NEHRU ARTS AND SCIENCE COLLEGE

(Autonomous)

(Reaccredited With "A" Grade by NAAC, ISO 9001: 2008 & 14001: 2004 Certified Recognized by UGC with 2(f) & 12(B) and Affiliated to Bharathiar University) Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105, Tamil Nadu.

DEPARTMENT OF COMPUTER APPLICATIONS

PROGRAMME OUTCOMES

On successful completion of the programme, the graduates will have

PO1	**Critical Thinking:** Understand the fundamental concepts of Computers, Business environment and IT application and business.
PO2	**Design/Development of Solution:** Understand & analyze technical data to reach actionable conclusions, including technological solutions to the business.
PO3	**Modern Tool Usage:** Learn technologies & Programming languages in addressing problems.
PO4	**The Social interaction:** Develop competent technical writing skills so as to enable the graduate to have effective communication in business.
PO5	**Environment and Sustainability:** Gain the attitude of continuous learning and deriving innovative ideas.
PO6	**Ethics:** Apply ethical principle and commit to professional ethics responsibilities as per the norms of the IT industry
PO7	**Individual and Team Work:** Adopt team building environment and will be a good team player.
PO8	**Communication:** Create improved communication and business management skills, especially in providing technical support.
PO9	**Project management and finance:** Attain clarity on both conceptual and application-oriented skills in commerce, Finance & Accounting and IT Applications in Business context.
PO10	**Lifelong learning:** Update technologies continuously.

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PROGRAMME SPECIFIC OUTCOMES (PSOs)

After the successful completion of the programme, the students are expected to

PSO1	Obtain ability to specify, design, develop, test and maintain usable software systems that behave reliably and efficiently and satisfy all the requirements that customers have defined for them.
PSO2	Gain skill to develop software systems that would perform tasks related to Research, Education and Training and/or E-governance
PSO3	Expertise in determining and optimizing the performance of a given algorithm on a given platform.
PSO4	Acquire capability to anticipate the changing direction of information technology and evaluate and communicate the likely utility of new technologies to an individual or organization
PSO5	Make the students capable in decision making at personal and professional level.

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Recognized by UGC with 2(f) &12(B), Under Star College Scheme by DBT, Govt. of India)
Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105, Tamil Nadu.

Scheme of Examination
BACHELOR OF COMPUTER APPLICATIONS
Programme Code: UCA
(Applicable to the students admitted during the year 2022-2023)

SEMESTER	Part	Course Code	Name of the Course	Instruction hours / week	Duration Hours	CIA	ESE	Total	Credits
I	I	22U1TAM101/ 22U1HIN101/ 22U1MAL101/ 22U1FRN101	Elanthamizh Rachnathmak Hindi Kadhayum Samskaaravum Le Francais Fondamental -I	5	3	50	50	100	4
	II	22U2ENG101	Professional English - I	5	3	50	50	100	4
	III	22U3CKC101	Core Paper I: Python Programming	4	3	50	50	100	4
		22U3CKC102	Core Paper II: Digital Fundamentals and Computer Architecture	4	3	50	50	100	4
		22U3CAP101	Core Paper III: Practical in Python Programming	4	3	50	50	100	4
		22U3MIA101	Allied Paper I: Mathematics for Computer Science	5	3	50	50	100	4
	IV	21U4ENV101	@Ability Enhancement Compulsory Course: Environmental Studies	2	3	50	-	50	2
		22U4HVY201	Value Education: Human Values and Yoga Practice	1	-	-	-	-	-
				30				**650**	**26**
II	I	22U1TAM202/ 22U1HIN202/ 22U1MAL202/ 22U1FRN202	Pynthamizh Sanchar Hindi Novalum Bhashaapadanavum Le Francais Fondamentale -II	5	3	50	50	100	4
	II	22U2ENG202	Professional English - II	5	3	50	50	100	4
	III	22U3CJC201	Core Paper IV: Java Programming	4	3	50	50	100	4
		22U3CKC204	Core Paper V: Data Structures	4	3	50	50	100	4
		22U3CAP202	Core Paper VI: Practical in Java and Network Programming	4	3	50	50	100	4
		22U3MIA202	Allied Paper II: Discrete Mathematics	5	3	50	50	100	4

Part	Course Code	Title						
IV	21U4HRC202	@ Ability Enhancement Compulsory Course: Human Rights and Constitution of India	2	3	50	-	50	2
	22U4HVY201	@ Value Education: Human Values and Yoga Practice	1	2	50	-	50	2
			30				700	28
I	22U1THA303/ 22U1HND303/ 22U1MLA303/ 22U1FEN303	Narunthamizh Prernathmak Hindi Sanchaarasaahithyam Le Francais Preliminaire	3	3	30	45	75	3
II	22U2ELS303	Technical English - I	3	3	30	45	75	3
III	22U3CKC305	Core Paper VII: Operating Systems	4	3	30	45	75	3
	22U3CJC302	Core Paper VIII: Relational Database Management Systems	4	3	30	45	75	3
	22U3CAP303	Core Paper IX: Practical in SQL and PL/SQL	3	3	25	25	50	2
	22U3MIA303	Allied Paper III: Operations Research	4	3	50	50	100	4
	22U3CAP304	Core Paper X: Practical in LINUX	2	3	25	25	50	2
IV	22U4CAZ301	Skill Based Paper I: Practical in Excel Macro	3	3	30	45	75	3
	22U4NM3BT1 / 22U4NM3AT1/ 22U4NM3CAF/ 22U4NM3GST/ 22U4NM3WRT	# @Basic Tamil – I / ##Advanced Tamil – I / * NME: Consumer Affairs / Gender Sensitization / Women's Rights	2	3	50		50	2
	SBOEC	Skill Based Open Elective Courses - Extra Departmental Course	2	3	-	50	50	2
	22U4CAVALC	Skill Enhancement: Value Added Course - Institute Industry Linkage	-	-	-	-	-	-
			30				675	27
I	22U1THA404/ 22U1HND404/ 22U1MLA404/ 22U1FEN404	Senthamizh Vaicharik Hindi Drisyakalayum Computarum Le Francais Elementaire	3	3	30	45	75	3
II	22U2ELS404	Technical English - II	3	3	30	45	75	3
III	22U3CAC405	Core Paper XI: .Net Programming	5	3	30	45	75	3
	22U3CKC408	Core Paper XII: Software Engineering	3	3	30	45	75	3
	22U3CAP406	Core Paper XIII: Practical in .Net Programming	4	3	25	25	50	2
	22U3BAA404	Allied Paper IV: Financial Accounting	5	3	30	45	75	3

IV	IV	22U4CAZ402	Skill Based Paper II: Practical in Multimedia Systems	3	3	30	45	75	3
		22U4NM4BT2 / 22U4NM4AT2/ 22U4NM4GEN	# @Basic Tamil – II / ##Advanced Tamil - II / General Awareness	2	3	50		50	2
		VBOEC	Value Based Open Elective Courses – Intra School Course	2	3	-	50	50	2
		22U4CAVALC	Skill Enhancement: Value Added Course - Institute Industry Linkage	-	-	-	-	-	Grade
				30				**600**	**24**
V	III	22U3CAC507	Core Paper XIV: Computer Networks	5	3	30	45	75	3
		22U3CAC508	Core Paper XV: Ethical Hacking	5	3	30	45	75	3
		22U3CKC509	Core Paper XVI: PHP Programming	5	3	30	45	75	3
		22U3CAP509	Core Paper XVII: Practical in PHP Programming	5	3	30	45	75	3
		22U3CKE501/ 22U3CKE502 22U3CKE503/ 22U3CKE504	Discipline Specific Elective Paper – I	6	3	30	45	75	3
		22U3CAV510	In-plant Training	-	-	50	-	50	2
	IV	22U4CAZ503	Skill Based Paper III: Practical in Internet of Things	4	3	30	45	75	3
				30				**500**	**20**
VI	III	22U3CKC611	Core Paper XVIII: Data Mining	6	3	50	50	100	4
		22U3CAV611	Project and Viva-Voce	6	-	50	50	100	4
		22U3CKE605/ 22U3CKE606/ 22U3CKE607/ 22U3CKE608	Discipline Specific Elective Paper - II	6	3	30	45	75	3
		22U3CAE609/ 22U3CAE610/ 22U3CAE611/ 22U3CAE612	Discipline Specific Elective Paper - III	6	3	30	45	75	3
	IV	22U4CAZ604	Skill Based Paper IV: Practical in R Programming	6	3	30	45	75	3
	V	22U5EXT601	Extension Activities	-	-	50	-	50	2
				30				**475**	**19**
			Total					**3600**	**144**
			Additional Credit Optional (II-VI)						**8$**

Basic Tamil -Students who have not studied Tamil up to 12th standard.

##**Advance Tamil** – Students who have studied Tamil language up to 12th standard and chosen other languages under part I of the UG programme but would like to advance their Tamil language skills.

* NME – Student shall choose any one course out of three courses.

@ No End Semester Examinations. Only Continuous Internal Assessment (CIA)

$ - Not included in Total marks and CGPA Calculation

** Examination and Evaluation for value added course shall be conducted by the Industry and the marks shall be submitted to the Controller of Examination for the award of the degree.

ELECTIVE PAPERS:

Elective Papers	Course Code	Name of the Course
Elective Paper - I	22U3CKE501	Blockchain Technology
	22U3CKE502	Next Generation Networks
	22U3CKE503	Internet of Things
	22U3CKE504	Big Data Analytics
Elective Paper - II	22U3CKE605	Software Quality Assurance
	22U3CKE606	Information Security
	22U3CKE607	Cloud Computing
	22U3CKE608	Cyber Security
Elective Paper - III	22U3CAE609	Artificial Intelligence
	22U3CAE610	Software Project Management
	22U3CAE611	Bioinformatics
	22U3CAE612	Mobile Application Development

EXTRA DEPARTMENTAL COURSE

S. No.	Semester	Course Code	Course Title
1	III	22U4CK3ED1	Multimedia Tools - Practical
2		22U4CK3ED2	Web Development using HTML - Practical

Intra School Course offered by the Department to other Department Students (within the School)

S. No.	Course Code	Name of the Course
1	22U4VBOE01	Design Ecosystem
2	22U4VBOE02	Design Thinking
3	22U4VBOE03	Disaster Management
4	22U4VBOE04	Environmental Pollution and Waste Management (EMS)
5	22U4VBOE05	History of Ancient India
6	22U4VBOE06	Indian Knowledge System
7	22U4VBOE07	Principles of IPR
8	22U4VBOE08	Science, Society and Culture
9	22U4VBOE09	Community Engagement
10	22U4VBOE10	Emotional Intelligence
11	22U4VBOE11	Fundamentals of Tourism
12	22U4VBOE12	Health Education
13	22U4VBOE13	Media and Politics
14	22U4VBOE14	Positive Psychology and Work Life
15	22U4VBOE15	Professional Ethics
16	22U4VBOE16	The Science of Happiness
17	NCC	

- NCC – Students who qualify NCC B Certificate Examination need not appear for these open Electives. The Credits shall be transferred.
- Students shall opt any course within their Schools.

Self-Study Paper offered by Department of Computer Applications:

S. No.	Semester	Course code	Course Title
1	Semester II to V	22UCASS01	Problem Solving and Programming
2		22UCASS02	Web Design Using HTML

(Dr. K. SECWAVIOVAYAKI)

Chairman

Board of Studies in Computer Applications

Nehru Arts and Science College

Coimbatore.

BoS - Chairman
Department of Computer Applications,
Nehru Arts and Science College,
Thirumalayampalayam, Coimbatore - 641105.

Academic Council
Dr B. Anirudhan
Chairman
Nehru Arts and Science College

Course Code	Title		
22U1TAM101 / 21U1TAM101	**PART-I - Elanthamizh (இளந்தமிழ்)**		
Semester: I	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
(Common to all UG Programmes)			

Course Objective	மொழி இலக்கியத்தின் வாயிலாக அறம் சார் பண்பு மற்றும் ஆளுமைமிக்க மாணவர்களை உருவாக்குதல்.
Course Category	**Skill Development** (மாணவர்களின் மொழித்திறனை ஊக்குவித்தல்)
Development Needs	**Regional** (உலக அளவில் தமிழ் மொழியின் அவசியத்தை உணர்த்துதல்)
Course Description	மாணவர்களின் மொழித்திறனை ஊக்குவித்தல் மற்றும் உலக அளவில் தமிழ் மொழியின் அவசியத்தை உணர்த்துதல்

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	சங்க இலக்கியங்கள் வாயிலாக சமூகச் சீர்திருத்தச் சிந் சிந்தனைகள் பெறப்படும்.	விரிவுரை/ காணொளிப்பட விளக்கம்	ஒப்படைவு
CO 2	அற இலக்கியங்களின் வழி தமிழர்களின் வாழ்வியல் பண்புகளைக் கற்று அறிதல்.	விரிவுரை	குழுத்திட்டம்
CO 3	பெண்ணியக் கவிஞர்களின் படைப்புத்திறனை மாணவர்களுக்குஉணர்த்துதல்	விரிவுரை/ காணொளிப்பட விளக்கம்	கருத்தரங்கு
CO 4	சிறுகதைகளின் வழி சமூக கருத்துகளை மாணவர்களுக்கு அறிவுறுத்தல்	விரிவுரை / குழு விவாதம்	ஒப்படைவு
CO 5	தமிழ் இலக்கிய வரலாற்றுத்திறனை வளர்த்தல்	விரிவுரை/ குழு விவாதம்	கருத்தரங்கு

Offered by	இளந்தமிழ்

Course Content இளந்தமிழ் (முதற்பருவம்)	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	சங்க இலக்கியம்	1. ஐங்குநூறு 2. பதிற்றுப்பத்து 3. பத்துப்பாட்டு - முல்லைப்பாட்டு 4. சிறுபாணாற்றுப்படை	கிள்ளைப்பத்து (281-290) பாடல்கள் இரண்டாம் பத்து (11 -15 ஐந்து பாடல்கள்) முல்லைப்பாட்டு முழுவதும் (1-103 வரிகள்) சேரநாட்டின் வளமை
	Instructional Hours		**15**
Suggested Learning Methods: நாடக முறையில் கலந்துரையாடல்			
II	அற இலக்கியம் நீதிநூல்கள்	1. அறன் வலியுறுத்தல் 2. புகழ் 3. வாய்மை 4. நாலடியார்-பொருட்பால் 5. நான்மணிக்கடிகை	31- 40 குறட்பாக்கள் 231 - 240 குறட்பாக்கள் 291 - 300 குறட்பாக்கள் 11 ஆவது அதிகாரம் (கூடா நட்பு 1-10) முதல் ஐந்து பாடல்கள்
	Instructional Hours		**15**
Suggested Learning Methods : ˙ கலந்துரையாடல்			
III	பெண்ணியக் கவிதைகள்	1. ஆண்டாள் பிரியதர்சினி 2. கவிஞர் இளம்பிறை 3. சுகிர்தராணி 4. அ. வெண்ணிலா	பூச்சிவாழ்க்கை- சுயம் பேசும் கிளி தொட்டிச்செடி அம்மா நீரில் அலையும் முகம்
	Instructional Hours		**15**
Suggested Learning Methods : புதுக்கவிதை எழுதும் திறன் பெற்றமை			

IV	சிறுகதைகள்	1. குட்டி ரேவதி 2. ஜெயமோகன் 3. ச.தமிழ்ச்செல்வன் 4. வண்ணநிலவன் 5. உமாமகேஸ்வரி	நிறைய அறைகள் உள்ள வீடு யானை டாக்டர் வெயிலோடு போய் எஸ்தர் மரப்பாச்சி

		Instructional Hours	15

Suggested Learning Methods : சிறுகதை படைக்கும் திறன் பெற்றமை

V	தமிழ் இலக்கிய வரலாறு	1. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் 2. சிறுகதையின் தோற்றமும் வளர்ச்சியும் 3. படிமம், குறியீடு பற்றிய – விளக்கம்	தமிழ் இலக்கிய வரலாறு

		Instructional Hours	15

Suggested Learning Methods : குழு விவாதம்

	Total Hours	75

Text Books	இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல்''**இளந்தமிழ்''** தொகுப்பு: தமிழ்த்துறை ,நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர்.
Reference Books	சங்க இலக்கியம்- உரையாசிரியர் ஒளவை துரைசாமிப்பிள்ளை, பதிப்பாசிரியர்கள் இரா.இளங்குமரனார்,முனைவர்.பி.தமிழகன் தமிழ் மண் அறக்கட்டளை, சென்னை.17 நிறைய அறைகள் உள்ளவீடு - குட்டிரேவதி எழுத்து பிரசுரம்,11மாடல் நகர்,10 வது வீதிவீதி,சென்னை.
Web. URLs	https://youtu.be/2SMM5LvZYo0

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Seminar	Assignment	Group Project	Total
8	8	10	8	8	8	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	H	H	M	H	-	-	-	-	-
CO2	-	-	M	-	H	L	H	H	-	-	-	-	-
CO3	-	-	L	-	M	M	H	H	-	-	-	-	-
CO4	-	-	H	-	H	M	M	L	-	-	-	-	-
CO5	-	-	H	-	H	L	H	H	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	
22U1HIN101	**Part - 1 : Rachnathmak Hindi**

Semester: I	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**

(Common to all UG Programmes)	
Course Objective	हिंदी भाषा का अच्छा ज्ञान प्राप्त करने के लिए।
Course Category	**Skill Development**
Development Needs	**Regional**
Course Description	**Improved accuracy & quality, improved communication**

Course Outcomes		**Teaching Methods**	**Assessment Methods**
CO 1	नाटक से रचनात्मकता का विकास होता है। यह हमारे आसपास की दुनिया को समझने में भी मदद करता है।	Lecture / Video Methods	Assignment
CO 2	कहानियां छात्रों की कल्पना और जिज्ञासा को जगाने में मदद करती हैं।	Case studies	Group Project
CO 3	व्याकरण हिंदी भाषा को सही ढंग से बोलने, लिखने और समझने में मदद करता है। विज्ञापन लेखन और कहानी लेखन छात्रों को उनके रचनात्मक लेखन और कल्पना शक्ति को विकसित करने में मदद करेगा।	Lectures / Video Lessons	Seminar
CO 4	अनुवाद सभी लोगों के बीच प्रभावी संचार को सक्षम बनाता है।	Lecture / Video Methods	Assignment
CO 5	गद्यांश लेखन लिखित पाठ के सार को समझने और संदर्भ के आधार पर आपके निष्कर्षों का अनुमान लगाने में आपकी बुद्धिमत्ता का आकलन करता है।	Lecture / Dumb Charades	Seminar

