistic Regression, Ridge Regression, Lasso Regression, Polynomial Regression, Regression model evaluation metrics Covariance, Correlation, Difference Between Covariance and Correlation, Correlation methods- Pearson correlation, Kendall rank correlation, Spearman correlation, Analysis of variance- ANOVA
UNIT-VI: HYPOTHESIS TESTING (6 hrs.) Hypothesis, hypothesis testing – Null- and alternative hypothesis , Type-I and type-II errors , Significance levels and powers of the tests. p-values. Tests for the expected value and variance of random variables- One-tailed and two-tailed tests, T-test, F-test, Z-test and Chi-Square test, Relationship between confidence intervals and hypothesis testing.
Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):* GATE: All units

Text Books:

1. Montgomery, Douglas C., and George C. Runger. Applied Statistics and Probability for Engineers. John Wiley & Sons, 2010
2. Probability and Random variable, David Stirzaker, University of oxford.
3. Text Book of correlation and regression ,A.K.Sharma, Discovery Publishing House,2005

Reference:

1. Introduction to Hypothesis Testing (Easy Statistics),Anusha IlluKumbura, Easy Statistic Series.
2. Probability and Statistics, Michael J. Evans and Je§rey S. Rosenthal, University of Toronto
3. Random Variable and Probability Distribution. Cramer, Cambridge University Press.

E- Books / E- Learning References:

1. https://www.spps.org/cms/lib/MN01910242/Centricity/Domain/859/Statistics%20Textbook.pdf
2. https://www.fireblazeaischool.in/blogs/covariance-and-correlation-in-machine-learning/
3. https://www.probabilitycourse.com/chapter4/4_0_0_intro.php
4. https://www.geeksforgeeks.org/types-of-regression-techniques/

Second Year Information Technology (2022 Course) Object Oriented Programming				
Course Code:	**ITPCC403**	**Credit:**	**3**	
Contact Hrs.:	3 Hrs/week (L)	**Type of Course:**	Lecture	
Examination Scheme	In-sem. Evaluation 40 Marks	Practical/Activity based Evaluation 60 Marks		

Pre-requisites:

- Programming and Problem solving -I
- Programming and Problem solving -II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-Sem. Evaluation	Internal	40
2.	Practical/Activity based Evaluation	External	60

Course Objectives	
1	To explain object-oriented programming concepts
2	To create classes and objects for real world problems
3	To use inheritance and polymorphism
4	To create abstract class and Interface
5	To handle exceptions using exception handling
6	To make use of collections for implementing generics

Course Outcomes: Students will be able to	
403.1	Describe the object-oriented programming paradigm
403.2	Define classes and objects for real world problems
403.3	Implement inheritance and polymorphism for given problems
403.4	Implement abstract class and interface
403.5	Handle exceptions using exception handling mechanism
403.6	Make use of collections for implementing generics programming

Topics covered:

UNIT-I: CONCEPTS OF OBJECT-ORIENTED PROGRAMMING (6 Hrs.)

Introduction to Procedural-Oriented and Object-Oriented Paradigms, Limitations of Procedural Programming, Need of Object-Oriented Programming, Fundamentals of the Object-Oriented Programming (OOP): Objects, Classes, Data abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding and Message Passing, Data types, Control structures, Arrays and Strings, Case study

UNIT-II: DEFINING CLASSES AND METHODS (6 Hrs.)

Define a Class, Creating an Objects, Access specifiers, Introducing Methods, adding a Method-with parameters, without parameters, with return type, without return types, Static data, Static methods, Constructors, types of Constructors, Overloading Methods/Constructors, this keyword Using Object as a Parameters, Returning Objects, the finalize () Method, Recursion, Command Line Argument, Inner classes, Case study

UNIT-III: INHERITANCE AND POLYMORPHISM (6 Hrs.)
Introduction, Need of Inheritance, Types of Inheritance, using super keyword, Creating Polymorphism, Method Overriding, Dynamic Method Dispatch, Using final with Inheritance, Case study

UNIT-IV: ABSTRACT CLASSES AND INTERFACE (6 Hrs.)
Using Abstract methods and Class, Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, variables in Interfaces, Interfaces can be extended, Case study

UNIT-V: EXCEPTION HANDLING (6 Hrs.)
Errors, Types of errors, Exception, Exception Handling, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, Creating Your Own Exception Subclasses, Case study.