Offered by	**Hindi**

Course Content	**Instructional Hours / Week : 5**

Unit	**Description**	**Text Book**	**Chapters**
I	नाटक लड़ाई - 1979 - सर्वेश्वर दयाल सक्सेना	**1**	**All**
	Instructional Hours		**15**
Suggested Learning Methods : Visual Learning			
II	कहानी - 1. मजबूरी' - मन्नू भंडारी 2. ठाकुर का कुआँ - मुंशी प्रेमचंद 3. चीफ की दावत - भीष्म साहनी 4. भोलाराम का जीव -हरिशंकर परसाई	1	1 to 4
	Instructional Hours		**15**
Suggested Learning Methods : Auditory			

III	1. अनुप्रयुक्त व्याकरण - संज्ञा, सर्वनाम, क्रिया और विशेषण की पहचान करना। 2. विज्ञापन लेखन **3.** दिए गए संकेतों से कहानी लेखन।	1	1,2,3
		Instructional Hours	**15**

Suggested Learning Methods : Comprehensive writing

IV	अनुवाद : अंग्रेज़ी से हिंदी (अनुवाद अभ्यास - 3) 1 - 10 अनुच्छेद	3	1,2
		Instructional Hours	**15**

Suggested Learning Methods : Auditory, Visual

V	पारिभाषिक शब्दावली , गद्यांश लेखन	5	1,2
		Instructional Hours	**15**

Suggested Learning Methods : Comprehensive writing

	Total Hours	**75**

Text Books	1. नाटक लड़ाई - 1979 - सर्वेश्वर दयाल सक्सेना 2. 2. कहानी संग्रह 3. अनुवाद अभ्यास - 3 दक्षिण भारत हिंदी प्रचार सभा , चेन्नई -17 4. Bharatdarshan.co.nz 5. भाषाशास्त्र का पारिभाषिक शब्द कोश - राजेंद्र द्विवेदी 6. श्री रामदेव , व्याकरण प्रदीप, लोक भारती प्रकाशन, इलाहाबाद
Reference Books	संदर्भ ग्रंथ 1. हिंदी नाटक और रंगमंच - डॉ राम कुमार वर्मा 2. हिन्दी अलोचना की परीभाषिक शब्दावली - पेपरबैंक 3. आधुनिक हिंदी व्याकरण और रचना - डॉ. वासुदेव नंदन प्रसाद
Web. URLs	

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group project	Total
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	M	L	-	-					
CO2	-	-	H	L	L	H	-	-					
CO3	-	-	-	L	M	H	-	-					
CO4	-	-	M	M	H	L	-	-					
CO5	-	-	L	M	H	L	-	-					

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	
22U1MAL101	**Part - 1 Kadhayum Samskaaravum**

Semester: I	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**

(Common to all UG Programmes)	
Course Objective	ആധുനികകാലത്തെ മലയാളകഥകളെ കുറിച്ചും സംസ്കാരത്തെ കുറിച്ചും അവബോധം ഉണ്ടാക്കുന്നു
Course Category	Skill Development
Development Needs	Regional
Course Description	Improved accuracy & quality, improved communication

Course Outcomes		**Teaching Methods**	**Assessment Methods**
CO 1	കഥയുടെ സംവേദനം ആസ്വാദകന്റെ അഭിരുചിയെ പൂർത്തിയാക്കുന്നു	Lecture / Video Methods	Assignment
CO 2	പ്രകൃതിയുമായി ബന്ധപ്പെടുന്ന കഥാപരിസരം	Case studies	Group Project
CO 3	ഭക്ഷണവും അതിന്റെ സംസ്കാരവും കൂട്ടായ്മ ഉണ്ടാക്കുന്നു	Lectures / Video Lessons	Seminar
CO 4	ഭക്ഷണത്തിന്റെ മൂല്യം അർത്ഥവത്താക്കുന്നു	Lecture / Video Methods	Assignment
CO 5	ആശയ വിപുലനം	Lecture / Dumb Charades	Seminar

Offered by	**Department of Malayalam**

Course Content	**Instructional Hours / Week : 5**

Unit	**Description**	**Text Book**	**Chapters**
I	ചെറുകഥകൾ - സമകാലിക കഥകൾ 1. പരുന്ത് - E .സന്തോഷ്കുമാർ 2. പാലാഴിമഥനം - K .രേഖ 3. കുളവാഴ - വി .എം .ദേവദാസ് 4. മരണമുണ്ടാക്കിക്കളിക്കാം - പി .വി ഷാജികുമാർ 5. കക്കുകളി - ഫ്രാൻസിസ് നൊറോണ	1	1 to 5
	Instructional Hours		**15**
Suggested Learning Methods : Visual Learning			
II	നവോഥാനകഥകൾ 1. വെള്ളപ്പൊക്കത്തിൽ - തകഴി 2. ബസു യാത്ര - കേശവദേവ് 3. മരപ്പാവകൾ - കാരൂർ 4. മാണിക്കൻ - ലളിതാംബിക അന്തർജനം 5. ജന്മദിനം - ബഷീർ	1	6 to 10
	Instructional Hours		**15**
Suggested Learning Methods : Auditory			

III	സംസ്കാര പഠനം - കേരളത്തിലെ രുചിഭേദങ്ങൾ 1. കാസർകോടും കന്നയാളവും ദൈവവിപ്ലവത്തിന്റെ കണ്ണൂരും 2. സാമൂതിരി ,മുട്ടമാല ,എരന്ത് ,ബ്രാഹ്മണാൾ - (കോഴിക്കോട്) 3. മലപ്പുറം കേരളത്തിന്റെ അറേബ്യ	1	1,2,3
	Instructional Hours		**15**

Suggested Learning Methods : Comprehensive writing

IV	സംസ്കാര പഠനം - കേരളത്തിലെ രുചിഭേദങ്ങൾ 1. ചേട്ടായിയെ ഇത് ശൂരാട്ടാ - തൃശൂർ 2. കരിമ്പനകളുടെ നാട്ടിൽ - പാലക്കാട്	1	4,5
	Instructional Hours		**15**

Suggested Learning Methods : Auditory, Visual

V	നവമാധ്യമങ്ങൾ - വിവർത്തനം	1	1,2,3
	Instructional Hours		**15**

Suggested Learning Methods : Comprehensive writing

	Total Hours	**75**

Text Books	1. ചെറുകഥകൾ - (10 ചെറുകഥകൾ) 2. സംസ്കാര പഠനം - നാടൻ കേരള എക്സ്പ്രസ്സ് ഡോ.സി. ഗണേഷ്, ഗ്രീൻ ബുക്ക്സ് തൃശ്ശൂർ 3. നവമാധ്യമങ്ങൾ - ടി.കെ .സന്തോഷ്കുമാർ ഡി.സി.ബുക്ക്സ് കോട്ടയം
Reference Books	1. എം അച്യുതൻ - ചെറുകഥ ഇന്നലെ ഇന്ന് - ഡി.സി.ബുക്ക്സ് കോട്ടയം 2. ചെറുകഥയുടെ ഛന്ദസ്- വി. രാജകൃഷ്ണൻ മാതൃഭൂമി ബുക്സ് കോഴിക്കോട് 3. പുതിയ കഥ പുതിയ വായന - എഡി : ഡോ.ഷീബാ ദിവാകരൻ പുസ്തകലോകം പ്രസദ്ധീകരണം കോഴിക്കോട് 4. കേരള സംസ്കാരം - എ .ശ്രീധര മേനോൻ നാഷണൽ ബുക്ക്സ് കോട്ടയം 5. ന്യൂസ് റൂമിന്റെ അകവും പുറവും - ബി.ആർ .പി.ഭാസ്കർ ഗ്രീൻ ബുക്ക്സ് തൃശ്ശൂർ
Web. URLs	**http://www.keralaculture.org>literature**

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group project	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	H	H	-	-					
CO2	-	-	H	L	H	M	-	-					
CO3	-	-	-	M	M	H	-	-					
CO4	-	-	L	M	L	H	-	-					
CO5	-	-	L	-	H	-	-	-					

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U1FRN101/ 21U1FRN101	**Part - I LE FRANÇAIS FONDAMENTAL - I**		
Semester: I	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
	(Common to all UG Programmes)		
Course Objective	Acquisition of standard French through fundamental French grammar.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	This course has basic knowledge of the French grammar and aims to build a solid foundation in the acquisition of standard French through fundamental French grammar		

Course Outcomes		**Teaching Methods**	**Assessment Methods**
CO 1	Learn basic French grammar along with French civilisation	Lecture	Assignment
CO 2	Knows the gender of nouns	Word game/ Lecture	Seminar
CO 3	Learn Negation, articles, and understand the usage of prepositions.	Lectures / Video Lessons	Quiz
CO 4	Learn Futur proche, Pronominal verb,	Tutorial / Case Studies	Assignment
CO 5	Know to self-introduce and translate simple sentences	Lecture /	Group project

Offered by	**French**

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	Mes cinq sens en action	**1**	0
	Instructional Hours		**15**
Suggested Learning Methods: Worksheets , Reading practice			
II	S'ouvrir aux autres	1	1
	Instructional Hours		**15**
Suggested Learning Methods: Kahoot App, Worksheets			
III	Partager son lieu de vie	1	2
	Instructional Hours		**15**
Suggested Learning Methods : Audio & Visual, Speaking practice			
IV	Vivre au quotidien	1	3
	Instructional Hours		**15**
Suggested Learning Methods : Comprehensive Writing,			
V	S'ouvrir à la culture	1	4
	Instructional Hours		**15**
Suggested Learning Methods: Translating simple sentences, comprehending the passage.			
	Total Hours		**75**

Text Books	Saison 1 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix (Unit 0 to 4)
Reference books	A1 Echo Méthode de Français
Web. URLs	Lingua.com, TV 5 app,

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	H	H	-	-	-	-	-	-	-
CO2	-	-	H	L	H	M	-	-	-	-	-	-	-
CO3	-	-	-	M	M	H	-	-	-	-	-	-	-
CO4	-	-	L	M	L	H	-	-	-	-	-	-	-
CO5	-	-	L	-	H	-	-	-	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U2ENG101	**Part II - Professional English I**		
Semester: I	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
(Common to all UG Programmes)			
Course Objective	To help students to imbibe, develop, practice and use the LSRW skills and fine tune their productive skills.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	SD: Helps to develop LSRW skill		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recognize listening, and reading proficiency through the prose discourses.	Lecture/Tutorial	Assignment
CO 2	Use and interpret imaginative, and creative skills through the poetic genre.	Lecture/Tutorial	Assignment
CO 3	Enhance the students to use English effectively through short story.	Lecture/Tutorial	Speaking
CO 4	Execute and exercise grammatical skills in academics and career.	Lecture/Tutorial	Reading
CO 5	Evaluate the LSRW skills through literature.	Lecture/Tutorial	Writing

Offered by	**Department of English**

Course Content	**Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapters
I	**Prose** Leigh Hunt – Getting Up On Cold Morning Rajagopalachari – Tree Speaks A.G. Gardiner – On the Rule of the Road **Listening Activity** – Comprehension practice from Prose.	1	1-3
	Instructional Hours		**15**
Suggested Learning Methods : Cooperative Learning			
II	**Poetry** John Milton – On His Blindness Maya Angelou -Phenomenal Women A. K. Ramanujan – A River **Speaking Activity** – Group Discussion Forum	1	4-6
	Instructional Hours		**15**
Suggested Learning Methods : Inquiry Based Learning			
III	**Short Stories** O. Henry – The Last Leaf R. K. Narayan – The Missing Mail Oscar Wilde - The Happy Prince **Reading Activity** – Pronunciation practice and enhancement from Short-stories	1	7-9
	Instructional Hours		**15**
Suggested Learning Methods : Classroom Activity			

IV	**Grammar** Parts of Speech Tenses Kinds of Sentences **Writing Activity** – Paragraph Writing using grammar Components	1	10-13
		Instructional Hours	**15**

Suggested Learning Methods : Direct Method

V	**Writing Skills** Letter Writing (Formal & Informal) Notice, Writing Circular Memo, Advertisement Minutes of the Meeting	1	14-17
		Instructional Hours	**15**

Suggested Learning Methods : Activity Based Learning

	Total Hours	**75**

Text Books	Compiled by the Department of English, NASC.
Reference Books	CLIL (Content & Language Integrated Learning) – Module by TANSCHE NOTE: (Text: Prescribed chapters or pages will be given to the students by the department and the college)
Web. URLs	

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Speaking	Reading	Total
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	H	L	M	M	H	M	H	H	M	H	M
CO2	M	L	H	L	H	M	H	M	H	H	M	H	M
CO3	M	L	H	L	H	H	H	H	H	H	M	H	M
CO4	M	L	H	L	H	L	H	H	H	H	M	H	H
CO5	H	M	H	L	H	H	H	H	H	H	H	H	M

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U3CKC101 / 22U3CKC101	**Core Paper I: Python Programming**		
Semester: I	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**

(Common to B. Sc. IT / AIML / BCA)	
Course Objective	To develop algorithmic solutions to simple computational problems using Python
Course Category	Employability
Development Needs	Global
Course Description	Python is a versatile programming language that can be used in a variety of fields, such as software development, government administration, business, science, arts, education, and others

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand the basics of Python and write simple python program.	Lecture / Demonstration / Flipped Classroom	Assignment
CO 2	Develop Python programs with Control Statement and List method.	Demonstration / Constructivist Approach/ Tutorial	Seminar
CO 3	Apply Tuples, Functions and Set Iterators to develop simple applications	Lectures / Demonstration / Video Lessons	Quiz
CO 4	Apply Python Strings, Multithreading and Exceptions for problem solving.	Tutorial / Demonstration / Case Studies	Program Execution
CO 5	Manipulate Files and perform Event Handling.	Lecture / Demonstration / Class Projects	Program Execution

Offered by	**Information Technology**

Course Content	Instructional Hours / Week : 4

Unit	Description	Text Book	Chapters
I	**Fundamentals of Python Programming:** Introduction – Features – Applications – Installation-Sample Program-Python Virtual Machine-Memory management in Python-Comparison between C, Java and Python- Keywords, Identifiers, Statements, Indentation. Syntax and Styles: Data Types – Literals – Variables-Operators and Expressions-Evaluation of Expression-Sample Programs.	1	1,2
	Instructional Hours		**12**
Suggested Learning Methods: Video lectures about the basics of Python Programming			
II	**Control Flow:** If – While – For – Break – Continue-Pass-Entry Controlled Loop - Exit Controlled Loop – Counter Controlled Loop - Condition Controlled Loop - Nested Loop - Sample Programs. Arrays-Sequences - Python Lists: Read a List type from a Keyboard-Accessing Elements of a List- Modifying Elements of a List – BasicOperations - Built-in Functions – Python List Methods.	1,2	3,4,5,9
	Instructional Hours		12
Suggested Learning Methods: Practice using Flow Charts			

III	Tuples-Need of a Tuple-Sequence of Unpacking – Methods –Sample programs.Dictionaries:Making a Dictionary-Basic Operations-Dictionary Operations – Sets-Iterators and Generators – SamplePrograms. Functions: Defining Functions-Calling Functions-Passing Arguments-Keyword Arguments-Default Arguments-Required Arguments-Variable Length Arguments-Return Statements-Nesting of Passing Arguments-Anonymous Functions-Recursive Functions- Scope of Local and Global Variables.	1	6,7,8

Instructional Hours	12

Suggested Learning Methods: Develop small programmes using tuples	

IV	**Strings in Python:** Reading – Accessing – Modifying – Finding - Iterating through a String - Build-in String Functions.Errors and Exceptions – Multithreading	2	8

Instructional Hours	

Suggested Learning Methods: Develop small applications	

V	**Files and Directory Access:** Files and Streams - Opening a File - Reading/Writing Operations in a File - Other operations in a File - Iterating through a File - Splitting Words - Serialization and Deserialization. Events: Event Objects - Binding callbacks to events - Event names - Keyboard events - Mouse Events - Sample Programs	1	13,17

Instructional Hours	12

Suggested Learning Methods: Laboratory practice	

Total Hours	**60 Hrs**

Text Books	1. Ch.Satyanaryana, M.Radhika Mani, B.N. Jagadesh, Python Programming, University Press Pvt. Ltd.2018. 2. Dr.S.A.Kulkarni, Problem Solving and Python Programming, 2nd Edition, Yesdee Publishing,2018
Reference Books	1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers,2016 2. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd.,2011.
Web. URLs	

Tools for Assessment (50 Marks)						
CIA I	**CIA II**	**CIA III**	**Assignment**	**Seminar**	**Quiz**	**Total**
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping												
CO / PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	H	H	L	M	M	-	-	M	H	H	M	M
CO2	M	M	M	M	H	M	-	-	H	H	H	M	H
CO3	H	L	M	H	M	M	-	-	M	H	H	M	M
CO4	M	H	L	M	L	L	-	-	H	M	H	H	M
CO5	M	M	H	H	M	H	-	-	H	H	M	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
21U3CKC102/ 22U3CKC102	Core Paper II: Digital Fundamentals and Computer Architecture		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

(Common to B. Sc. CS / IT / BCA)	
Course Objective	To enable the students to know about the Operations in digital computer, Boolean algebra, CPU Architecture, memory design and its functionality
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	Understand Number Conversion, the concept of I/O organization and logic circuits.Analyze memory organization and multiprocessor in digital computers.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Perform number conversion and identify the logic gates.	Lecture, Problem Based Teaching and Tutorial	Quiz
CO 2	Design basic combinational logical circuit.	Lecture Demonstration	Quiz
CO 3	Understand the concept of I/O organization	Video Lessons	Assignment
CO 4	Apply priority to interrupts and use it for data transfer.	Lecture,Tutorial	Assignment
CO 5	Analyse memory organization and multiprocessor in digital computers.	Lecture,Tutorial	Seminar

Offered by	Computer Science

Course Content	Instructional Hours / Week: 4

Unit	Description	Text Book	Chapters
I	**Digital Logic – Digital Operations - Digital Computers.** **Number System and Binary Codes:** Decimal, Binary, Octal, Hexadecimal Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Serial Adder, Half subtractor, Full subtractor, Parallel binary subtractor-Digital Logic: The Basic Gates –NOR, NAND, XOR Gates.	1,2	1,3,4
	Instructional Hours		**12**
	Suggested Learning Methods: Number System Problem Solving		
II	**Combinational Logic Circuits:** Boolean algebra-Karnaugh map – Canonical form 1 – Construction and properties –Implicants – Don't care combinations - Product of sum, Sum of products, simplifications. Sequential circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers – Decoder -Encoder – shift registers-Counters	1,2	2,5,6
	Instructional Hours		**12**
	Suggested Learning Methods: Video Presentation		
III	**Input – Output Organization:** Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking- Modes of Transfer	3	11
	Instructional Hours		**12**
	Suggested Learning Methods: Report Preparation		

IV	**Priority Interrupt:** Daisy- Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication-Serial Communication-Character Oriented Protocol, Data Transparency, Bit Oriented Protocol.	3	11

Instructional Hours	**12**

Suggested Learning Methods: Report Preparation

V	**Memory Organization**: Memory Hierarchy – Main Memory-Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization. **Multiprocessor:Interconnection**Structure, Interprocessor Arbitration, Interprocessor Communication and Synchronization.	3	12

Instructional Hours	**12**

Suggested Learning Methods - Video Presentation

Total Hours	**60**

Text Books	1. V.K. Puri&Henry**Digital Electronics Circuits and Systems**, TMH, 1997. 2. M. Morris Mano, **Computer System Architecture**, PHI publications,2000.
Reference Books	1. M. Carter, Computer **Architecture**, Schaum'S Outline Series, TMH, 1996.
Web. URLs	https://www.educba.com/digital-computer-fundamentals/

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	**50**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H		M	M		M	H	H	H	H	M	M
CO2	H	H		M	M		M	H	H	H	H	M	M
CO3	H	H		M	M		M	H	H	H	H	H	H
CO4	H	H		M	M		M	H	H	H	H	H	H
CO5	H	H		M	M		M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U3CAP101 / 22U3CAP101	Core Paper III: Practical in Python Programming		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
(Bachelor of Computer Applications)			
Course Objective	To introduce the concepts of python programming constructs.		
Course Category	Skill Development /Employability/Entrepreneurship		
Development Needs	Global		
Course Description	To development skill set in python programming and apply the concepts to develop applications in order to meet the Local and Global needs.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Develop simple Python programs.	Program Demonstration, Projects	Program Creativity
CO 2	Understand and apply the concept of control statements.	Program Demonstration	Debugging
CO 3	Apply the concept of looping constructs and functions for solving basic programs.	Laboratory Practice,	Application of Logic
CO 4	Develop programs for sorting of Strings, Lists, Tuples and File handler.	Constructivist learning, Code review	Program Development
CO 5	Create programs using Linear and Binary Search Techniques	Demonstration, Projects	Program Development

Offered by	Computer Applications

Course Content	Instructional Hours / Week: 4

Unit	List of Practical
1	Write a python program that displays the following information: Your name, Full Address Mobile, number, College name, Course subjects.
2	Write a python program to find the largest three integers using if-else and conditional operator.
3	Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
4	Write a python program to find the product of two matrices.
5	Write recursive functions for GCD of two integers.
6	Write recursive functions for the factorial of positive integer.
7	Write recursive functions for Fibonacci Sequence up to given number n.
8	Write recursive functions to display prime number from 2 to n.
9	Write a python program that writes a series of random numbers to a file from1 to n and display.
10	Write a python program to sort a given sequence: String, List and Tuple.
11	Write a python program to make a simple calculator.