UNIT-VI: GENERIC PROGRAMMING AND COLLECTIONS FRAMEWORK (6 Hrs.)
Collections Overview, The Collection Interface: The List Interface, The Set Interface, The Map Interface and The Queue Interface, The Collection Classes: The ArrayList Class, The LinkedList Class, The HashSet Class, the Hash map Class, TheTreeSetClass, Case study

Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):*
GATE:Unit 1

PRACTICAL OR ACTIVITY BASED EVALUATION

1. Based on unit III to VI practical oriented problems will be assigned by teacher during End Sem Examination.
2. Three hours will be given to students for End Sem Examination.
3. From each unit two problems will be allotted to students and student will provide solution for any one problem per unit. Within 3 hrs. student will solve 4 problems.
4. Evaluation of each problem carries 15 marks where 10 marks is for successful execution and 5 marks is for QA. The weightage of four problems solved by students is 60.

Text Books:

1. Object Oriented Programming Using Java, E. Balaguruswamy ,Tata McGraw Hill
2. Programming with Java, E. Balaguruswamy , Tata McGraw Hill

Reference Books:

1. Timothy A. Budd , An Introduction to Object Oriented Programming, Addison-Wesley
2. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.
3. Object-Oriented Programming and Java by Danny Poo (Author), Derek Kiong (Author), Swarnalatha Ashok (Author)Springer; 2nd ed. 2008 edition (12 October 2007), ISBN-10: 1846289629, ISBN-13: 978-1846289620,2007
4. Object-Oriented Design Using Java, Dale Skrien, McGraw-Hill Publishing, 2008, ISBN - 0077423097, 9780077423094.
5. UML for Java Programmers by Robert C. Martin, Prentice Hall, ISBN 0131428489,2003.

E- Books / E- Learning References:

1. https://www.w3schools.com/java/java_oop.asp
2. https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/
3. https://www.freecodecamp.org/news/object-oriented-programming-concepts-java/
4. https://www.guru99.com/java-oops-concept.html

Second Year Information Technology (2022 Course) Processor Architecture and Interfacing			
Course Code:	**ITPCC404**	**Credit:**	**3**
Contact Hrs.:	3Hrs/week (L)	**Type of Course:**	Lecture
Examination Scheme	In-sem. Evaluation 40 Marks	End-sem. Examination 60 Marks	

Pre-requisites:

- Digital Electronics and Computer Organisation

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-Sem. Evaluation	Internal	40
2.	End Semester Examination	External	60

Course Objectives	
1	To explain the architecture of the PIC controller.
2	To describe Instruction set and I/O Port Programming.
3	To apply programming concepts for Delay, Arithmetic and Logic Operations, and Memory Access.
4	To describe concepts of Timer, Serial Port, and Interrupt programming.
5	To apply knowledge of programming for interfacing of LCD, Keyboard, ADC, and DAC.
6	To analyze current trends in microcontrollers.

Course Outcomes: Students will be able to	
404.1	Describe the architecture of the PIC controller.
404.2	Describe Instruction set and I/O Port Programming.
404.3	Explain interrupts and Use programming concepts to interface I/O.
404.4	Describe concepts of Capture, Compare and PWM programming.
404.5	Explain the different model and application of the Raspberry Pi.
404.6	Use python programming concepts to interface I/O using Raspberry Pi.

Topics covered:

UNIT-I:PIC MICROCONTROLLERS: INTRODUCTION (6 hrs.)

Microcontrollers and Embedded Processors, Overview of the PIC18 Family, PIC18 PIN connection, PIC18 Configuration Registers, The WREG Register in PIC18,The PIC18 File Register and access Bank, Use of Instructions with the Default Access Bank,PIC18 Status Register, PIC18 Data Format and Directives, The Program Counter and Program ROM Space in the PIC18, RISC Architecture in the PIC18.

UNIT-II: INSTRUCTION SET AND I/O PORT PROGRAMMING (6 hrs.)

Arithmetic Instructions, Signed Number Concepts and Arithmetic Operations, Logic and Compare Instructions, Rotate Instruction and Data Serialization, BCD and ASCII Conversion, Branch Instructions and Looping, Call Instructions and Stack, PIC18 Time Delay and Instruction Pipeline, I/O Port Programming in PIC18, I/O Bit Manipulation Programming.

UNIT-III: PIC INTERUPTS & INTERFACING-I (6 hrs.)

Timer/Counter: Registers used for Timer/Counter operation, Delay calculations, Programming of Timers using Embedded C.

PIC Interrupts: Interrupt Vs Polling, IVT, Steps in executing interrupt, Sources of interrupts; Enabling and disabling interrupts, Interrupt registers, Priority of interrupts,

Programming of: Timer using interrupts, External hardware interrupts, Serial communication interrupt; Interfacing of LED, Interfacing 16X2 LCD (8 bits) and Key board (4 x 4 Matrix), Interfacing Relay & Buzzer.
UNIT-IV: PIC INTERFACING-II (6 hrs.) CCP modes: Capture, Compare and PWM generation; DC Motor speed control with CCP, Stepper motor interfacing with PIC, Basics of Serial communication protocols: Study of RS232, I2C, SPI, UART, Serial communication programming using Embedded C.
UNIT-V: INTRODUCTION to RASPBERRY Pi (4 hrs.) Different Models of Raspberry Pi, Why Raspberry Pi, Peripherals of Raspberry Pi, Applications of Raspberry Pi.
UNIT-VI: INTERFACING USING Pi (8 hrs.) Overview of Rasberian OS (Operating System), Installation, different types of Operating Systems. Basic Python Programming ,Temperature dependent auto cooling system
Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):* NA

Text Books:

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey 'PIC Microcontroller and Embedded Systems using Assembly and C for PIC18', Pearson Education 2008.
2. John Iovine, 'PIC Microcontroller Project Book', McGraw Hill 2000Understand the basics of embedded system
3. Ramesh Gaokar, Fundamentals of Microcontrollers and applixcation in Embedded system(With PIC 18 Microcontroller family)Penram International Publishing.

Reference Books:

1. Microcontroller from Assembly Language to C using PIC18FXX2, Robert B. Reese, Davinici Engineering press.
2. PIC Microcontroller: An Introduction to Software and Hardware Interfacing, Han Way Huang, Cengage Learning.
3. Tony Givargis, "Embedded system design", Wiley Student Edition.
4. Peatman,"Design with PIC Microcontroller",Pearson Education.
5. Han-way Huang,"PIC Microcontroller",India Edition
6. Rasberry Pi CookBook: Software & Hardware problems and Solutions By Simon Monk (O'Reilly Media Inc.)
7. Raspberry Pi Hardware Reference by Warren Gay (Apress)

E- Books / E- Learning References:

1. https://www.youtube.com/watch?v=sUkgUQ9mpcg&list=PL8G4ZtHAnWn3rrCZPIej2-eqk1bjKCsmL&index=49
2. https://www.youtube.com/watch?v=WGcierfsSNo&list=PL8G4ZtHAnWn3rrCZPIej2-eqk1bjKCsmL&index=50
3. https://www.youtube.com/watch?v=nLlBssKCN2w
4. https://nptel.ac.in/courses/117104072
5. https://nptel.ac.in/courses/108105102
6. https://tinyurl.com/kvbwxfay
7. https://www.coursera.org/learn/raspberry-pi-platform

Second Year Information Technology (2022 Course) Computer Graphics and Animation				
Course Code:	**ITPCC405**	**Credit:**	**3**	
Contact Hrs.:	3 Hrs/week (L)	**Type of Course:**	Lecture	
Examination Scheme	In-sem. Evaluation 40 Marks	End-sem. Examination 60 Marks		

Pre-requisites:

- Data Structure and Algorithms

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Evaluation	Internal	40
2.	End Semester Examination	External	60

Course Objectives	
1	To explain graphics, graphics drawing algorithm to solve problems
2	To explain Polygon filling & 2D Transformation.
3	To explain 3D Transformation, windowing and clipping concepts
4	To describe basics of animation.
5	To explain principles and types of animation.
6	To explain the workflow of animation.