12	Write a python program for Linear Search and Binary Search.
13	Write python program in which a function (with single string parameter)is defined and calling that function prints the string parameters given to function.
14	Write python program in which a class is define, the n create object of that class and call simple print function define in class.

Total Hours	**60**

Suggested Learning Methods: Solving Case studies, Program development, Code Review and Peer Coding

Tools for Assessment (50 Marks)

Application of Logic	e- Program Creativity	e- Program Debugging	Test 1	Test 2	Observation Note Book	Total
8	8	8	10	10	6	**50**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	-	M	H	-	M	H	H	H	H	M	M
CO2	H	H	-	M	H	-	M	H	H	H	H	M	M
CO3	H	H	-	M	H	-	M	H	H	H	H	H	H
CO4	H	H	-	M	H	-	M	H	H	H	H	H	H
CO5	H	H	-	M	H	-	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3MIA101	**Allied Paper I : Mathematics for Computer Science**		
Semester : I	**Credits : 4**	**CIA : 50 Marks**	**ESE : 50 Marks**
(Common to B. Sc. DCFS / CS / IT / BCA)			
Course Objective	To enable the students to learn concepts of Statistical and Numerical Methods used in Computer applications.		
Course Category	Skill Development		
Development Needs	Regional		
Course Description	This course covers a mix of applied linear algebra, Statistics and Numerical Analysis; it covers a central point of contact between Mathematics and Computer science.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Know the concepts of Matrices and solve the problem using Eigen values.	Lectures / Video Lectures	Problem solving Skill
CO 2	Solve Simultaneous Linear algebraic equations.	Lectures / Tutorial	Assignment
CO 3	Relate various formulae in Numerical Differentiation and Integration	Lectures / Video Lectures	Seminar
CO 4	Evaluate the Measures of central tendency and dispersion.	Lectures / Peer Teaching	Problem solving Skill
CO 5	Analyse Correlation and Regression	Lecture / Tutorial	Quiz
Offered by	**Mathematics**		

Course Content		Instructional Hours / Week : 5	
Unit	**Description**	**Text Book**	**Chapters**
I	**Matrices:** Introduction – Types of Matrices –Matrix Operations - Determination – Inverse of a matrix – Rank of a Matrix. Eigen value Problems.	1,3	4
	Instructional Hours		**15**
Suggested Learning Methods: Problem Solving Practice			
II	**System of Simultaneous Linear Algebraic Equations:** Gauss Elimination, Gauss Jordon, Gauss Jacobi Method, Gauss Seidal method (up to 3x 3 matrices).	2	4
	Instructional Hours		**15**
Suggested Learning Methods: Class Test			
III	**Numerical Differentiations:** Newton's forward Difference - Backward Difference – Stirling's formula. **Numerical Integration:** Trapezoidal Rule - Simpson's $1/3^{rd}$ rule & Simpson's $3/8^{th}$ rule.	2	9
	Instructional Hours		**15**
Suggested Learning Methods: Problem Solving Practice			

IV	**Measures of Central Tendency:** Mean Median and Mode – Empirical Relationship between mean, median and mode. **Measures of Dispersion:** Range, Quartile deviation and Standard deviation.	3	7,8
		Instructional Hours	**15**

Suggested Learning Methods : Quiz

V	**Correlation:** Introduction, Scatter Diagram - Karl Pearson's Correlation and Spearman's Rank Correlation. **Regression:** Regression equation of variables – Linear Regression.	3	10,11
		Instructional Hours	**15**

Suggested Learning Methods: Problem Solving Practice

	Total Hours	**75**

Text Books	1. P. Kandasamy, K.Thilgavathy, K. Gunavathy, **Engineering Mathematics, Volume I**, S.Chand Company, 2006. 2. P.Kandasamy, K.Thilagavathy and K.Gunavathy, **Numerical Methods**, S.Chand& Company LTD, Revised 2005. 3. S. P. Gupta, **Statistical Methods**, Sultan Chand & Sons, Fourth edition, Reprint 2017.
Reference Books	1. E. Balagurusamy, **Numerical Methods**, Tata McGraw Hill publishing company LTD, Reprint, 2008. 2. P.A.Navanitham, **Business Mathematics and Statistics**, **(Part II),** Jai Publishers, Trichy – 21.
Web. URLs	1. https://youtu.be/MG7t6SWBnwA 2. https://www.youtube.com/watch?v=1MiT06JFNo4

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Problem Solving Skills	Assignment	Seminar	Total
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	M	M	M	L	H	H	H	H	H
CO2	H	H	L	M	M	M	M	L	M	M	H	M	M
CO3	H	M	L	M	M	M	M	L	M	L	H	H	M
CO4	H	M	L	M	M	M	M	L	H	M	H	M	H
CO5	H	M	L	M	M	M	M	L	H	M	H	H	M

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title	
21U4ENV101	Ability Enhancement Compulsory Course - Environmental Studies	
Semester : I	Credits : 2	CIA : 50 Marks

(Common to all UG Programmes)

Course Objective:

       This course enables the students to recognize the interconnectedness of multiple factors in environmental challenges and communicate clearly and competently matters of environment concern.

Course Outcomes:

       On completion of course the students will be able to

CO 1	Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
CO 2	Understand concepts and methods from ecological and physical sciences and their application in environmental problem solving.
CO 3	Solve the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO 4	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
CO 5	Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes.

Course Content   **Instructional Hours / Week : 2**

Unit	Description	Text Book	Chapter
I	**Natural Resources:** Forest resources, Water resources, Mineral resources, Food resources, Energy resources and Land resources.	1	2
	Instructional Hours		**6**
II	**Ecosystems:** Concept of an ecosystem, Structure and function; Introduction, types, characteristic features, structure and function of ecosystem - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). **Activity: Prepare an album on types of Ecosystem.**	1	3
	Instructional Hours		**6**
III	**Environmental Pollution:** Definition Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution and Noise pollution, Solid waste management. **Activity: Discuss the solutions for water pollution**	1	5
	Instructional Hours		**6**
IV	**Social Issues and the Environment:** Water conservation, rain water harvesting, watershed management, Environmental ethics - Issue summits' and possible solutions and Public awareness. **Activity: Identify and analyse a Social Issue and an Environment issue in your locality.**	1	6
	Instructional Hours		**6**

V	**Disaster Management:** Floods, Earthquakes, Cyclones, Landslides: From management to mitigation of disasters: The main elements of a mitigation and measures of strategy: Floods, Earthquakes, Cyclones and Landslides	2	16
	Instructional Hours		**6**
Field Work: Visit to local area to document Environmental assets (River / Forest / Grass land / Mountain), Visit to local polluted site (Urban / Rural /industrial / Agricultural), Study of common plants, insects, birds, Study of simple ecosystem: Pond, River, Hill slopes.			
	Total Hours		**30**

Text Book(s):

1. Shashi Chawla. A Text Book of Environmental Studies, Tata McGraw-Hill, 2012.

2. From UGC website: https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

Reference Book(s):

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd., Bikaner.

2. Jadhav, H & Bhosale, V.M. 1995 Environmental Protection and Laws Himalaya Pub. House, Delhi 284 p.

3. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions

4. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p

5. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt. Ltd., 345 p.

Tools for Assessment (50 Marks)

Ecosystem Album Preparation	Field visit and report submission	Group discussions about issues related to their locality / about Disaster Management	CIA	Total
10	10	5	25	50

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	-	L	H	H	H	H	L					
CO2	L	-	L	H	H	H	H	L					
CO3	L	-	L	H	H	H	H	L					
CO4	L	-	L	H	H	H	H	L					
CO5	L	-	L	H	H	H	H	L					

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U1TAM202 / 21U1TAM202	**PART - I - PYNTHAMIZH** (பைந்தமிழ்)		
Semester: II	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
(Common to all UG Programmes)			

Course Objective	மொழி இலக்கியத்தின் வாயிலாக அறம் சார் பண்பு மற்றும் ஆளுமைமிக்க மாணவர்களை உருவாக்குதல்.
Course Category	**Skill Development** (மாணவர்களின் மொழித்திறனை ஊக்குவித்தல்)
Development Needs	**Regional** (உலக அளவில் தமிழ் மொழியின் அவசியத்தை உணர்த்துதல்)
Course Description	மாணவர்களின் மொழித்திறனை ஊக்குவித்தல் மற்றும் உலக அளவில் தமிழ் மொழியின் அவசியத்தை உணர்த்துதல்

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	பக்தி இலக்கியங்கள வழி வாழ்வியல் நெறிகளை மாணவர்களுக்கு எடுத்துரைத்தல்	விரிவுரை/காணொளிப்பட விளக்கம்	ஒப்படைவு
CO 2	சிற்றிலக்கியங்களின் மூலம் தமிழர்களின் வாழ்க்கை கூறுகளை எடுத்துரைத்தல்	விரிவுரை	குழுதிட்டம்
CO 3	தமிழ் நாவல்களின் வழி சமுதாயச் சிந்தனைகளைக்கூறுதல்	விரிவுரை/காணொளிப்பட விளக்கம்	கருத்தரங்கு
CO 4	இலக்கண அறிவை வளர்த்தல்	விரிவுரை	ஒப்படைவு
CO 5	தமிழ் இலக்கிய வரலாற்றுத்திறனை மேம்பாடு அடையச் செய்தல்	விரிவுரை/ குழு விவாதம்	கருத்தரங்கு

Offered by	பைந்தமிழ்

Course Content பைந்தமிழ் (இரண்டாம்பருவம்)	Instructional Hours / Week : 5

Unit		Description	Text Book & Chapters
I	பக்தி இலக்கியங்கள்	1. திருமந்திரம் - மூன்றாம் தந்திரம் (அதிகாரம் 2) 2. நாலாயிரத் திவ்வியப்பிரபந்தம்- பெரியாழ்வார் 3. மாணிக்கவாசகர்-எட்டாம்திருமுறை 4. திருநாவுக்கரசர்- திருவரங்கமாலை	அட்டமாசித்திகள் திருப்பல்லாண்டு அச்சோப்பதிகம் நான்காம்திருமுறை - தேவாரம்
		Instructional Hours	**15**
Suggested Learning Methods: ஆன்மிக சிந்தனைத்திறன் பெற்றமை			**2 Hrs**
II	சிற்றிலக்கியங்கள்	1. கலம்பகம் - நந்திக்கலம்பகம் 2. பள்ளு – முக்கூடற்பள்ளு 3. குறவஞ்சி – திருக்குற்றாலக்குறவஞ்சி 4. பிள்ளைத்தமிழ் - மீனாட்சியம்மை பிள்ளைத்தமிழ 5. பட்டினத்தார்பாடல்கள்	91 -100 பாடல்கள் 350 – 360- செய்யுள்கள் 1-10- செய்யுள்கள் 1 -10- செய்யுள்கள் 358 – 367 பாடல்கள்
		Instructional Hours	**15**
Suggested Learning Methods : கலந்துரையாடல்			**02 Hrs**
III	நாவல்	1. இமையம் (வெ.அண்ணாமலை)	செல்லாதபணம்
		Instructional Hours	**15**
Suggested Learning Methods : நாவல் எழுதும் திறன் பெற்றமை			**02 Hrs**

IV	இலக்கணம்	1. வல்லினம் மிகும் இடங்கள் 2. வல்லினம் மிகா இடங்கள் 3. யாப்பின் உறுப்புகள் (எழுத்து முதல் தொடை வரை) 4. பாவின் வகைகள்	தமிழ் இலக்கணம்

Instructional Hours	**15**

Suggested Learning Methods : பிழையின்றி தமிழ் எழுதுதல்	**02 Hrs**

V	தமிழ் இலக்கிய வரலாறு	1. சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும் 2. புதினத்தின் தோற்றமும் வளர்ச்சியும் 3. பக்தி இலக்கியத்தின் தோற்றமும் வளர்ச்சியும் 4. விண்ணப்பங்கள்,மடல்கள்,எழுதச் செய்தல்	தமிழ் இலக்கிய வரலாறு

Instructional Hours	**15**

Suggested Learning Methods : குழு விவாதம்	**02 Hrs**

Total Hours	**75**

Text Books	1. இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல் **"பைந்தமிழ்"** தொகுப்பு: தமிழ்த்துறை, நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர்.
Reference Books	1. திருமந்திரம் - மாணிக்கவாசகர் அருளிய திருவாசகம் - சித்தாந்த பண்டிதர் திரு.ப.இராமநாத பிள்ளை விளக்க உரையுடன் கழக வெளியீடு, திருநெல்வேலி, 2. தமிழண்ணல்-புதிய நோக்கில் தமிழ் இலக்கியவரலாறு, மீனாட்சி புத்தகநிலையம் மதுரை.
Web. URLs	https://youtu.be/cL89sSZq_FI

Tools for Assessment (50 Marks)						
CIA I	**CIA II**	**CIA III**	**Seminar**	**Assignment**	**Group Project**	**Total**
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping												
PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	H	H	M	H	-	-	-	-	-
CO2	-	-	M	-	H	L	H	H	-	-	-	-	-
CO3	-	-	L	-	M	M	H	H	-	-	-	-	-
CO4	-	-	H	-	H	M	M	L	-	-	-	-	-
CO5	-	-	H	-	H	L	H	H	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title
22U1HIN202	**Part - 1 : Sanchar Hindi**

Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

| **(Common to all UG Programmes)** ||||

Course Objective	पाठ्यक्रम संवादी हिंदी में पारंगत होने में मदद करता है।
Course Category	Skill Development
Development Needs	Regional
Course Description	Improved accuracy & quality, improved communication

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	कविता की मूल शब्दावली और व्यावहारिक तत्वों को समझें। मुक्त छंद और कविता के पारंपरिक रूपों में अंतर्निहित सामान्य तकनीकों को समझें।	Lecture / Video Methods	Assignment
CO 2	छात्र विभिन्न प्रकार की संवादात्मक स्थितियों में हिंदी में प्रदर्शित करने, चित्रित करने, नाटक करने और व्याख्या करने के लिए अर्जित कौशल को लागू करने में सक्षम होंगे	Case studies	Group Project
CO 3	छात्र औपचारिक और अनौपचारिक पत्र लिखने में सक्षम होंगे।	Lectures / Video Lessons	Seminar
CO 4	अनुवाद सभी लोगों के बीच प्रभावी संचार को सक्षम बनाता है।	Lecture / Video Methods	Assignment
CO 5	छात्र हिंदी भाषा के वक्ता के साथ किसी भी सामान्य विषय पर विभिन्न स्तरों पर बातचीत करने में सक्षम होंगे ।	Lecture / Dumb Charades	Seminar

Offered by	Hindi

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	आधुनिक हिंदी काव्य : रश्मिरथी , रामधारी सिंह 'दिनकर'	1	All
	Instructional Hours		**15**
Suggested Learning Methods : Visual Learning			**02 Hrs**
II	एकांकी संग्रह : 1. शिवाजी का सच्चा स्वरूप - (सेठ गोविंददास) 2. औरंगजेब की आखिरी रात - रामकुमार वर्मा 3. रीढ़ की हड्डी - (जगदीशचंद्र माथुर) 4. सिपाही की माँ - (मोहन राकेश	1	1 to 4
	Instructional Hours		**15**
Suggested Learning Methods : Auditory			**02 Hrs**

III	पत्र लेखन : (छुट्टी पत्र , संपादक को पत्र , पुस्तकों के लिए आदेश पत्र , नौकरी के लिए आवेदन पत्र , निजी पत्र)	1	1,2,3
		Instructional Hours	**15**
Suggested Learning Methods : Comprehensive writing			**02 Hrs**
IV	अनुवाद : हिंदी से अंग्रेजी (अनुवाद अभ्यास - 3) 1 - 10 passages	3	1,2
		Instructional Hours	**15**
Suggested Learning Methods : Auditory, Visual			**02 Hrs**
V	बोलचाल की हिन्दी : 1. शिक्षक - विद्यार्थी 2. ग्राहक-दुकानदार 3. डॉक्टर - रोगी, 4. साक्षात्कार 5. दो यात्री 6. माँ - बेटा	5	1,2
		Instructional Hours	**15**
Suggested Learning Methods : Comprehensive writing			**02 Hrs**
		Total Hours	**75**

Reference Books	1. रश्मिरथी / रामधारी सिंह "दिनकर" - कविता कोश 2. सरस एकांकी नाटक : डॉ. रामकुमार वर्मा 3. अनुवाद अभ्यास - 3 दक्षिण भारत हिंदी प्रचार सभा , चेन्नई -1
Reference Books	1. श्रेष्ठ हिन्दी एकांकी -डॉ विजयपाल सिंह 2. बोलचाल : पं० अयोध्या सिंह उपाध्याय 3. हिंदी व्याकरण निबंध और पत्र लेखन -डॉ. एन. एल. माथुर
Web. URLs	**www.webdunia.com**

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group project	Total
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	L	M	-	-					
CO2	-	-	H	L	H	H	-	-					
CO3	-	-	L	L	M	H	-	-					
CO4	-	-	M	M	L	L	-	-					
CO5	-	-	L	M	M	M	-	-					

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	
22U1MAL202	**Part - 1 : Novalum Bhashaapadanavum**
Semester: II	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**

(Common to all UG Programmes)	
Course Objective	വിദ്യാർത്ഥികളിൽ മലയാള ഭാഷയുടെ വികാസവും മലയാള സാഹിത്യത്തിൽ നോവലുകൾക്കുള്ള സ്ഥാനവും വായനാശീലവും വർദ്ധിപ്പിക്കുന്നു
Course Category	**Skill Development**
Development Needs	**Regional**
Course Description	**Proper guidance, opportunities and encouragement that help them achieve their ambitions**

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	സമൂഹത്തിലെ ഒരു വിഭാഗത്തിന്റെ ജീവിതം	Lecture / Video Methods	Assignment
CO 2	പ്രകൃതിയും മറ്റു ജീവജാലങ്ങളുടെയും മാറ്റങ്ങൾ	Case studies	Group Project
CO 3	പ്രകൃതി നാശത്തിനെതിരായി ഒന്നിച്ചു പ്രവർത്തിക്കുന്നു	Lectures / Video Lessons	Seminar
CO 4	സമൂഹത്തിലെ ഭാഷാസങ്കല്പം തിരിച്ചറിയുന്നു	Lecture / Video Methods	Assignment
CO 5	നല്ല ഭാഷ എങ്ങനെ സൃഷ്ടിക്കാമെന്ന് മനസ്സിലാക്കുന്നു	Lecture / Dumb Charades	Seminar

Offered by	Malayalam

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	നോവൽ - എൻമകജെ	1	1 to 16
	Instructional Hours		15
Suggested Learning Methods : Visual Learning			**02 Hrs**
II	നോവൽ - എൻമകജെ	1	17 to 34
	Instructional Hours		15
Suggested Learning Methods : Auditory			**02 Hrs**
III	നോവൽ - എൻമകജെ	1	35 to 51
	Instructional Hours		15
Suggested Learning Methods : Comprehensive writing			**02 Hrs**
IV	ഭാഷാപഠനം - തെളിമലയാളം	1	1,2,3
	Instructional Hours		15

Suggested Learning Methods : Auditory, Visual			**02 Hrs**
V	ഭാഷാപഠനം - തെളിമലയാളം	1	4,5
		Instructional Hours	**15**
Suggested Learning Methods : Comprehensive writing			**02 Hrs**
		Total Hours	75 Hrs

Text Books	1. അംബികാസുതൻ മാങ്ങാട് - എൻമകജെ - ഡി.സി.ബുക്സ് കോട്ടയം 2. എം.എൻ.കാരശ്ശേരി - തെളിമലയാളം - ഡി.സി.ബുക്സ് കോട്ടയം
Reference Books	1. പ്രൊഫ.എൻ.കൃഷ്ണപ്പിള്ള - കൈരളിയുടെ കഥ - ഡി.സി.ബുക്സ് കോട്ടയം 2. ഡോ. പന്മന രാമചന്ദ്രൻ നായർ - സമ്പൂർണ്ണമലയാള സാഹിത്യ ചരിത്രം - ഡി.സി.ബുക്സ് കോട്ടയം 3. ഡോ.കെ.എം. ജോർജ് - ആധുനിക മലയാള സാഹിത്യ ചരിത്രം പ്രസ്ഥാനങ്ങളിലൂടെ - ഡി.സി.ബുക്സ് കോട്ടയം 4. എരുമേലി - മലയാള സാഹിത്യം കാലഘട്ടത്തിലൂട - ഡി.സി.ബുക്സ് കോട്ടയം
Web. URLs	http://www.keralaculture.org>literature http://www.manoramaonline.com

Tools for Assessment (50 Marks)						
CIA I	**CIA II**	**CIA III**	**Assignment**	**Seminar**	**Group project**	**Total**
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping												
CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	H	H	H							
CO2	-	-	H	M	H	M							
CO3	-	-	M	M	M	H							
CO4	-	-	L	H	L	H							
CO5	-	-	L	M	L	H							

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U1FRN202/ 21U1FRN202	**Part-I LE FRANÇAIS FONDAMENTAL - II**		
Semester: II	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
(Common to all UG Programmes)			
Course Objective	This course is comprised of deep study of grammar categories and aims to apply the grammatical structures correctly.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	This course aims to develop communicative competence of the students in French, to create cultural awareness, to promote autonomy in learning French.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Acquire an understanding of French culture, use the basic foundation of verbs.	Lecture	Assignment
CO 2	Describe a place, learn pronom en, y and adjectives.	Tutorial / Case Studies	Seminar
CO 3	Recall the tenses and learn Imparfait tense	Lectures / Video Lessons	Quiz
CO 4	Write about the weather and learn pronom COD,	Word game / Lecture	Assignment
CO 5	Write short passages and translate, Comprehend the passage and learn pronom COI	Lecture	Group project

Offered by	**Department of French**

Course Content	**Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapters
I	Goûter à la campagne	1	5
	Instructional Hours		**15**
Suggested Learning Methods: Worksheets, TV5 App			
II	Voyager dans sa ville	1	6
	Instructional Hours		**15**
Suggested Learning Methods: Kahoot App, Duolingo			
III	Faire du neuf avec du vieux	1	7
	Instructional Hours		**15**
Suggested Learning Methods : Comprehensive Writing			
IV	Changer d'air	1	8
	Instructional Hours		**15**
Suggested Learning Methods : Comprehensive Writing			
V	Devenir éco-citoyen	1	9
	Instructional Hours		**15**
Suggested Learning Methods : Translating simple sentences and short passages			
	Total Hours		**75**

Text Books	Saison 1 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix (Unit 5 to 9)
Reference Books	A1 Echo Méthode de Français
Web. URLs	Lingua.com, TV 5 app, Learn French by podcast (spotify)

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	H	H	-	-	-	-	-	-	-
CO2	-	-	H	L	H	M	-	-	-	-	-	-	-
CO3	-	-	-	M	M	H	-	-	-	-	-	-	-
CO4	-	-	L	M	L	H	-	-	-	-	-	-	-
CO5	-	-	L	-	H	-	-	-	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U2ENG202	**Part II - Professional English II**		
Semester: II	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
(Common to all UG Programmes)			
Course Objective	To equip the students with the language skills and its functional usage. Facilitate the insight and taste of Literature.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	SD: Helps to develop LSRW skill		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Mastering life skills through prose discourse.	Lecture/Tutorial	Assignment
CO 2	Acquire ethics and values through poetic genre.	Lecture/Tutorial	Assignment
CO 3	Recognise the nuances of English language through short stories.	Lecture/Tutorial	Speaking
CO 4	Enhance fluency over language with self-confidence.	Lecture/Tutorial	Reading
CO 5	Examine how the language is used in literature and develop LSRW Skills	Lecture/Tutorial	Writing

Offered by	**Department of English**

Course Content	**Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapters
I	**Prose** E.M. Forster - Tolerance Mahatma Gandhi - Women Not the Weaker Sex Issac Asimov - The Fun They had **Listening Activity** – Comprehension practice from Prose.	1	1-3
	Instructional Hours		**15**
Suggested Learning Methods : Cooperative Learning			
II	**Poetry** Robert Frost - Stopping by Woods on a Snowy Evening William Blake - A Poison Tree Alexander Pope – Ode on Solitude **Speaking Activity** – Group Discussion Forum	1	4-6
	Instructional Hours		**15**
Suggested Learning Methods : Inquiry Based Learning			
III	**Short Stories** Mark Twain - The Cat and the Painkiller Japanese Folk Tale - The Envious Neighbour Hector Hugh Munro (Saki) – The Open Window **Reading Activity** – Pronunciation practice and enhancement from Short-stories	1	7-9

			Instructional Hours	15
Suggested Learning Methods : Classroom Activity				
IV	**Grammar** Articles Concord Active and Passive Voices Direct and Indirect Speech **Writing Activity** – Paragraph Writing using grammar Components	1	10-13	
			Instructional Hours	15
Suggested Learning Methods : Direct Method				
V	**Writing Skills** Resume Writing Email Writing Dialogue Writing Testimonial Writing Creative Writing	1	14-17	
			Instructional Hours	15
Suggested Learning Methods : Activity Based Learning				
			Total Hours	75

Text Books	Compiled by the Department of English NASC.
Reference Books	CLIL (Content & Language Integrated Learning) – Module by TANSCHE NOTE: (Text: Prescribed chapters or pages will be given to the students by the department and the college)
Web. URLs	

Tools for Assessment (50 Marks)						
CIA I	CIA II	CIA III	Assignment	Speaking	Reading	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	H	L	M	M	H	M	H	H	M	H	M
CO2	M	L	H	L	H	M	H	M	H	H	M	H	M
CO3	M	L	H	L	H	H	H	H	H	H	M	H	M
CO4	M	L	H	L	H	L	H	H	H	H	M	H	H
CO5	H	M	H	L	H	H	H	H	H	H	H	H	M

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CJC201	**Core Paper IV: Java Programming**		
Semester: II	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
	(Common to B. Sc. AIML / BCA)		
Course Objective	To gain knowledge about basic Java language syntax and semantics to write java programs and understand the principles of classes, methods, inheritance, polymorphism and packages.		
Course Category	Skill Development /Employability/Entrepreneurship		
Development Needs	Global		
Course Description	To understand the Object-Oriented Paradigm for developing programs using Control statements, Arrays, Packages, Interfaces, Exceptional Handling, Multi-threading and createnetworking applications		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Remember the fundamental concepts of Object-oriented Programming.	Lecture / Demonstration	Class Participation
CO 2	Develop simple Java programs with Control statements and arrays.	Demonstration, Constructivist learning	Quiz
CO 3	Apply the principles of packages and interfaces.	Constructivist learning Demonstration	Seminar
CO 4	Design Java application using the concepts of Exception Handling and Multithreading.	Lecture, Constructivist learning,	Seminar
CO 5	Develop applications using IO Streams and AWT.	Problem-based Teaching, Constructivist learning	Assignment

Offered by	Computer Science

Course Content	Instructional Hours / Week: 4

Unit	Description	Text Book	Chapters
I	**Fundamentals of Object-Oriented Programming:** Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object-Oriented Programming. **Java Evolution:** History – Features – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers. **Overview of Java:** simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine-Command Line Arguments.	1	1,2,3
	Instructional Hours		**12**
	Suggested Learning Methods: Code Debugging		
II	Constants, Variables, Data Types, Operators and Expressions, **Decision Making and Branching:** if, if...else, nested if, switch,? : Operator, **Decision Making and Looping:** while, do, for – Jumps in Loops - Labelled Loops, Classes, Objects and Methods. **Arrays:** One Dimensional Array-Creating an Array- Two Dimensional Array.	1	4,5,6,7 & 8
	Instructional Hours		**12**
	Suggested Learning Methods: Code Debugging		
III	**Interfaces: Multiple Interface-**Introduction-Defining Interface-Extending Interface-Implementing Interface-Accessing Interface Variables. **Packages:** Introduction-Java API Packages-Using System Packages-Naming Conventions-Creating Packages-Accessing a Package-Using a Package-Adding a Class to a	1	10,11 & 12

		Package-Hiding Classes-Static Import.		
		Instructional Hours		**12**
		Suggested Learning Methods: Simple Application Development		
IV		**Exception Handling:** Fundamentals-Hierarchy of the Exception Classes- Types of Exception –Exception Class-Uncaught Exceptions-Handling Exception-User Defined Exception. **Multithreaded Programming:** The Java Thread Model-Concept of Thread-Runnable Interface-Thread Class-Thread Creation-Thread's Life Cycle-Thread Scheduling-Synchronization and Deadlock-Inter Thread Communication-Joining Threads-Suspending, Resuming and Stopping Threads-JDBC.	2	10 & 11
		Instructional Hours		**12**
		Suggested Learning Methods: Simple Application Development		
V		**Input/Output Classes:** Input and Output Operations-Hierarchy of Classes in java.io Package-File Class-InputStream and OutputStream Classes-FileInputStream and FileOutputStream Classes-Reader and Writer Classes-RandomAccessFile Class-Stream Tokenizer. **Applets:** Applet Basics-Applet Life Cycle-Running Applets-Methods of the Applet Class-Graphics Class-Color Class-Font Class-Limitations of Applets. Java Networking -INetaddress-User Datagram Protocol, Internet Control Protocol, UDP Programming in Java Transmission Control Protocol, Multithreading & TCP Sockets Programming in Java.	2	16,18 &19
		Instructional Hours		**12**
		Suggested Learning Methods: Simple Application Development		
		Total Hours		**60**

Text Books	1. E. Balagurusamy, **Programming with Java – A Primer**, Tata McGraw Hill Publication, 3rd Edition, 2007 2. ISRD Group, **Introduction to Object Oriented Programming Through Java**, Tata McGraw Hill Publication, Forth Reprint 2008. 3. Java Network Programming, 4th Edition,Orielly Publication.
Reference Books	1. Patrick Naughton& Hebert Schildt, **The Complete Reference Java 2,** Tata McGraw Hill Publication**,** 3rdEdition, 2002 2. John R. Hubbard, **Programming with Java**, Tata McGraw Hill Publication, 2nd Edition, 2009.
Web. URLs	**https://www.w3schools.com/java/default.asp**

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H		M	H		M	H	H	H	H	M	M
CO2	H	H		M	H		M	H	H	H	H	M	M
CO3	H	H		M	H		M	H	H	H	H	H	H
CO4	H	H		M	H		M	H	H	H	H	H	H
CO5	H	H		M	H		M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title
21U3CKC204 / 22U3CKC204	**Core Paper V: Data Structures**

Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

| **(Common to B. Sc. CS / IT / BCA)** |||||

Course Objective	To enable the students to understand about the various techniques such as Linked list, Searching and Sorting, apply them to solve complex programs.
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	To understand the concept of Arrays, Stacks and Queues, Linked list, searching and sorting and apply to solve real world problem using appropriate Data Structure.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand the representation of Arrays, Stacks and Queues.	Smart Board / Demonstration	Group Discussion
CO 2	Solve the problems using Queues and List.	Smart Board / Demonstration	Quiz
CO 3	Demonstrate different types of Tree representation and Graph.	Demonstration	Seminar
CO 4	Design Algorithm to perform different types of Sorting.	Video Lessons	Seminar
CO 5	Illustrate Symbol, hash and File organization and apply to solve real world problem using appropriate Data Structure.	Smart Board / Demonstration	Assignment

Offered by	Computer Science

Course Content	Instructional Hours / Week: 4

Unit	Description	Text Book	Chapters
I	**Introduction:** Overview - create Programs - Analyse Programs. **Arrays:** Axiomatization - Sparse Matrices - Representation of Arrays.**Stacks & Queues:** Fundamentals - Evaluation of Expressions - Multiple Stacks and Queues.	1	1,2,3
	Instructional Hours		**12**
	Suggested Learning Methods: Write Algorithms for Real time Scenario		
II	**Recursion:** Recursive definition and process - recursion in C - Writing Recursive program - simulating Recursion - efficiency of recursion.**Queues and List:** The queue and its sequential representation - Linked list - List in C - An example Simulation using linked list - other list structure.	2	3,4
	Instructional Hours		**12**
	Suggested Learning Methods: Write Algorithms for Real time Scenario		
III	**Trees:** Binary Tree - Binary Tree representation - the Huffman algorithm - representing list as Binary - Trees and their applications - Game trees.**Graphs:** A Flow problem - The linked representation of Graph - Graph traversal and spanning forests	2	5,8
	Instructional Hours		**12**
	Suggested Learning Methods: Group Discussion		

IV	**Internal Sorting:** Insertion Sort - Quick Sort - 2-Way Merge Sort - Heap Sort - Shell Sort.**External Sorting:** Storage Devices - K-Way Merging.**Sorting With Tapes:** Balanced Merge Sorts - Polyphase Merge.	1	7,8

	Instructional Hours	**12**

Suggested Learning Methods: Group Discussion		

V	**Symbol Table:** Static Tree Tables - Dynamic Tree Tables. **Hash Tables:** Hashing Functions- Overflow Handling. **Files:** Files, Queries and Sequential Organizations- Index Techniques - **File Organization:** Sequential Organization- Random Organization- Linked Organization.	1	9, 10

	Instructional Hours	**12**

Suggested Learning Methods - Video Presentation		

	Total Hours	**60**

Text Books	1. Ellis Horowitz &SartajSahni, **Fundamentals of Data Structures**, Galgotia Publication. 2. Aaron M. Tenenbaum, YedidyahLangsam, Moshe J.Augenstein, **Data Structure using C**, Pearson Education, 2009.
Reference Books	1. Ellis Horowitz, Sartaj Sahni&SanguthevarRajasekaran, **Fundamentals of Computer Algorithms**, Galgotia Publications Pvt Ltd, 1999. 2. Jean-Paul Tremblay and Paul G.Sorenson, **An Introduction to Data Structures with Applications**, Second Edition, Tata MaGraw Hill,2008. 3. Mark Allen Weiss, **Data Structures and Algorithm Analysis in C**, Florida International University, Pearson Education, Second Edition, 1997.
Web. URLs	**https://www.programiz.com/dsa**

Tools for Assessment (50 Marks)						
CIA I	**CIA II**	**CIA III**	**Class Participation**	**Assignment**	**Seminar**	**Total**
8	**8**	**10**	**8**	**8**	**8**	**50**

Mapping												
CO / PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	H	M	M	M	-	M	H	H	H	H	M	M
CO2	H	H	M	M	M	-	M	H	H	H	H	M	M
CO3	H	H	M	M	M	-	M	H	H	H	H	H	H
CO4	H	H	M	M	M	-	M	H	H	H	H	H	H
CO5	H	H	M	M	M	-	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title
22U3CAP202	Core Paper VI: Practical in Java and Network Programming
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

(Bachelor of Computer Applications)	
Course Objective	To enable the students to develop problem solving skills and programming ability in Java language.
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	To make the students to understand the object-oriented paradigm, design technique, syntax.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Develop programs to implement the string, array and multiple inheritance concepts.	Problem Based Teaching, Constructivist learning	Program Creativity
CO 2	Implement the multithreading, exception handling concepts to solve real world problems	Constructivist learning, Code Review	Debugging
CO 3	Apply the concept of package to illustrate reusability.	Constructivist learning	Application of Logic
CO 4	Create application for file handling.	Problem Based Teaching, Constructivist learning	Program Development
CO 5	Create Networking Applications using Java Network Programming concepts	Problem Based Teaching, Constructivist learning	Program Development

Offered by	Computer Applications

Course Content	Instructional Hours / Week: 4

Unit	List of Practical
1	Write a Java Applications to extract a portion of a character string and print the extracted string.
2	Write a Java program to insert an element (specific position) into an array.
3	Write a Java Program to implement the concept of Interfaces.
4	Write Java program to implement overloading of methods.
5	Write a program to implement the concept of Exception Handling.
6	Write java program to demonstrate runtime polymorphism using overriding.
7	Write Java program to add two matrices.
8	Write a Java Program to implement the concept of multithreading with the use of any three multiplication tables and assign three different priorities to them.
9	Write a Java program to import classes from user defined package and creating package.
10	Write a Java program to process text file.
11	Write a Java Program to find the IP Address of the Machine
12	Write a Java Program to implement TCP Protocol.