Course Outcomes: Students will be able to	
405.1	Use line drawing and circle drawing algorithms to solve problems
405.2	Apply Polygon filling & 2D Transformation methods.
405.3	Apply 3D Transformation, windowing and clipping concepts.
405.4	Explain basics concept of animation.
405.5	Explain principles and types of animation.
405.6	Explain the process of making an animation

Topics covered:

Unit-I: INTRODUCTION AND OVERVIEW OF GRAPHICS SYSTEM(6Hrs.)
Introduction to Computer Graphics, Raster scan and Random scan display,
Line Drawing: DDA Line Mathematical Treatment algorithm, Bresenhem Line Mathematical Treatment & algorithm
Circle Drawing: Bresenhem's circle drawing Mathematical Treatment & algorithm.
OpenGL – Introduction, Open GL libraries, Primitive operations

UNIT-II: POLYGON FILLING AND 2D TRANSFORMATION (6Hrs.)
Polygons: Polygons and its types, Inside test method,
Polygon filling methods: Seed Fill/Flood fill, Boundary Fill, Scan-line Fill algorithms,
2D Transformations: Translation, Scaling, Rotation

UNIT-III: WINDOWING, CLIPPING AND 3D TRANSFORMATION(6Hrs.)
Windowing: Concept of window and viewport, viewing transformations
Line Clipping: Cohen Sutherland Method
Polygon Clipping: Sutherland Hodgman Method
3D Transformation: Translation, scaling, rotation about X, Y, Z

UNIT-IV: INTRODUCTION TO ANIMATION & VOCABULARY (6 Hrs.) What is animation? History of animation, Early animation devices, pros and cons of animation, Animation Vocabulary-Timeline, Framerate, Working on one's & two's, Shots & Scenes, Keyframes | Breakdowns | Inbetweens, Timing | Spacing | Easing Demonstration of animation terminology using tools
UNIT-V: PRINCIPLES OF ANIMATION & ITS TYPE (6 Hrs.) Principles of animation – (Squash and stretch, Anticipation, Staging, Straight ahead action and pose to pose, Follow through and overlapping action, Slow in and slow out, Arc, Secondary action, Timing, Exaggeration, Solid drawing, Appeal), Type of animation – Traditional animation, 2D animation, 3D animation, Typography Animation, Clay animation, Sand Animation, Flip book Animation, Stop-motion animation Demonstration of animation concepts using tools
UNIT -VI: PROCESS OF ANIMATION, SOFTWARE & HARDWARE (6 Hrs.) How animation works? Workflow of creating animation. Steps of making an animated film Animation Software, Animation Hardware.
Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(*if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):* NA

Text Books:

1. D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN81 – 7808 – 794 – 4
2. S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 –100472 – 6.
3. The complete animation course by Chris Patmore Pub.-Baron's Educational Series. (New York)
4. Animation Unleashed by Ellen Bessen, Michael Weise Productions,2008(U.S.A)

Reference Books:

1. D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw-HillPublication, 2001, ISBN 0 – 07 – 047371 – 4.
2. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
3. F.S. Hill JR, "Computer Graphics Using Open GL", Pearson Education
4. The Encyclopedia of Animation Techniques, Richard Taylor, 1996 (India)
5. Experimental Animation: An Illustrated Anthology by Robert Russet and Cecile Starr Pub.- Van Nostrand Reinhold Compa Pub.1976 (U.S.A)

E- Books / E- Learning References:

1. https://www.bloopanimation.com/animation-for-beginners/
2. https://www.digitalartsonline.co.uk/features/motion-graphics/best-websites-online-tools-for-learning-animation/

Second Year Information Technology (2022 Course) Organizational Behaviour				
Course Code:	**ITOEC406**	**Credit:**	**3**	
Contact Hrs.:	3 Hrs/week (L)	**Type of Course:**	Lecture	
Examination Scheme	40$	**60$$**		

Pre-requisites:
NA

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	MOOCs Assignments	External	40
2.	MOOCs Examination	External	60

Course Objectives	
1	To explain foundation of organizational behaviour and individual values, attitudes and emotions.
2	To describe individual values, attitude, perception, motivation, personality, misbehaviour and emotions.
3	To practice Group behaviour and its dynamics.
4	To practice the leadership types, theories and Power.
5	To explain conflict management, types and negotiations.
6	To provide the dynamics of organizational behaviour and managing change.
Course Outcomes: Students will be able to	
406.1	Describe various theories, concepts and terms used in the field of organizational behaviour
406.2	Apply individual values, attitude, perception, motivation, personality, misbehaviour and emotions.
406.3	Formulate approaches for group behaviour, team building and communication
406.4	Analyze the power and leadership quality.
406.5	Evaluate conflict management, types and negotiations.
406.6	Describe dynamics of organizational behaviour and managing change.