13	Write a Java Program to illustrate the Local Loop in the network.
14	Write a Java Program to implement UDP Protocol.
15	Write a Java Program to implement Stop and Wait Protocol

Suggested Learning Methods: Solving Case studies, Peer tutoring and pair programming	
Total Hours	**60**

Tools for Assessment (50 Marks)

Application of Logic	e-Program Creativity	e- Program Debugging	Test 1	Test 2	Observation Note Book	Total
8	8	8	10	10	6	**50**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	-	M	M	-	-	H	M	H	H	M	M
CO2	M	H	-	M	M	-	M	H	M	H	M	H	M
CO3	M	H	-	M	M	-	-	H	H	M	M	M	H
CO4	H	H	-	M	M	-	-	H	M	H	H	H	M
CO5	H	H	-	M	M	-	-	H	H	M	H	M	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3MIA202	**Allied Paper II : Discrete Mathematics**		
Semester: II	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
(Common to B. Sc. CS / DS / IT / AIML / DCFS / BCA)			
Course Objective	To learn about the Discrete Structure for Computer Based Application.		
Course Category	Skill Development		
Development Needs	Regional		
Course Description	This course is to understand and use abstract discrete structures that are backbones of Computer Science. In particular, this course meant to introduce logic, proofs, sets, relations, functions, counting, and graphwith an emphasis on applications in Computer Science.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Learn the basic concepts of Set theory	Lectures / Peer Teaching	Assignment
CO 2	Implement the basic ideas of Mathematical Logic in Computer Science	Lectures / Tutorial	Seminar
CO 3	Classify different types of Relations and Functions	Lectures / Video Lectures	Assignment
CO 4	Infer the concepts of Grammar and Automata theory.	Lectures / Tutorial	Work Sheet
CO 5	Know the concepts of Graph theory	Lectures / Video Lectures	Quiz

Offered by	Mathematics

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	**Set Theory:**Introduction-Set & its Elements-Set Description-Types of sets-Venn-Euler Diagrams-Set operations & Laws of set theory. Fundamental products- Partitions of sets – Minsets- Algebra of sets and Duality-Inclusion and Exclusion Principle	**1**	**1**
	Instructional Hours		**15**
	Suggested Learning Methods:Problem Solving Practice		
II	**Mathematical Logic:**Introduction- prepositional calculus –Basic logical operations- Tautologies-Contradiction – Argument-PDNF & PCNF - Method of proof.	1	12
	Instructional Hours		**15**
	Suggested Learning Methods: Class Test		
III	**Relations:** Binary Relations – Set operation on relations-Types of Relations – Partial order relation – Equivalence relation – Composition of relations. Functions – Types of functions – Invertible functions – Composition of functions.	1	3,4
	Instructional Hours		**15**

	Suggested Learning Methods: Assignments		
IV	**Languages:** Operations on languages – Regular Expressions and regular languages. **Grammar:** Types of grammars – Grammar Construction-Finite state machine –Finite State Automata- DFA- NDFA- Conversion of NDFA into DFA.	1	15
	Instructional Hours		**15**
	Suggested Learning Methods:Problem Solving Practice		
V	**Graph Theory:** Basic terminology – paths, cycle & Connectivity – Sub graphs – Types of graphs. Trees – Properties of trees – Binary trees-Traversal of Binary Trees.	1	9,10
	Instructional Hours		**15**
	Suggested Learning Methods:Problem Solving Practice		
	Total Hours		**75 Hrs**

Text Books	1. J.K. Sharma, **Discrete Mathematics**, Macmillan India Ltd, 2nd edition, 2005.
Reference Books	1. J. P. Tremblay, R. Manohar, **Discrete Mathematics Structures with Applications to Computer Science**, McGraw Hill International Edition, 2005. 2. T.Veerarajan, **Discrete Mathematics with Graph Theory and Combinatories**, McGraw Hill International Edition, 2008
Web. URLs	1. **https://www.youtube.com/watch?v=oaOm2pnKkyY** 2. **https://youtu.be/tyDKR4FG3Yw**

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	**50**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO 4	PSO 5
CO1	H	H	L	M	H	M	M	M	H	H	H	M	M
CO2	H	H	L	M	H	M	M	H	H	H	H	M	M
CO3	H	H	L	M	H	M	M	H	H	H	H	H	H
CO4	H	H	L	M	M	M	M	M	H	H	H	H	H
CO5	H	H	L	H	M	M	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title
21U4HRC202	Ability Enhancement Compulsory Course - **Human Rights and Constitution of India**
Semester : II	**Credits : 2** · **CIA : 50 Marks**

(Common to all UG Programmes)

Course Objective:

Understand the concept of human rights and the importance of Indian Constitution.

Course Outcomes:

CO1	Understand the principal aspects of human rights and duties in a broad sweep.
CO2	Acquire the knowledge about the Fundamental Duties and Rights of Indian Citizen
CO3	To know the rights of women and Children in India
CO4	Understand the structure and importance of Indian Constitution
CO5	Know the functions of Government and Election Commission of India

Course Content   **Instructional Hours / Week : 2**

Unit	Description	
I	An Introduction to Human Rights :Values – Dignity, Liberty, Equality, Justice, Unity in Diversity - Human Rights – Meaning and features; Significance of the study - Classification of Human Rights - Rights and Duties – Correlation	
	Instructional Hours	**6**
II	Human Rights and Fundamental Rights - Fundamental Rights and Fundamental Duties- Directive Principles - Role of Judiciary in the protection of Human Rights- National Human Rights Commission *Activity : Case Study related to Human Rights*	
	Instructional Hours	**6**
III	Human Rights of Women and Children- Social Practice and Constitutional Safeguards – Female foeticide and infanticide-Physical assault and Harassment- Domestic violence-Conditions of Working Women *Activity : Conduct a Group Discussion on the above topics*	
	Instructional Hours	**6**
IV	**Constitution – Structure and Principles -** Meaning and importance of Constitution - Making of Indian Constitution –Sources - Salient features of Indian Constitution-Government of Union- Government of State-Features of judicial system in India	
	Instructional Hours	**6**
V	Federalism in India – Features - Local Government -Panchayat –Powers and functions -Election Commission –Organisation and functions-Citizen oriented measures – RTI – Provisions and significance *Activity : Seminar/ Role play related to Indian Constitution*	
	Instructional Hours	**6**
	Total Hours	**30**

Text Book:

1. **"Human Rights and Constitution of India",** Complied by Curriculum Development Cell, Nehru Artsand Science College.

Tools for Assessment (50 Marks)

Case Study and Report submission	Seminar / Role play	Group Discussion	Comprehensive test for 5×5 = 25 marks	Total
10	10	5	25	50

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	L	H	H	H	H					
CO2	-	-	-	L	H	H	H	H					
CO3	-	-	-	L	H	H	H	H					
CO4	-	-	-	L	H	H	H	H					
CO5	-	-	-	L	H	H	H	H					

H-High; M-Medium; L-Low

Course Designed by	Verified by

Course Code	Title
22U4HVY201	**Value Education : Human Values and Yoga Practice**
Semesters : I & II	**Credits : 2**	**CIA : 50 Marks**

(Common to all UG Programmes)

Course Objective:

- To help the students appreciate the essential complementarity between 'values' and 'skills' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
- To prepare and distribute standardized Yoga teaching and training material with reference to institute health**.**

Course Outcomes:

CO1	To know the importance of Ethics to be followed in the Human life.
CO2	To inculcate a sense of respect towards harnessing values of life and spiritof fulfilling social responsibilities.
CO3	To gain knowledge about the values that develops life skills.
CO4	To understand and Practice Meditation & Surya Namaskar.
CO5	To understand and apply the knowledge for physical health and well being through Asanas

Course Content   Instructional Hours / Week : 1 (For Semesters I and II)

Unit	Description
I	**Human Values –** Introduction **-** Definition of Ethics and Values - Character and Conduct - Nature and Scope of Ethics. **Individual and Society -** Theories of Society - Social Relationships and Society - Empathy: Compassion towards other beings.
	Instructional Hours 4
II	**Self-realization and Human Values-**Self-realization and Harmony-Rules and Regulations-Rights and Duties-Good and Obligation-Integrity and Conscience. **Obligation to Family-**Trust and Respect-Codes of Conduct.
	Instructional Hours 5
III	**Character Formation Towards Positive Personality**: Truthfulness, Constructivity, Sacrifice, Sincerity, Self Control, Altruism, Tolerance, Scientific Vision. **Refinement of worries**: Neutralization of anger-Intelligent quotient(IQ),Emotional quotient(EQ),Spiritual Quotient (SQ)
	Instructional Hours 5
IV	**Power of Meditation**- Development of mind in stages - Mental Frequencies Methods for Concentration. Meditation Practices - Surya Namaskar. Physical Exercises -Kayakalpa Practices Training for Potentialising the Mind.
	Instructional Hours 6
V	**ASANAS** **Standing Posture:** Tadasana, Utkattasana, arthaKadi Chakrasana, Trikonasana, Artha

Chandrarasana, Padahastasana, Virabhadrasana, Vrikshasana, Artha, Natarajasana.
Sitting posture: Padmasana, Gomukasana, Ustrasana, ArdhaMatsyendrasana, Patchimottanasana.
Prone posture: Bhujangasana, shalabhasana, Dhanurasana, Chakrasana.
Supine posture: Sarvangasana, Halasana, Matsyasana, Shanti asana
Pranayama: Bhastrika, Bhramari, NadiShodhan

Instructional Hours	**10**
Total Hours	**30**

Text book:

1. **"Value Education",** compiled by Curriculum Development Cell, Nehru Arts and Science College.

Tools for Assessment

25 marks	25 marks
Comprehensive test in Units I to III for 25 marks during CIA III of Sem. II	Perform 02 Yoga postures for Practical exam to be conducted during the mid. of Sem. II

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	H	L	M	H	H					
CO2	-	-	-	L	M	H	M	H					
CO3	-	-	-	L	M	H	S	H					
CO4	-	-	-	L	L	H	M	H					
CO5	-	-	-	L	L	H	M	H					

H-High; M-Medium; L-Low

Course Designed by	Verified by

Course Code	Title		
21U3CKC305/ 22U3CKC305	**Core Paper VII: Operating Systems**		
Semester: III	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**
(Common to B. Sc. CS / IT / BCA)			

Course Objective	To understand the importance of Operating Systems and its functionalities to manage resources of Computer and Peripherals.
Course Category	Employability
Development Needs	Global
Course Description	Operating System describes of types,States,Paging,Segmentations.

Course Outcomes		Teaching Methods	Assessment Methods
CO1	Recognize the basic concepts of operating system	Lecture / Flipped Classroom	Assignment
CO2	Understand the concepts of processes and scheduling of process.	Lecture / Tutorial	Assignment
CO3	Explain the techniques of managing the deadlock and memory	Lecture	Seminar
CO4	Illustrate the Segmentation of Paging and Page Replacement policies.	Lecture / Tutorial	Quiz
CO5	Apply various file system implementation	Lecture / Case Studies	Quiz

Offered by	**Computer Applications**

Course Content	**Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapters
I	Introduction: Abstract views of an OS – Goals of an OS – OS and the Computer System – Classes of Operating System: Batch Processing systems – Multiprogramming systems – Time sharing systems – Real Time Operating System – Distributed Operating System – Modern Operating systems	**1**	**1,2**
	Instructional Hours		**12**
Suggested Learning Methods:Assignment and Seminar Preparation			
II	Processes and Programs – Programmer View of Process – OS view of Process – Controlling Processes – Process State Transitions – Process Control Block – Process Scheduling: Scheduling Concepts and Terminology – Fundamental Techniques of scheduling – Non Preemptive scheduling policies - Preemptive scheduling policies	1	**3,4**
	Instructional Hours		**12**
Suggested Learning Methods: Assignment and Seminar Preparation			
III	Deadlock: Definition – Deadlocks in Resource Allocation – Handling deadlocks – Deadlock Detection and Resolution - Deadlock Prevention – Deadlock Avoidance. Memory Management: Static and dynamic Memory Allocation – The Memory Allocation Model – reuse of Memory – Contiguous Memory allocation – Non Contiguous Memory Allocation.	1	11
	Instructional Hours		**12**
Suggested Learning Methods:Preparing Procedure for Deadlock and Memory Managment			

IV	Paging – Segmentation – Segmentation with Paging. Virtual Memory: Basics – Demand Paging – Overview of Paging – Demand Paging preliminaries – Page replacement policies – Virtual Memory using segmentation	1	5
	Instructional Hours		**12**

Suggested Learning Methods:Preparation for Quiz			

V	Layers of the Input Output Control System (IOCS) – Overview of I/O Organization – Disk Scheduling. File systems: File System and IOCS – Files and File Operations – Fundamental File organizations – directory Structures – Case study on LINUX OS ,UNIX OS, Android OS (Self Study)	1	7
	Instructional Hours		**12**

Suggested Learning Methods: Case Studies on Latest Operating Systems			
	Total Hours		**60**

Text Books	1. D M Dhamdhere, **"Operating Systems- A Concept –Based Approach"**, 2nd Edition, 2006.
Reference Books	1. William Stallimgs, **"Operating Systems Internals and Design Principles"**, Seventh Edition,Pearson Education Inc.2012. 2. Abraham Silberchatz, Peter Baer Galvin,Greg Gagne, **"Operating System Concepts"**, Seventh Edition, Pearson 2009.
Web. URLs	https://www.geeksforgeeks.org/operating-systems

Tools for Assessment (30 Marks)						
CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
4	4	7	5	5	5	**30**

Mapping												
CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M	L	M	H	H	H	H	M	M
CO2	H	H	M	M	M	L	M	H	H	H	H	M	M
CO3	H	H	M	M	M	L	M	H	H	H	H	H	H
CO4	H	H	M	M	M	L	M	H	H	H	H	H	H
CO5	H	H	M	M	M	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
22U3CJC302	**Core Paper VIII: Relational Database Management Systems**		
Semester: III	Credits: 3	CIA: 30 Marks	ESE: 45 Marks
(Common to BCA / B. Sc. AIML)			
Course Objective	To inculcate fundamental knowledge in RDBMS concepts and make them to create, manipulate information with the real time datasets.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	The course gives introduction to the fundamentals of relational databases using database programming techniques emphasizing database structures, modelling and database access.		

Course Outcomes		Teaching Methods	Assessment Methods
CO1	Remember the Data types and fundamentals of database.	Lecture / Flipped Classroom	Assignment
CO2	Understanding the concept of Database and Various queries in SQL.	Lecture / Tutorial	Assignment
CO3	Applying the concept in various tables to retrieve information.	Tutorial	Seminar
CO4	Understanding the concept of PL/SQL using cursors.	Lectures / Tutorial	Seminar
CO5	Able to evaluate the errors and write triggers in PL/SQL.	Lecture / Flipped Classroom	Quiz

Offered by	Computer Applications

Course Content	Instructional Hours / Week : 4

Unit	Description	Text Book	Chapters
I	**Introduction:** Database **-** Purpose of Database Systems - Data Models – Database Language – Transaction Management - Overall System Structure.	2,1	1
	A Relational approach: Relationships –Relational Database Model – Integrity Rules – Theoretical Relational Languages. **Database Design:** Data Modelling and Normalization: Data Modelling – Dependency –Normal forms – Dependency Diagrams – De – Normalization.		
	Instructional Hours		**12**

Suggested Learning Methods: Video lectures about the basics of Database			
II	**Oracle9*i*:**Oracle9i an introduction – SQL –SQL *Plus Commands – Errors & Help – Alternate Text Editors. Oracle Tables.**DDL:** Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.	1	3,4
	Instructional Hours		**12**
Suggested Learning Methods: SQL Query Writing			
III	**Working with Table:** Data Management and Retrieval: DML – Adding a new Row/Record – Updating and Deleting an Existing Rows/Records – Retrieving Data from Table -Restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions – Grouping Data. **Multiple Tables:** Joins and Set operations: Join – Set operations.	1	5,6
	Instructional Hours		**12**
Suggested Learning Methods: SQL Query Writing			
IV	**PL/SQL:** A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. **Control Structures and Embedded SQL:** Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	1	10, 11&12
	Instructional Hours		**12**
Suggested Learning Methods: Video lectures about the basics of PL/SQL			
V	**PL/SQL Composite Data Types:** Records – Tables. **Named Blocks:** Procedures – Functions – Packages –Triggers – Data Dictionary Views	1	13,14
	Instructional Hours		**12**
Suggested Learning Methods: Writing PL/SQL Procedures			
	Total Hours		**60**
Text Books	1. Nilesh Shah ,**"Database Systems Using Oracle"**, 2nd edition, PHI. 2. Abraham Silberschatz, Henry F.Korth, S. Sudarshan , "**Database System Concepts**", 3rd Edition, McGraw – Hill Companies, inc.		

Reference Books	1. Arun Majumdar & Pritimoy Bhattacharya, **"Database Management Systems"**, TMH, 2007. 2. Gerald V. Post , **"Database Management Systems"**, 3rd Edition, TMH.
Web. URLs	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm

Tools for Assessment (30 Marks)						
CIA I	**CIA II**	**CIA III**	**Assignment**	**Seminar**	**Quiz**	**Total**
4	4	7	5	5	5	**30**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CAP303	**Core Paper IX: Practical in SQL and PL/SQL**		
Semester: III	**Credits: 2**	**CIA: 25 Marks**	**ESE: 25 Marks**
(Bachelor of Computer Applications)			
Course Objective	To acquire fundamental knowledge Relational Database Management System concepts.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	To make the students to understand Relational Database Management System concepts using Oracle and able to do the various operations on Tables		

Course Outcomes		Teaching Methods	Assessment Methods
CO1	Apply the Programming and Software Engineering skills and techniques using SQL.	Demonstration	Application of Logic
CO2	Analyze the relational data model with optimal and feasible solutions	Demonstration	Program Development
CO3	Apply the Programming and Software Engineering skills and techniques using SQL.	Demonstration	Program Creativity
CO4	Analyze the relational data model with optimal and feasible solutions	Demonstration	Program Development
CO5	Evaluate the Optimal Solutions	Demonstration	Program Development

Offered by	**Computer Applications**	
Course Content		**Instructional Hours / Week: 3**

Program	List of Practical
1	Create an Employee table with primary key, foreign key and Insert the Values.
2	Alter the existing table with an appropriate query, Update the values and retrieve using Select Verb.
3	Create a table and perform various DCL & TCL Commands
4	Perform various Single – row and Grouping functions using SQL.
5	Create an appropriate table and perform various Join Operations.
6	Create suitable table and perform various Set Operations.
7	Write a PL/SQL program to check whether the given string is palindrome or not.
8	Write a PL/SQL Cursor for referencing fields in a record.
9	Write a PL/SQL to raise the exceptions in Bank Account Management table
10	Write a PL/SQL program to find factorial of numbers using function and procedure.

11	Write a PL/SQL to handle package.
12	Write a PL/SQL trigger for entering mark in the student table.

	Total Hours	45

Suggested Learning Methods: Solving Case studies, Program development, Code Review and Peer Coding

Tools for Assessment (25 Marks)

Application of Logic	Program Creativity	Program Debugging	Test 1	Test 2	Observation Note Book	Total
4	4	4	5	5	3	25

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	H	H
CO2	H	H	L	M	H	L	M	H	H	H	H	H	H
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3MIA303	**Allied Paper III : Operations Research**		
Semester: III	**Credits : 4**	**CIA: 50 Marks**	**ESE: 50 Marks**

(Common to all UG Programmes)	
Course Objective	On successful completion of the course the students to learn various mathematical applications in industries, decision making for real time environment
Course Category	Skill Development
Development Needs	Global
Course Description	Operations research is an analytical approach of problem-solving skill and Decision-making that is useful in the management of organizations.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Classify different OR models and knowing their advantages in decision making environment	Group learning / Lectures	Assignment
CO 2	Recognize and formulate transportation, assignment problems and derive their optimal solution.	Peer Teaching / Lectures	Unit Test
CO 3	Gain knowledge about Game theory and replacement models.	Lectures / Tutorial	Seminar
CO 4	Outlining the Queuing Theory concepts.	Group learning / Lectures	Assignment
CO 5	Construct Network models (PERT & CPM) for scheduling the project.	Video Lectures / Lectures	Quiz

Offered by	**Mathematics**

Course Content			Instructional Hours / Week : 4	

Unit	Description	Text Book	Chapters
I	Linear programming – Mathematical Formulation-Solving LPP using Graphical Method-Canonical and Standard form of LPP .	1	2, 3
	Simplex Method - Big-M Method, Principles of Duality.	1	4, 5
	Instructional Hours		**12**
Suggested Learning Methods : Problem Solving Practice			
II	**Transportation Problems**: Introduction – Initial Basic Feasible solutions – Balanced Transportation Problem : North West Corner Rule, Least Cost Method , Vogel's Approximation Method - Unbalanced Transportation Problem- Optimality – MODI Method (Non Degeneracy).	1	10
	Assignment Problem: Introduction – Hungarian Assignment method – Maximization in Assignment problem - Unbalanced Assignment problem- Travelling salesman problem.	1	11
	Instructional Hours		**12**
Suggested Learning Methods : Seminar			
III	**Game Theory:** Concept of Pure and Mixed Strategies – Solving 2 x 2 matrix with and without saddle point - n x 2 & 2 x m games by Graphical Method - Dominance Property.	1	17

	Replacement models: Elementary Replacement Models - Present Value - Rate of Return - Depreciation - Individual Replacement – Group Replacement.	1	18
	Instructional Hours		**12**

Suggested Learning Methods : Group Discussion			
IV	**Queuing Theory (Derivations not included):** Introduction – Elements of Queuing System – Operating Characteristics of Queuing systems – Probability Distributions in Queuing Systems - Birth death process.	1	20
	Classification of Queuing Models: Single Server - finite and infinite population models. (Model I , Model II & Model III) – Problems only.	1	20
	Instructional Hours		**12**

Suggested Learning Methods : https://youtu.be/xGkpXk-AnWU			
V	**Network Scheduling:** Critical Path Method – Principles of Network Construction: Forward Pass – Backward Pass computations – Types of Floats - Practical Problems in Networking Methods. **PERT:** Critical Path – Probability of completion of project-Difference between PERT and CPM.	1	21
	Instructional Hours		**12**

Suggested Learning Methods : Problem Solving Practice			
	Total Hours		**60**

Text Books	1.Kanti Swarup, P.K. Gupta, Man Mohan, **Operations Research,** S. Chand & Sons, 1997.
Reference Books	1.Hamdy A Taha, **Operations Research – An introduction,** Prentice Hall of India PVT.LTD, 8th edition, 2008. 2.J. K. Sharma, **Operations Research Theory and Applications**, MacMillan India Ltd, 2008.
Web. URLs	1. https://youtu.be/4U3B5lr-MqM.(Introduction to OR) 2.https://www.youtube.com/watch?v=2AOhCWhwOKo (PERT concepts)

Tools for Assessment (50 Marks)						
CIA I	**CIA II**	**Model**	**Seminar**	**Assignment**	**Periodical Quizzes**	**Total**
8	8	10	8	8	8	50

Mapping												
CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	L	-	M	M	-	M	H	L	L	M	L	L
CO2	M	M	-	M	M	-	M	H	L	M	M	L	M
CO3	M	M	-	M	M	-	M	H	M	M	M	L	M
CO4	M	M	-	M	M	-	M	H	M	M	M	L	M
CO5	M	M	-	M	M	-	M	H	M	M	M	L	M

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
22U3CAP304	**Core Paper X: Practical in LINUX**		
Semester: III	**Credits: 2**	**CIA: 25 Marks**	**ESE:25 Marks**
Course Objective	To know about the basics of Shell Script programming language		
Course Category	Employability / Skill Development		
Development Needs	Global		
Course Description	This course examines the important techniques in operating system design and implementation.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Apply the shell programming commands.	Demonstration	Program Creativity
CO 2	Able to apply various scripting concept in programs.	Demonstration	Program Debugging
CO 3	Gain Knowledge about OS types, Path setting, directories	Demonstration	Program Creativity
CO 4	Create shell programming manipulating concepts.	Demonstration	Program Development
CO 5	Develop applications using various scripting language.	Demonstration	Program Development

Offered by	Computer Applications	

Course Content	Instructional Hours / Week : 2

Programme	Description
1	Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff.
2	Write a shell script to show the following system configuration : a. currently logged user and his log name b. current shell, home directory, Operating System type, current Path setting, current working directory c. show currently logged number of users, show all available shells d. show CPU information like processor type, speed e. show memory information
3	Write a Shell Script to implement the following: pipes, Redirection and tee commands.
4	Write a shell script for displaying current date, user name, file listing and directories by getting user choice.
5	Write a shell script to implement the filter commands.
6	Write a shell script to remove the files which has file size as zero bytes.
7	Write a shell script to find the sum of the individual digits of a given number.

8	Write a shell script to find the greatest among the given set of numbers using command line arguments.
9	Write a shell script for palindrome checking.
10	Write a shell script to print the multiplication table of the given argument using for loop.

Suggested Learning Methods: Solving Case studies, Program development, Code Review and Peer Coding	

	Total Hours	**30**

<div align="center">

Tools for Assessment (25 Marks)

</div>

Application of Logic	Program Creativity	Program Debugging	Test 1	Test 2	Observation Note Book	Total
4	4	4	5	5	3	**25**

<div align="center">

Mapping

</div>

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	M	M	H	H	H	H	M	H	H
CO2	H	M	H	M	M	H	H	M	M	H	H	M	H
CO3	H	L	H	H	H	H	L	H	H	L	H	H	H
CO4	H	L	H	H	H	H	L	H	H	L	H	H	H
CO5	H	L	H	H	H	H	L	H	H	L	H	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
22U4CAZ301	**Skill Based Paper I: Practical in Excel Macro**		
Semester: III	**Credits: 3**	**CIA: 30 Marks**	**ESE:45 Marks**
Course Objective	To acquire fundamental knowledge Relational Database Management System concepts.		
Course Category	Skill Development /Employability		
Development Needs	Global/Local		
Course Description	To enable the students to develop macros for implementing real world applications using various built in functions available in spreadsheet.		

Course Outcomes		Teaching Methods	Assessment Methods
CO1	Develop the program using Basic Controls.	Demonstration	Application of Logic
CO2	Implement the concepts of with applications.	Demonstration	Creating Application
CO3	Gain Knowledge in using various operators.	Demonstration	Program Creativity
CO4	Analyze how to extract different parts of names	Demonstration	Program Development
CO5	Evaluate the Optimal Solutions	Demonstration	Program Development

Offered by	**Computer Applications**

Course Content	**Instructional Hours / Week : 3**

Program	Description
1	Write a Simple Macro programs using Button and Message box.
2	Write an Excel Macro Program to work with Books and Sheets using loops.
3	Write an Excel Macro Program to find Area of Shapes.
4	Write an Excel Macro Program to Perform Arithmetic and Logical Operations.
5	Write an Excel Macro Program to implement case conversion, split first name and last name.
6	Write an Excel Macro Program to calculate variation and standard deviation forth given values.
7	Write an Excel Macro Program to generate Sales Calculator.
8	Write an Excel Macro Program to Prepare charts for ResultAnalysis.
9	Write an Excel Macro program to perform String Manipulation.
10	Write an Excel Macro Program to Count number of words in a given sentence.
11	Write an Excel Macro Program to Perform Credit Policy for finding minimum and maximum values
12	Write an Excel Macro Program to Perform Cash flow Estimation.

Suggested Learning Methods: Solving Case Studies and Application Development													
												Total Hours	45 Hrs

Tools for Assessment (30 Marks)							
Application of Logic	Creating Application	Quiz	Test1	Test2	Observation Note Book	Total
5	5	5	6	6	3	30

Mapping													
CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	M	M	H	H	H	H	M	H	H
CO2	H	M	H	M	M	H	H	M	M	H	H	M	H
CO3	H	L	H	H	H	H	L	H	H	L	H	H	H
CO4	H	L	H	H	H	H	L	H	H	L	H	H	H
CO5	H	L	H	H	H	H	L	H	H	L	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CAC405	**Core Paper XI: .Net Programming**		
Semester: IV	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**
Course Objective	To inculcate programming algorithm process and structure of VB.Net and ASP.Net.		
Course Category	Employability		
Development Needs	Global		
Course Description	To understand the concept of GUI Design Tool, also to make them aware of controls in VB.NET by coding programs and develop interface using Visual Basic .NET.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Remember the .Net Controls and statements	Lecture /Flipped Classroom	Assignment
CO 2	Understand the Structures and OOPs Concepts	Lecture / Tutorial	Assignment
CO 3	Develop and implement windows, console and web-based application	Lecture	Seminar
CO 4	Examine webpage, file management, ADO.Net for Database Connection	Lecture / Tutorial	Seminar
CO 5	Understand and ability to design ASP Page	Lecture / Flipped Classroom	Quiz

Offered by	Computer Applications	
Course Content		**Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapters
I	VisualStudio.Net:Beginning**:** Programming withVisual Studio.NetEnvironment- Working with variables and Operations- Writing Methods Applying Scope - Using Decision Statements – Using IterationStatements.	1	1
	Instructional Hours		**15**
Suggested learning methods:Video lectures about the basics of Visual Studio .Net			
II	What is Classification? -What is Encapsulation? - Working withConstructors and thenewKeyword – Copying int variablesand Classes.Using ref and outParameters. **Inheritance and Interface:** Inheritance – Multiple Inheritance - Abstraction – Encapsulation – Polymorphism.	1	6
	Instructional Hours		**15**
Suggested learning methods:Video lectures about the basics of OOPs Concepts			
III	**Windows Forms:** Forms as classes – Forms at Design Time – Forms at Runtime - **Controls** – **Data Access with ADO.Net:** why do we need ADO.Net? – The ADO.Net Architecture - .Net Data Provider – The Dataset Component.	1	22,23,27
	Instructional Hours		**15**
Suggested learning methods:Write Programs for Forms using Database Connectivity			

IV	What is ASP.Net? – Setting up for ASP.Net – An Overview Programming Basics – Basics of Programming – ASP.Net Data types – Operators – Common ASP.Net Page Syntax – Built-in ASP.Net objects and interactivity- The Response object – The ASP Server object.	2	33,34

	Instructional Hours	**15**

Suggested learning methods:Video lectures about the basics of ASP. Net

V	Web Forms and ASP.Net – Web Forms – ASP.Net and Configuration – ASP.Net and state- The Application Scope – ASP Sessions – The Session Object – The Scripting Object Model – Active Server Components and Controls– More Active Server Component.	2	33,34,35

	Instructional Hours	**15**

Suggested learning methods: Video lectures about the basic of ASP.Net Objects and Writing Simple Programs using ASP. Net

	Total Hours	**75**

Text Books	1. Andrew Troelsen**"Pro VB 2008 and the .NET 3.5 Platform"**
	2. Dave Mercer, **"ASP.Net: A Beginner's Guide"**, Tata McGraw Hill, Fifth Reprint 2008.
Reference Books	MridulaParihar, **"ASP.Net Bible"**, Wiley India Edition, Reprint 2007.
Web. URLs	https://www.javatpoint.com/vb-net-dot-net-framework-introduction

Tools for Assessment (30 Marks)

Program Debugging	Problem Solving	Mini Project	Test 1	Test 2	Observation Note Book	Total
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
21U3CKC408/ 22U3CKC408	**Core Paper XII : Software Engineering**		
Semester: IV	**Credits: 3**	**CIA: 30 MARKS**	**ESE: 45 MARKS**
	(Common to B. Sc. CS / B. Sc. IT / BCA)		

Course Objective	To gain knowledge about basic concepts of Software Engineering
Course Category	Skill Development / Employability
Development Needs	National / Global
Course Description	This course introduces students to the different software development lifecycle (SDLC) phases used in developing, delivering, and maintaining software products. Students will also acquire basic software development skills and understand common terminology used in the software engineering profession

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recognize the basics of Software Engineering and Process models.	Lecture	Assignment
CO 2	Understand the requirements and data modeling to develop the software	Tutorial	Assignment
CO 3	Distinguish between various designs techniques to develop the software.	Lecture	Seminar
CO 4	Understand the Types of testing and testing tools	Lecture/Tutorial	Seminar
CO 5	Use of Risk Management and Reengineering Concepts	Lecture/Flipped Classroom	Case StudyAnalysis

Offered by	Computer Science

Course Content			Instructional Hours / Week :3	

Unit	Description	Text Book	Chapters
I	**Software and Software Engineering**: The nature of software – Software Engineering-The software process-Software Engineering practice- software myths.	**1**	1
	Process Models: A Generic process model -Prescriptive process models - Specialized process models - The Unified Process.	**1**	2
	Instructional Hours		**9**
	Suggested Learning Methods : Video lectures about the basics of Software Engineering		
II	**Understanding Requirements**: Requirements Engineering - Eliciting Requirements -Requirement Modeling: Requirements Analysis.	1	5
	Data Modeling Concepts - Class - Based Modeling.	1	6
	Flow oriented modeling - Creating a behavioral model.	1	7
	Instructional Hours		**9**
	Suggested Learning Methods: Video lectures about the basics of Software Engineering		
III	Design Concepts: Design Concepts - The design model.	1	8
	Architectural Design: Software Architecture - ArchitecturalStyles - Architectural Design.	1	9
	Component - Level Design: Component - Designing Class - Based Components	1	10
	User Interface Design: User Interface Analysis and Design - Interface Design steps.	1	11

		Instructional Hours	**9**
	Suggested Learning Methods : Video lectures about the basics of Software Engineering		
IV	**Testing:** Validation testing - System testing - Software testingfundamentals - White box testing - Control structure testing - Black box Testing	1	17,18
	Testing Tools: Test Planning - Test Metrics And Test Reports - Qualitative And Quantitative Analysis.	2	13
		Instructional Hours	**9**
	Suggested Learning Methods : Video lectures about the basics of Software Testing		
V	**Risk Management:** Software Risks - Risk Identification - RiskProjection - Risk Refinement - Risk Mitigation, Monitoring and Management.	1	28
	Reengineering: Reengineering - Software Reengineering - Reverse Engineering. **Case study:** SRS for Banking System.		29
		Instructional Hours	**9**
	Suggested Learning Methods : Case Studies		
		Total Hours	**45**

Text Books	1. Roger S Pressman, **Software Engineering a Practitioner's Approach**, Seventh Edition, McGraw Hill, International Edition, 2013. 2. M G Limaye, Software Testing Principles, Techniques and Tools, Tata McGrawHill Companies, I^{st} Edition, 2009.
Reference Books	1. Richard Fairley, **Software Engineering Concepts**, Tata McGraw-Hill PublishingCompany Limited, 2010. 2. Waman S. Jawadekar, **Software Engineering – Principles and Practice**, TataMcGraw Hill Publishing Company Limited, 2011.
Web. URLs	https://www.youtube.com/watch?v=tZreaH_FyMs&list=PLV8vIYTIdSnat3WCO9jfeht Zyjnxb74wm

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Case Study Analysis	Total
4	4	7	5	5	5	**30**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M	L	M	H	H	H	H	M	M
CO2	H	H	M	M	M	L	M	H	H	H	H	M	M
CO3	H	H	M	M	M	L	M	H	H	H	H	H	H
CO4	H	H	M	M	M	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
21U3CAP406/ 22U3CAP406	**Core Paper XIII: Practical in .Net Programming**		
Semester: IV	**Credits: 2**	**CIA: 25 Marks**	**ESE: 25 Marks**
Course Objective	To inculcate the programming algorithm, process, and structure of VB.Net and ASP.Net.		
Course Category	Skill Development /Employability/Entrepreneurship		
Development Needs	Global		
Course Description	To development skill set in .Net programming and apply the concepts to develop applications using GUI controls		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Apply the structure to design window based and Web Base Applications.	Demonstration	Application of Logic
CO 2	Analyse the optimal and feasible solution.	Demonstration	Program Creativity
CO 3	Apply the structure to design window based and Web Base Applications.	Demonstration	Application of Logic
CO 4	Analyse the optimal and feasible solution.	Demonstration	Program Debugging
CO 5	Evaluate the feasibility of the solution to be implemented.	Demonstration	Program Development
Offered by	**Computer Applications**		

Course Content	Instructional Hours / Week: 4

Program	List of Practical
1	Write VB.Net program to develop a calculator with basic operations.
2	Write VB.Net program to create menus in a form using menu editor.
3	Design a form in VB.Net using common dialog control to display the save and open dialog box.
4	Develop a VB.NET Programbyimplementing Concept ofInheritance.
5	Write VB.Net program for a various font application
6	Write VB.Net program to use a tool bar to set editor properties.
7	Write VB.Net program to create and reading text file.
8	Write VB.Net program to implement a binary search using collection class.
9	Design College Website using ASP.Net.
10	Write ASP.Net Program to create online examination system.
11	Write ASP.Net Program to develop website for online mobile shop.
12	Design Online Registration Form using ASP.Net