Topics covered:

UNIT-I: FUNDAMENTALS OF ORGANIZATIONAL BEHAVIOUR(4 hrs.)
Definition, need and importance of organizational behaviour, Nature and scope, Models of OB(Autocratic, Custodial, Supportive, Collegial & SOBC)
Values, Attitudes and Emotions: Introduction, Values, Attitudes, Definition and Concept of Emotions, Emotional Intelligence - Fundamentals of Emotional Intelligence, The Emotional Competence Framework, Benefits of Emotional Intelligence, difference between EQ and IQ,Case Study

UNIT-II: INDIVIDUAL BEHAVIOUR (4 hrs.)
Concept of perception, factors influencing perception, Stress Management, Personality and personal effectiveness, Learning process, Motivation: Importance, Types, Theories of Motivation (Content and Process theory), Case Study

UNIT-III: GROUP BEHAVIOUR (4 hrs.) Interpersonal Behaviour, understanding groups and teams, Groups in organizations, Group dynamics, Group decision making, Team building, Communication, Control, Johari Window, Case Study
UNIT-IV: LEADERSHIP AND POWER (4 hrs.) Meaning, Importance, Leadership styles, Behavioural Theories, Fiedler model, LMX theory and Path Goal theory, Leaders vs Managers, Power and Politics, Case Study
UNIT-V: CONFLICT MANAGEMENT (4 hrs.) Definition and Meaning, Sources of Conflict, Types of Conflict, Organization Conflicts and Negotiations, Case Study
UNIT-VI: DYNAMICS OF ORGANIZATIONAL BEHAVIOUR (4 hrs.) Organization Structure, Organizational culture and climate, Communication, Organizational change and development, methods for implementing organizational change, Case Study

Text Books:

1. Stephen P. Robins, Organizational Behavior, / Pearson Education
2. Fred Luthans, Organizational Behavior, McGraw Hill

Reference Books:

1. UdaiPareek, Understanding Organizational Behaviour, Oxford Higher Education
2. Margi Parikh and Rajan Gupta, Organizational Behaviour, McGraw Hill Education
3. S.S.Khanka,OrganisationalBehaviour,S.Chand&Co,New Delhi
4. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley
5. Mc Shane & Von Glinov, Organizational Behaviour, McGraw Hill

MOOC: Organizational Behaviour (12 weeks)

https://onlinecourses.nptel.ac.in/noc20_mg51/preview

Second Year Information Technology (2022 Course) Object Oriented Programming Lab			
Course Code:	**ITPCC407**	**Credit:**	**2**
Contact Hrs.:	4 Hrs/week (P)	**Type of Course:**	Practical
Examination Scheme	Term-work 25 Marks	Oral 25 Marks	

Pre-requisites:

- Programming and Problem Solving -I
- Programming and Problem Solving -II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25
2.	Oral	External	25

Course Objectives	
1	To implement object-oriented programming concepts
2	To handle exceptions using exception handling
3	To make use of collections for implementing generics
4	To use file handling for given problem

Course Outcomes: Students will be able to	
407.1	Study and installation of Tools for development and execution of java Programs
407.2	Write program for a given problems using OOP Concepts.
407.3	Use exception handling mechanism to manage exceptions
407.4	Make use of generic framework for given problems
407.5	Solve a database-oriented problem using file handling
407.6	Demonstrate and Present solution for given problems

List of Experiments

1. Study of different modern tools and Installation of JDK and Java IDE like Netbeans or Eclipse
2. Design a class for student entity and consider relevant abstract data. Accept and display the data for 5 objects using array of objects.
3. Design a class ‘Complex ‘with data members for real and imaginary part. Provide default and Parameterized constructors. Write a program to perform arithmetic operations of two complex numbers.
4. Identify commonalities and differences between Publication, Book and Magazine classes. Title, Price, Copies are common instance variables and saleCopy is common method. The differences are, Bookclass has author and order Copies(). Magazine Class has orderQty, Currentissue, receiveissue().Write a program to find how many copies of the given books are ordered and display total sale of publication
5. Design and develop inheritance for a given case study, identify objects and relationships and implement inheritance wherever applicable. Employee class with Emp_name, Emp_id, Address, Mail_id, and Mobile_no as members. Inherit the classes, Programmer,

Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary

6. Design a base class shape with two double type values and member functions to input the data and compute_area() for calculating area of figure. Derive two classes' triangle and rectangle. Make compute_area() as abstract function and redefine this function in the derived class to suit their requirements. Write a program that accepts dimensions of triangle/rectangle and display calculated area. Implement dynamic binding for given case study.
7. Design and develop a context for given case study and implement an interface for Vehicles Consider the example of vehicles like bicycle, car, and bike. All Vehicles have common functionalities such as Gear Change, Speed up and apply breaks .Make an interface and put all these common functionalities. Bicycle, Bike, Car classes should be implemented for all these functionalities in their own class in their own way.
8. Implement a program to handle Arithmetic exception, Array Index Out OfBounds.The user enters two numbers Num1 and Num2. The division of Num1 and Num2 is displayed. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception. Display the exception.
9. Implement a generic program using any collection class to count the number of elements in a collection that have a specific property such as even numbers, odd number, prime number and palindromes.
10. Implement a program for maintaining a student records database using File Handling.Student has Student_id,name,Roll_no, Class, marks and address. Display the data for five students.
    a) Create Database
    b) Display Database
    c) Clear Records
    d) Modify record
    e) Search Record

11. Using all concepts of Object-Oriented programming develop a solution for any application contains following operations such as
    a) Creation of database
    b) Addition of data
    c) Deletion of Data
    d) Updation of Data
    e) Display of Data

Oral Evaluation

1. Student will design and develop a mini project using object oriented concepts and present the same during OR exam.

Text Books:

1. Programming with Java, E Balagurusamy,Tata McGraw Hill

Reference Books:

1. Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.

2. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
3. Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.
4. Core Java Volume-I Fundamentals, Eight Edition, Horstmann& Cornell, Pearson Education.
5. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.
6. Java Programming, D. S. Malik, Cengage Learning.

E- Books / E- Learning References

1. https://www.w3schools.com/java/java_oop.asp
2. https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/
3. https://www.freecodecamp.org/news/object-oriented-programming-concepts-java/
4. https://www.guru99.com/java-oops-concept.html

Second Year Information Technology (2022 Course) Processor Architecture and Interfacing Lab				
Course Code:	**ITPCC408**	**Credit:**	**1**	
Contact Hrs.:	2Hrs/week (P)	**Type of Course:**	Practical	
Examination Scheme	Term-work 25 Marks	Practical 25 Marks		

Pre-requisites:

- Digital Electronics and Computer Organisation

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25
2.	Practical	External	25

Course Objectives	
1	To explain embedded C programming concepts to interface different I/O
2	To apply knowledge of programming for interfacing of different I/O
3	To make use of Python Programming to interface I/O using Raspberry Pi.

Course Outcomes : Students will be able to	
408.1	Write embedded C Program to interface different I/O
408.2	Write embedded C Program using serial communication protocols
408.3	Use python programming concepts to interface I/O using Raspberry Pi.

List of Experiments:

1. Parallel port interacting of LEDS—Different programs (flashing, Counter, BCD,HEX, Display of Characteristic)
2. Write a program for interfacing button, LED, relay & buzzer.
   On pressing button1 relay and buzzer is turned ON and LED‘s start chasing from left to right.
   On pressing button2 relay and buzzer is turned OFF and LED start chasingfrom right to left.
3. Interfacing 4X4 keypad and displaying key pressed on LCD.
4. Write an Embedded C program for External interrupt input switch press, output at relay
5. Generate square wave using timer with interrupt.
6. Interfacing serial port with PC both side communication.
7. Generation of PWM signal for DC Motor control.
8. Study of python programming language (Overview, syntax, One simple program like addition of two numbers).
9. Write a python program to add array of n numbers.
10. Write a python program to interface LED using raspberry Pi
11. Develop a mini project using any microcontroller.

Text Books:

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey ‘PIC Microcontroller and Embedded Systems using Assembly and C for PIC18’, Pearson Education 2008.
2. John Iovine, ‘PIC Microcontroller Project Book’, McGraw Hill 2000Understand the basics of embedded system

3. Ramesh Gaokar,Fundamentals of Microcontrollers and applixcationin Embedded sytem(With PIC 18 Microcontroller family)PenramInternational Publishing.

Reference Books:

1. Microcontroller from Assembly Language to C using PIC18FXX2, Robert B. Reese,Davinici Engineering press.
2. PIC Microcontroller: An Introduction to Software and Hardware Interfacing, Han
3. Way Huang, CengageLearning.Rajkamal, “Embedded Systems”, TMH, Second Edition.
4. Tony Givargis, “Embedded system design”, Wiley Student Edition.
5. Peatman,”Design with PICMicrocontroller”,Pearson Education.
6. Han-way Huang,”PICMicrocontroller”,India Edition

E- Books / E- Learning References

1. https://www.youtube.com/watch?v=sUkgUQ9mpcg&list=PL8G4ZtHAnWn3rrCZPIej2-eqk1bjKCsmL&index=49
2. https://www.youtube.com/watch?v=WGcierfsSNo&list=PL8G4ZtHAnWn3rrCZPIej2-eqk1bjKCsmL&index=50
3. https://www.youtube.com/watch?v=nLlBssKCN2w
4. https://nptel.ac.in/courses/117104072
5. https://nptel.ac.in/courses/108105102

Second Year Information Technology (2022 Course) Computer Graphics and Animation Lab				
Course Code:	**ITPCC409**	**Credit:**	**1**	
Contact Hrs.:	2 Hrs/week (L)	**Type of Course:**	Practical	
Examination Scheme	Term-work 25 Marks	Practical 25 Marks		

Pre-requisites:

- Data Structure and Algorithms

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25
2.	Practical	External	25

Course Objectives	
1	To explain basic concepts of graphics & Bresenham's line, DDA line and Bresenham's circle drawing algorithm using geometric, mathematical and algorithmic concepts.
2	To explain Polygon filling & 2D Transformation.
3	To explain 3D Transformation, windowing and clipping concepts
4	To describe basics of animation.
5	To explain principles and types of animation.
6	To explain the workflow of animation.

Course Outcomes: Students will be able to	
409.1	Study and installation of OpenGL
409.2	Write a program for a given problem using line drawing and circle drawing algorithm
409.3	Demonstrate different transformation and filling methods on polygon
409.4	Create the animation using software

List of Experiments

1. Install and explore the OpenGL.
2. Draw any line or shape using any Line drawing algorithms using following line patterns.
   i) Simple line ii) Dotted line iii) Dashed line iv) Solid line
   using mouse interface. Divide the screen in four quadrants with center as (0, 0). The line should work for all the slopes +ve, -ve, >1,<1.
3. Implement Bresenham's circle drawing algorithm to draw any object. The object should be displayed in all the quadrants with respect to center and radius.
4. Implement translation, rotation, scaling and shear transformation on Polygon
5. Implement the following polygon filling methods
   I. Floodfill or seed fill II. boundary fill
6. Create bouncing square within canvas using HTML and JavaScript.
7. Moving car animation using CSS.

8. Create a coffee machine animation using HTML, JavaScript and CSS.
9. Use graphics animation tools like Maya/Blender/3D Studio for creation of theme based animation.
10. Design and develop a mini project using computer graphics algorithms.

Text Books:

1. D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN81 – 7808 – 794 – 4
2. S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 –100472 – 6.

Reference Books:

1. D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 – 07 – 047371 – 4.
2. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
3. Foley,"Computer Graphics: Principles & Practice in C", 2e, ISBN 9788131705056, Pearson Edu.
4. F.S. Hill JR, "Computer Graphics Using Open GL", Pearson Education
5. Beginning Adobe Animate CC: Learn to Efficiently Create and Deploy Animated and Interactive Content - by Tom Green & Joseph L
6. Adobe Animate CC Classroom in a Book - by Russell Chun

E- Books / E- Learning References

1. https://www.bloopanimation.com/animation-for-beginners/
2. https://www.glprogramming.com/red/chapter01.html
3. https://www.w3schools.com/css/css_intro.asp
4. https://www.w3schools.com/html/html_intro.asp