Suggested Learning Methods: Solving Case studies, Program Development, Code Review and Peer Coding		

	Total Hours	60

Tools for Assessment (25 Marks)						
Application of Logic	Program Creativity	Program Debugging	Test 1	Test 2	Observation Note Book	Total
4	4	4	5	5	3	25

Mapping												
CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3BAA404	**Allied Paper – IV: Financial Accounting**		
Semester: IV	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**

Course Objective:	To gain the knowledge on various systems of accounting and accounting procedures of Branch accounts, Departmental accounts, Royalty accounts and Hire Purchase and Instalment System.
Course Category:	Employability
Development Needs:	National
Course Description:	Financial Accounting provides the basis for understanding financial reporting and the basic use of financial information to assess a company's financial strength and viability.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Find various systems of accounting	Lecture / Flipped Classroom	Work Sheet
CO 2	Prepare hire purchase and installment system	Lecture / Tutorial	Assignment
CO 3	Interpret and explain the performance of branches	Lecture / Tutorial	Assignment
CO 4	Prepare Departmental Accounts and its performance	Lecture / Tutorial	Work Sheet
CO 5	Grasp the accounting treatments relating to issue, acceptance, discounting, maturity and endorsement of bills and notes in the books of drawer and drawee.	Lecture / Flipped Classroom	Class Participation

Course Content   **Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapters
I	Single Entry System – Meaning – Definition – Ascertainment of Profit – Difference Between Single Entry system and Double entry system – Net worth Method – Conversion Method	2	13
	Instructional Hours		**15**
Suggested Learning Methods:			
II	Hire Purchase and Installment Purchase system – Calculation of Interest - Default and Repossession – Hire Purchase Trading Accounts	2	18
	Instructional Hours		**15**
Suggested Learning Methods :			
III	Branch Accounts - Meaning, Features and Types of Branch Accounting - Debtors System – Final Accounts - Wholesale Branch System - Stock & Debtors System	2	16
	Instructional Hours		**15**
Suggested Learning Methods :			

IV	Departmental accounts – Meaning – Objectives – Advantages – Distinction between branch and department - Transfers at cost or selling price – Interdepartmental Transfer	2	17
	Instructional Hours		15
Suggested Learning Methods			
V	Royalty Accounts - Lease (Excluding Sublease) – Bills of exchange (Trade Bills only)	2	20, 25
	Instructional Hours		15
Suggested Learning Methods :			
	Total Hours		75

Text Books :

1. S.P. Jain and K.L. Narang., **"Advanced Accounting"**, Kalyani Publishers, 2015.
2. T.S Reddy and A. Murthy., **"Financial Accounting"**, Margham Publications, 2015.

Reference Books :
1. R.L. Gupta and Radhasamy, **"Advanced Accounting"**, Sultan Chand and Sons, 1994.
2. M.C. Shukla, T.S. Grewal and S.C. Gupta, **"Advanced Accounts"**, S. Chand and Company Pvt. Ltd., 2016.
3. R.L. Gupta, **"Advanced Accounting"**, Sultan Chand & Sons, New Delhi, 2012.
4. M.C.Sukla, T.S.Grewal and S.C Gupta, **"Advanced Accounting"**, Sultan Chand &Sons, New Delhi, 2015.R.L.

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Work Sheet	Class Participation	Total
4	4	7	5	5	5	**30**

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	-	L	-	L	L	M	H	L	L	M	H
CO2	M	L	-	L	-	L	L	M	H	M	M	M	H
CO3	M	L	-	L	-	L	L	M	H	M	M	H	M
CO4	M	L	-	L	-	L	L	M	H	M	M	M	M
CO5	M	L	-	L	-	L	L	M	M	H	H	L	L

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title
22U4CAZ402	**Skill Based Paper II:** **Practical in Multimedia Systems**
Semester: IV	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**

Course Objective	To make the students to be a proficient in a broad range of design skills and animation
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	This course introduces the many applications that enhance the world of multimedia and the web, as well as the technological decisions that are needed to deploy them. Students learn how various tools are used to create a rich, dynamic Image/visual experience for users in many different formats. Emphasis is given to understanding current, new, and emerging technologies and the impact they have on web-based media. Basic computer skills are required.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Apply the graphical designs and functions using Photoshop & CorelDraw	Laboratory Practice	Program Creativity
CO 2	Create Professional design & animation	Laboratory Practice	Program Creativity
CO3	Frame banner using graphical designs and functions	Laboratory Practice	Program Creativity
CO4	Develop Professional design & animation	Laboratory Practice	Program Creativity
CO5	Create Animated Objects	Laboratory Practice	Program Creativity

Offered by	**Computer Applications**

Course Content	Instructional Hours / Week: 3

Unit	List of Practical for Photoshop&CorelDraw
1	Combine aspects of several images into one professional images using Photoshop.
2	Animate Plane Flying the Clouds using Photoshop.
3	Create Plastic Surgery for Nose using Photoshop.
4	Create 3D shapes and text using Photoshop
5	Create Web Page using Photoshop.
6	Create College Seminar Brochure
7	Create a 3D text in Corel Draw
8	Create a logo for your department in Corel Draw.
9	Create an advertisement for a Textile company in Corel Draw.
10	Using Corel Draw, design a business card for a company.

11	Using Corel Draw, design a banner for a marriage function.
12	Create New year Monthly Calendar

Suggested Learning Methods: Creative theme and poster development.

	Total Hours	45 Hrs

Tools for Assessment (30 Marks)

Designing	Theme development	Poster Presentation	Test I	Test II	Observation	Total
5	5	5	6	6	3	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CAC507	Core Paper XIV: Computer Networks		
Semester: V	Credits: 3	CIA: 30 Marks	ESE: 45 Marks
Course Objective	To equip the students with an exposure towards data communication strategies with the fundamental concepts of computer networks.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	The course introduces main concepts of networking, application areas, reference models, transmission environment, routing algorithms, IP, UDP and TCP protocols, application protocols and network security.		

Course Outcomes		Teaching Methods	Assessment Methods
CO1	Understand about Network Hardware, Software and uses of computer networks.	Lecture	Assignment
CO2	Understand the Guided Transmission Media, Wireless Transmission, and Communication Satellites.	Lecture/ Flipped Classroom	Seminar
CO3	Understand Error Detection and Correction, Elementary Data Link Protocols.	Tutorials	Assignment
CO4	Apply various Transport Protocols and Routing algorithms.	Lecture	Seminar
CO5	Understand the concept of DNS and Cryptography.	Tutorials	Quiz

Offered by	Computer Applications

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	**Uses of Computer Networks**: Business Applications - Home Applications - Mobile Users - Social Issues. **Network Hardware**: Personal Area Networks - Local Area Networks - Metropolitan Area Networks - Wide Area Networks - Internetworks. **Network Software**: Protocol Hierarchies - Design Issues for the Layers - Connection-Oriented and Connectionless Services - Service Primitives - The Relationship of Services to Protocols. **Reference Models**: The OSI Reference Model - The TCP/IP Reference Model- A Comparison of the OSI and TCP/IP Reference Models.	1	1
	Instructional Hours		**15**
Suggested learning methods: Report Presentation			
II	**Physical Layer: Guided Transmission Media**: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. **Wireless Transmission**: The Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Lightwave Transmission. **Communication Satellites**: Geostationary Satellites - Medium-Earth Orbit Satellites – Low-Earth Orbit Satellites – Satellites versus Fiber.	1	2
	Instructional Hours		**15**
Suggested learning methods: Video Presentation			
III	**Data Link Layer: Data Link Layer Design Issues:** Services provided to the Network Layer - Framing - Error Control - Flow Control. **Error Detection and Correction:** Error-Correcting Codes - Error-Detecting Codes. **Elementary Data Link Protocols**: An Unrestricted Simplex Protocol - A Simplex Stop-and-Wait Protocol - A Simplex Protocol for a Noisy Channel. **Sliding Window Protocols:** A One-Bit Sliding Window Protocol – A Protocol using Go Back N – A Protocol using Selective Repeat.	1	3

		Instructional Hours	15
Suggested learning methods: Report Presentation			

IV	**Network Layer: Routing Algorithms:** The Optimality Principle - Shortest Path Routing - Flooding - Distance Vector Routing - Link State Routing - Hierarchical Routing - Broadcast Routing - Multicast Routing - Routing for Mobile Hosts - Routing in Ad Hoc Networks. **Transport Layer: Elements of Transport Protocols:** Addressing - Connection Establishment - Connection Release - Flow Control and Buffering - Multiplexing - Crash Recovery. **The Internet Transport Protocols UDP:** Introduction to UDP. **The Internet Transport Protocols TCP:** Introduction to TCP - The TCP Service Model - The TCP Protocol - The TCP Segment Header - TCP Connection Establishment - TCP Connection Release - Modeling TCP Connection Management - TCP Congestion Control - TCP Timer Management.	1	5,6

		Instructional Hours	15
Suggested learning methods: Video Presentation			

V	**Application Layer: DNS - The Domain Name System:** The DNS Name Space - Resource Records - Name Servers. **Electronic Mail:** Architecture and Services - The User Agent - Message Formats - Message Transfer - Final Delivery. **Network Security: Cryptography:** Introduction to Cryptography - Substitution Ciphers - Transposition Ciphers - One-Time Pads - Two Fundamental Cryptographic Principles.	1	7,8

		Instructional Hours	15
Suggested learning methods: Group Discussion			
		Total Hours	**75 Hrs**

Text Books	1. Andrew S. Tanenbaum, "Computer Networks", 4th Edition, PHI.
Reference Books	1. Achyut Godbole, "Data Communication and Networks", 2007, TMH. 2. Uyless Black, "Computer Networks: Protocols, Standards and Interfaces", 2nd Edition, PHI
Web. URLs	https://www.geeksforgeeks.org/basics-computer-networking/

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Quiz	Assignment	Seminar	Total
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	H	L	M	H	H	H	M	H	M
CO2	M	H	M	H	M	H	M	M	M	H	H	M	M
CO3	L	M	H	L	M	M	H	L	H	M	H	H	H
CO4	H	M	M	M	H	L	M	H	M	H	M	H	M
CO5	H	H	M	M	M	L	M	M	H	M	H	M	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CAC508	**Core Paper XV: Ethical Hacking**		
Semester: V	**Credits: 3**	**CIA: 30Marks**	**ESE: 45Marks**

Course Objective	To acquire knowledge on ethical hacking methodology, the foot printing & social engineering, port scanning, hacking web servers and hacking wireless. It enables students to understand the basic IP detecting & blocking concepts.
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	Description about Course category and Development Needs

	Course Outcomes	Teaching Methods	Assessment Methods
CO 1	Explain the hacking methodology, foot printing concept and social engineering to apply port scanning, we application and its vulnerabilities	Lecture / Flipped Classroom	Assignment
CO 2	Applytheprocessofportscanningtoolsandtargetingpingsweeps.	Lecture / Tutorial	Seminar
CO 3	Elucidate about process of hacking webservicesand wireless networks to apply cryptography techniques.	Lectures	Seminar
CO 4	Explain wireless authentication technology and apply the process of hackingweb services, wireless networks.	Lecture / Tutorial	Group Discussion
CO 5	Gain knowledge on the networking concepts and Shell commandson payload for sniffing and hacking.	Lecture / Flipped Classroom	Assignment

Offered by	**Artificiel Intelligence and Machine Learning**

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	**Ethical Hacking Overview:** Introductionto Ethical Hacking, Overview of TCP/IP, IP Addressing, Overview of Numbering System. **Network and Computer Attacks:** Malicious Software Networks and Computers, Protecting against malware attack, Intruder Attacks on networks and computers, Addressing Physical Security	1	1 & 3
		Instructional Hours	**15**
Suggested learning methods: Report Presentation			
II	**Foot printing and Social Engineering:** Using Web Tools for Web printing, ConductingCompetitive intelligence, Using Domain Name, Service zone transfers, Introduction to social engineering. **Port Scanning:** Introduction, Types of Port Scans, Using Port Scanning Tools, Conducting Ping Sweeps, Understanding Shell Scripting.	1	4 & 5
		Instructional Hours	**15**
Suggested learning methods:Video Lectures on Social Engineering			
III	**Programming for security professionals:** Introduction to Computer Programming, Learning the C language, Understanding the HTML Basics, Understanding PERL, Understanding OOP. **Desktop and Server OS Vulnerabilities:** Tools for identifying	1	7&8

	vulnerabilities in Windows, MS OS vulnerabilities, Best practices for hardening Microsoft system, Linux OS vulnerabilities, Remote Access attacks on Linux system, Countermeasures against linux remote attacks.		
		Instructional Hours	**15**
Suggested learning methods:Case Studies
IV	**Hacking web services:** Understanding webapplications and itsvulnerabilities, Toolsof webattackersand securitytester. **Hacking wireless networks:** Understanding wirelesstechnology, Understanding wirelessnetwork standards, Understandingauthentication, Understanding war driving, Understanding wireless hacking.	1	10 & 11
		Instructional Hours	**15**
Suggested learning methods: Group Discussion
V	**Cryptography:** Understanding cryptographybasics, Understanding symmetric andasymmetric algorithm, Understanding public KeyInfrastructure, Understanding cryptography attacks. **Network Protection Systems:** Understanding Routers, Understanding Firewalls, Understanding Intrusion Detection and Prevention Systems, Understanding Honey Pots.	1	12 & 13
		Instructional Hours	**15**
Suggested learning methods: Video Presentation on Network protection sytems
		Total Hours	**75Hrs**

Text Books	**1.** Michael T. Simpson, Kent Backman, and James E. Corley,**"Hands-On Ethical Hacking and Network Defense".**
Reference Books	1. Jon Erickson, —Hacking, The Art of Exploitation‖, No Starch Press Inc., 2nd Edition:2008. 2. RafayBoloch, —Ethical Hacking and Penetration Testing Guide‖, CRC Press, 2014. 3. EC-Council, —Ethical Hacking and Countermeasures: Attack Phases‖, Cengage Learning,2010.
Web. URLs	https://www.pdfdrive.com/hands-on-ethical-hacking-and-network-defense-e157899505.html

Tools for Assessment (30 Marks)
CIA I	**CIA II**	**CIA III**	**Assignment**	**Seminar**	**Quiz**	**Total**
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	H	H	H	H	M	M	M	M	M
CO2	M	M	H	M	H	M	M	M	M	H	M	M	H
CO3	H	H	M	H	M	M	L	H	L	M	H	M	M
CO4	H	H	L	M	H	M	H	M	H	H	M	H	M
CO5	H	M	M	H	M	H	L	H	H	M	M	M	M

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title			
22U3CKC509	**Core Paper XVI: PHP Programming**			
Semester: V	**Credits: 3**	**CIA: 30 Marks**		**ESE: 45 Marks**
(Common to B. Sc. CS / IT / BCA)				

Course Objective	To acquire fundamental knowledge for web development using PHP.
Course Category	Employability/Skill Development
Development Needs	Global/National /Local/Regional
Course Description	To understand the conceptsof PHP Programming and develop webpage.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recognize the basic development concepts of PHP	Lecture / Flipped Classroom	Group Discussion
CO 2	Write a simple program using conditional statements	Lecture/ Demonstration	Quiz
CO 3	Understand the concepts of functions and arrays	Flipped Classroom	Seminar
CO 4	Use of Functions, Classes and files	Lecture/ Demonstration	Seminar
CO 5	Construct a simple database program for adding and modifying records	Lecture/ Demonstration	Assignment

Offered by	Computer Science

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	Introducing PHP – Basic development Concepts-Creating first PHP Scripts. Using Variable and Operators - Storing Data in variable – Understanding Data types –Setting and checking variables Data types.	**1**	1,2
	Instructional Hours		**15 Hrs**
Suggested Learning Methods: Code Review			
II	Using Constants-Manipulating variables with operators. **Controlling Program Flow:** Writing Simple Programs. Conditional Statements-Writing more complex Conditional Statements – Repeating Action with Loops	1	2,3
	Instructional Hours		**15 Hrs**
Suggested Learning Methods: Write Simple Programs with conditional Statements			
III	Working with String and Numeric Functions - **Working with Arrays:**Storing Data in Arrays - Processing Arrays with Loops and Iterations –Using Arrays with Forms – Working with Array Functions-Working with Dates and Times.	1	4
	Instructional Hours		**15 Hrs**
Suggested Learning Methods :Write Simple Programs using Arrays			

IV	**Using Functions and Classes:** Creating User-Defined Functions-Creating Classes. **Working with Files and Directories:** Reading Files –Writing Files.	1	5, 6
	Instructional Hours		**15 Hrs**
Suggested Learning Methods : Write Simple Programs using Functions			
V	**Working with Database and SQL:** Introducing Database and SQL - Using MySQL - Adding and modifying Data - Handling Errors. cookies – working with sessions. Working with XML	1	7,28
	Instructional Hours		**15 Hrs**
Suggested Learning Methods : Write Applications using Database and XML			
	Total Hours		**75 Hrs**

Text Books	1. VikramVaswani,**PHP A Beginner's Guide**, Tata McGraw-Hill Publishing Company Limited, 1stEdition, New Delhi, 2010. 2. Julie C.Meloni, **PHP, MYSQL and Apache**, Pearson Education,2009
Reference Books	1. Steven Holzner, **The PHP Complete Reference**, Tata McGraw-Hill Publishing Company Limited, 1st edition New Delhi, 2010. 2. Steven Holzer, **Spring in to PHP5**, Tata McGraw-Hill Publishing Company Limited,1stedition New Delhi, 2010.
Web. URLs	1. **https://www.w3schools.com/php/php_intro.asp** 2. **https://www.tutorialspoint.com/php/index.htm**

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Quiz	Assignment	Seminar	Total
4	4	7	5	5	5	**30**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	M	H	M	H	M	H	M	M	H
CO2	M	M	H	H	H	H	M	H	M	H	H	H	H
CO3	M	H	H	H	H	H	H	H	H	H	H	H	H
CO4	M	H	H	H	H	S	H	H	H	H	H	H	S
CO5	H	H	H	M	H	S	H	H	H	H	M	H	S

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CAP509	**Core Paper XVII: Practical in PHP Programming**		
Semester: V	**Credits: 3**	**CIA: 30 Marks**	**ESE:45 Marks**
Course Objective	To acquire fundamental knowledge web development using PHP.		
Course Category	Skill Development /Employability		
Development Needs	Global/Local		
Course Description	To development skill set in PHP and apply the concepts to develop applications in order to meet the Local and Global needs.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Develop the program for control structure and functions	Demonstration	Program Creativity
CO 2	Develop simple program to implement database connectivity.	Demonstration	Debugging
CO 3	Create a simple database program for student information	Demonstration	Application of Logic
CO 4	Develop simple program to implement database connectivity.	Demonstration	Program Development
CO 5	Develop Web Page using appropriate tools	Demonstration	Program Development

Offered by	Computer Applications

Course Content	Instructional Hours / Week : 5

Program List

1. Write a PHP program to illustrate Conditional and Looping Statements.

2. Write a PHP program to demonstrate Array Functions, string, numeric and date functions.

3. Write a PHP program to create user defined functions.

4. Write a PHP program for file creation and file manipulation.

5. Write a PHP program for creating sessions.

6. Write a PHP program for creating cookies

7. Create a Simple application using forms in PHP

8. Write a PHP program for creating tables with constraints and demonstrate table join.

9. Write a PHP program for Database connectivity, Create,Insertion, Updating and Deleting rows in MySQL tables

10. Write a PHP program for sorting and searching a data.

11. Write a PHP Program to illustrate the usage of sub-queries, aggregate functions, set operators.

12. Write a PHP program to create a simple web page. Validate the Input and apply appropriates to format the output.

Suggested Learning Methods: Solving Case studies and Program development	
Total Hours	**75 Hrs**

Tools for Assessment (30 Marks)

Application of Logic	Program Creativity	Program Debugging	Test 1	Test 2	Observation Note Book	Total
5	5	5	6	6	3	**30**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	M	M	H	H	H	H	M	H	H
CO2	H	M	H	M	M	H	H	M	M	H	H	M	H
CO3	H	L	H	H	H	H	L	H	H	L	H	H	H
CO4	H	L	H	H	H	H	L	H	H	L	H	H	H
CO5	H	L	H	H	H	H	L	H	H	L	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U3CKE501/ 22U3CKE501	**Discipline Specific** **Elective Paper I : Blockchain Technology**		
Semester: V	**Credits: 3**	**CIA: 30 Marks**	**ESE:45 Marks**
(Common to B. Sc. CS / IT / BCA)			

Course Objective	To understand the Block chain technology and explain about the Block chain technology Techniques.
Course Category	Employability/Skill Development
Development Needs	Global/National /Local/Regional
Course Description	To understand the concepts of Block chain technology and its Techniques.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand emerging abstract models for Block chain Technology.	Lecture	Group Discussion
CO 2	Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain.	Lecture/ Tutorial	Group Discussion
CO 3	It provides conceptual understanding of the function of Block chain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.	Lecture/ Flipped Classroom	Assignment
CO 4	Apply hyper ledger Fabric and Etheric platform to implement the Block chain Application.	Lecture/ Tutorial	Seminar
CO 5	Understand the role of Block chain technology	Lecture/ Tutorial	Seminar

Offered by	**Computer Science**

Course Content	Instructional Hours / Week : 6

Unit	Description	Text Book	Chapters
I	**INTRODUCTION TO BLOCKCHAIN** Blockchain- Public Ledgers, Blockchain as Public Ledgers -Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions-Distributed Consensus, The Chain and the Longest Chain -Cryptocurrency to Blockchain 2.0 - Permissioned Model of Block chain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree	1	1
	Instructional Hours		**18 Hrs**
Suggested Learning Methods: Video Lectures on Introduction to blockchain			
II	**BITCOIN AND CRYPTO CURRENCY** A basic crypto currency, Creation of coins, Payments and double spending, FORTH - the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments-Consensus in a Bitcoin network	1	2
	Instructional Hours		18 Hrs
Suggested Learning Methods: Video Lectures on Introduction to bitcoin scripting			

III	**BITCOIN CONSENSUS** Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts- Consensus models for permissioned block chain-Distributed consensus in closed environment Paxos	1	3
	Instructional Hours		18 Hrs

Suggested Learning Methods: Group Discussion

IV	**DISTRIBUTED CONSENSUS** RAFT Consensus-Byzantine general problem, Byzantine fault tolerant system-Agreement Protocol, Lamport- Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance	1	5
	Instructional Hours		18 Hrs

Suggested Learning Methods: Group Discussion

V	**BLOCK CHAIN APPLICATIONS** Internet of Things-Medical Record Management System-Blockchain in Government and Blockchain Security-Blockchain Use Cases – Finance	1	7
	Instructional Hours		18 Hrs

Suggested Learning Methods : Apply the techniques with real time data

	Total Hours	**90 Hrs**

Text Books	1. Bashir, Imran **, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks**,2017.
Reference Books	1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. **Bitcoin and cryptocurrency technologies: A comprehensive introduction**. Princeton University Press, 2016. 2. Joseph Bonneau et al, **SoK: Research perspectives and challenges for Bitcoin and cryptocurrency**, IEEE Symposium on security and Privacy, 2015.
Web. URLs	**https://www.coursera.org/learn/introduction-blockchain-technologies**

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Class Participation	Assignment	Seminar	Total
4	4	7	5	5	5	**30**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	M	M	M	M	M	M	M
CO2	M	M	M	M	M	M	M	M	M	M	M	M	M
CO3	M	H	H	H	H	M	H	H	M	H	H	H	H
CO4	M	H	H	H	H	M	H	H	M	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CKE502	**Discipline Specific** **Elective Paper I: Next Generation Networks**		
Semester: V	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**
	(Common to B. Sc. CS / DCFS / IT / BCA)		

Course Objective	To learn the technical, economic and service advantages of next generation networks. Analyse the evolution of technologies of 4G and beyond, to explore the NGN framework catering services of end user with QoS provisioning.
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	Description about Course category and Development Needs

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Describe the issues and challenges of wireless domain in future generation network design	Lecture	Assignment
CO 2	Explain the evolution of technologies of 4G and beyond	Lecture/ Tutorial	Seminar
CO 3	Explore the LTE concepts and technologies	Lecture/ Tutorial	Seminar
CO 4	Outline the process of integrating SDN with LTE	Tutorial	Quiz
CO 5	Explain the NGN architectures, management and standardizations	Lecture / Flipped Classroom	Assignment

Offered by	Computer Applications	

Course Content	Instructional Hours / Week : 6

Unit	Description	Text Book	Chapters
I	**INTRODUCTION:** Evolution of public mobile services -motivations for IP based services, Wireless IP network architecture –3GPP packet data network architecture. Introduction to next generation networks - Changes, Opportunities and Challenges, Technologies, Next Generation Society, future Trends.	3 2	1, 2 1
	Instructional Hours		**18 Hrs**
Suggested Learning Methods:Report Presentation			
II	**LTE - Introduction:** Architectural Review of UMTS and GSM, History of Mobile Telecommunication Systems, Need for LTE. **Architecture of LTE Air Interface:** Air Interface Protocol Stack, Logical, Transport and Physical Channels, The Resource Grid, Multiple Antenna Transmission, Resource Element Mapping, downlink/uplink data transfer.	5	1, 6
	Instructional Hours		**18 Hrs**
Suggested Learning Methods:Video Lectures			
III	**SDMN-LTE INTEGRATION:** SDN paradigm and applications, SDN for wireless-challenges, Leveraging SDN for 5G network Ubiquitous connectivity-mobile cloud-cooperative cellular network-restructuring mobile networks to SDN-SDN/LTE integration benefits.	4	3, 4, 5, 6
	Instructional Hours		**18 Hrs**
Suggested Learning Methods:Video Lectures and Report Presentation			

IV	**NGN ARCHITECTURE**:Evolution towards NGN-Technology requirements, NGN functional architecture- Transport stratum, service stratum, service/ content layer and customer terminal equipment function. NGN entities, Network and Service evolution -fixed, mobile, cable and internet evolution towards NGN.	1	1, 3, 4, 6

	Instructional Hours	**18 Hrs**

Suggested Learning Methods:Video Lecture

V	**NGN MANAGEMENT AND STANDARDIZATION**: NGN requirements on Management-Customer, third party, Configuration, Accounting, performance, device and information management. Service and control management- End-toEndQoS and security. ITU and GSI-NGN releases, ETSI-NGN concept and releases, NGMN alliance and NGMN.	1 2	3,7,8 4

	Instructional Hours	**18 Hrs**

Suggested Learning Methods: Report & Video Presentation

	Total Hours	**90 Hrs**

Text Books	**1.**Jingming Li Salina, Pascal Salina "**Next Generation Networks-perspectives and potentials"** Wiley, January 2008. **2.**Thomas Plavyk, —**Next generation Telecommunication Networks, Services and Management**, Wiley & IEEE Press Publications, 2010. **3.** Jyh-Cheng Chen, National Tsing Hua University, Tao Zhang,Telcordia Technologies **- "IP-Based Next-Generation Wireless Networks",** Systems, Architectures and Protocols. **4.**MadhusangaLiyanage, Andrei Gurtov, Mika Ylianttila, **"Software Defined Mobile Networks beyond LTE Network Architecture",** Wiley, June 2015. **5.** Christopher Cox Director, Chris Cox Communications Ltd, UK, **"An Introduction to LTE, LTE-Advanced, Sae, Volte and 4G Mobile Communications".**
Reference Books	**1. "Next-Generation Wireless Technologies",** Naveen Chilamkurti Sherali Zeadally Hakima Chaouchi.
Web. URLs	https://www.academia.edu/38394302/_ebook_4G_LTE_LTE_Advanced_for_Mobile_Broadband_pdf

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M	L	M	H	H	H	H	M	M
CO2	H	H	M	M	M	L	M	H	H	H	H	M	M
CO3	H	H	M	M	M	L	M	H	H	H	H	H	H
CO4	H	H	M	M	M	L	M	H	H	H	H	H	H
CO5	H	H	M	M	M	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

B. Sc., / BCA NASC 2022

Course Code	Title		
21U3CKE503/ 22U3CKE503	**Discipline Specific Elective Paper - I : Internet of Things**		
Semester: V	**Credits: 3**	**CIA: 30 Marks**	**ESE:45 Marks**
(Common to B. Sc. CS / IT / BCA)			
Course Objective	To understand the Data and Knowledge Management and use of Devices in IoT Technology, Understand State of the Art – IoT Architecture and Real World IoT Design.		
Course Category	Employability/Skill Development		
Development Needs	Global/National /Local/Regional		
Course Description	This Course focuses on hands-on IoT concepts such as sensing, actuation and communication. It covers the development of Internet of Things (IoT) prototypes—including devices for sensing, actuation, processing, and communication—to help you develop skills and experiences.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand the vision of IoT from a global context.	Social Media	Class Participation
CO 2	Understand the Market perspective of IoT.	Brainstorming	Quiz
CO 3	Understand Use of Devices, Gateways and Data Management in IoT.	Video Lectures	Assignment
CO 4	Build state of the art architecture in IoT.	Demonstration	Assignment
CO 5	Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.	Discussion	Seminar

Offered by	Computer Science

Course Content	Instructional Hours / Week : 6

Unit	Description	Text Book	Chapters
I	**M2M to IoT**-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.	1	2
	Instructional Hours		**18 Hrs**
Suggested Learning Methods : Group Discussion			
II	**M2M to IoT – A Market Perspective**– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. **M2M to IoT-An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	1	3-4
	Instructional Hours		**18 Hrs**
Suggested Learning Methods : Quiz			
III	**M2M and IoT Technology Fundamentals-** Devices and gateways, Local and wide area networking, Data management.	1	5
	Instructional Hours		**18 Hrs**

	Suggested Learning Methods : Assignment		
IV	Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.	1	5
	Instructional Hours		**18 Hrs**
	Suggested Learning Methods : Assignment		
V	**IoT Architecture-State of the Art –** Introduction, State of the art. **Architecture Reference Model-** Introduction, Reference Model and architecture, IoT reference Model.	1	6-7
	Instructional Hours		**18 Hrs**
	Suggested Learning Methods : Seminar		
	Total Hours		**90 Hrs**

Text Books	1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** Academic Press, 2014.
Reference Books	1. Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** VPT, 2014. 2. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** Apress Publications, 2013
Web. URLs	1. https://www.tutorialspoint.com/internet_of_things/index.html

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Class Participation	Assignment	Seminar	Total
4	4	7	5	5	5	30

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	M	M	M	M	M	M	M
CO2	M	M	M	M	M	M	M	M	M	M	M	M	M
CO3	M	H	H	H	H	M	H	H	M	H	H	H	H
CO4	M	H	H	H	H	M	H	H	M	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U3CKE504/ 22U3CKE504	**Discipline Specific Elective Paper I : Big Data Analytics**		
Semester: V	**Credits: 3**	**CIA: 30 Marks**	**ESE:45 Marks**
(Common to B. Sc. CS / IT / BCA)			
Course Objective	To provide an overview of an exciting growing field of big data analytics, analyse big data like Hadoop, NoSql Map-Reduce and learn fundamental techniques and principles in achieving big data analytics.		
Course Category	Employability/Skill Development		
Development Needs	Global/National /Local/Regional		
Course Description	To understand the concepts of Big Data and analysis of these data entails along with ethical and conceptual challenges		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Know about the big data analytics	Jigsaw	Group Discussion
CO 2	Tools in big data analytics using Hadoop	Inquiry Based	Quiz
CO 3	Data model in big data analytics using NoSql	Demonstration	Assignment
CO 4	Understanding and Know about Map Reduce Programming	Video Lectures	Assignment
CO 5	Gain more knowledge about Hadoop streaming with R	Flipped Classrooms	Seminar
Offered by	**Computer Science, Computer Technology, Information Technology and BCA Departments**		

Course Content		Instructional Hours / Week : 6	

Unit	Description	Text Book	Chapters
I	**INTRODUCTION TO BIG DATA**: Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Bigdata Challenges, Case Study of Big Data Solutions.	1	1
	Instructional Hours		**18 Hrs**
Suggested Learning Methods : Group Discussion			
II	**HADOOP:** Introducing Hadoop – Why Hadoop – Why not RDBMS – RDBMS versus Hadoop – History of Hadoop – Hadoop Overview – Hadoop Distributed File System (HDFS) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN – Interacting with Hadoop Ecosystem	2	2
	Instructional Hours		**18 Hrs**
Suggested Learning Methods : Quiz			
III	**NoSQL DATA MODEL:** Introduction to NoSQL – NoSQL Business Drivers – NoSQL Data Architectural Patterns – Variations of NoSQL Architectural Patterns – Using NoSQL to Manage Big data – Case study of NoSQL	1	3
	Instructional Hours		**18 Hrs**

Suggested Learning Methods : Assignment			
IV	**MAP REDUCE Programming:** Introduction to MapReduce – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression	2	4
	Instructional Hours		**18 Hrs**
Suggested Learning Methods: Assignment			
V	**Hadoop streaming with R:** Understanding the basics of Hadoop streaming – How to run Hadoop streaming with R – Understanding a MapReduce application – Understanding how to code and run a Map-Reduce application – how to explore the output of Map Reduce application	3	4
	Instructional Hours		**18 Hrs**
Suggested Learning Methods: Seminar			
	Total Hours		**90 Hrs**

Text Books	1. Radha Shankarmani, M Vijayalakshmi, **"Big Data Analytics",**WileyPublications,first Edition 2016 2. Seema Acharya, Subhashini Chellappan**,** "**Big Data and Analytics",** Wiley Publication, first edition. Reprint in 2016 3. Vignesh Prajapati, **"Data analytics with R and Hadoop"** , Copyright © 2013, Packt Publishing.
Reference Books	1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, **"Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses"**, Wiley, 2013 2. Bill Franks, Taming,**"The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics"**, Wiley
Web. URLs	1. https://www.guru99.com/what-is-big-data.html 2. https://techtarget.com/searchbusinessanalytics/definition/big-data-analytics

Tools for Assessment (30 Marks)						
CIA I	**CIA II**	**CIA III**	**Class Participation**	**Assignment**	**Seminar**	**Total**
4	4	7	5	5	5	**30**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	M	M	M	M	M	M	M
CO2	M	M	H	H	H	M	M	H	H	H	H	H	H
CO3	H	M	H	H	H	H	M	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title	
21U3CAV511 / 22U3CAV510	**In-plant Training**	
Semester: V	**Credits: 2**	**ESE:50 Marks**

Objective:

To give optimum exposure on the practical side of industrial society

Guidelines:

1. Duration of the internship training is 2**0 days** during the summer vacation which falls at the **end of the 4th semester.**

2. The departments concerned will prepare on exhaustive panel of institutions, industries and practitioners.

3. The individual student has to identify the institution / industry / practitioners of their choice and inform the same to the HOD / staff-in-charge.

4. The students hereafter will be called as trainees should maintain a work diary in which the daily work done should be entered and the same should be attested by the section in-charge.

5. The departments should prepare an outline of the job to be done, sections in which they have to be attached both in the office as well as in the field.

6. The trainees should strictly adhere to the rules and regulations and office timings of the institutions to which they are attached.

7. The trainees have to obtain a certificate on successful completion of the internship from the chief executive of the organization.

8. Monitoring and inspection by staff on a regular basis.

9. Report writing manual and format should be prepared by the respective departments.

10. All model forms are to be attached wherever it is necessary.

11. Report evaluation: Internal viva-voce examination will be conducted and the maximum mark awarded is 50.

12. In-Plant Training has to be carried out only in the approved industries by the department/College

13. Report should be submitted in the 5th semester at end of the September

Course Code	Title		
21U4CAZ503 / 22U4CAZ503	**Skill Based Paper III: Practical in Internet of Things**		
Semester: V	**Credits: 3**	**CIA: 30 Marks**	**ESE:45 Marks**
(Bachelor of Computer Applications)			

Course Objective	On the successful completion of the course the students will able to design IoT applications
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	To make the students to understand Arduino, digital meter, various sensors for IoT applications.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Implement the design of digital meter	Constructivist learning, Code Review	Debugging
CO 2	Design with Tinkercad	Problem Based Teaching, Constructivist learning	Program Development

Offered by	**Electronics**

Course Content	**Instructional Hours / Week: 4**

Unit	List of Practical
1	Demonstrate the working of Arduino
2	Blinking LED
3	Design of digital dc voltmeter
4	Measure the air humidity using sensor
5	Measure the temperature using sensor
6	Simulate motor control on Tinkercad
7	Measure the distance of an object using sensor
8	Smart Home Automation system
9	Sense the available network
10	Sense a finger when it is placed on board

Suggested Learning Methods: Solving Case studies and Create Applications	10Hrs
Total Hours	**60Hrs**

Tools for Assessment (30 Marks)

Logical Thinking	Program Execution	Problem Solving	Test I	Test II	Observation	Total
5	**5**	**5**	**6**	**6**	**3**	30

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	M	M	-	M	M	-	-	H	M	H	H	M	M
CO2	M	H	-	M	M	-	M	H	M	H	M	H	M

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CKC611	**Core Paper XVIII: Data Mining**		
Semester: VI	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**
(Common to IT/CS/BCA)			

Course Objective	To enable the students to explore data using data mining techniques to solve the business problems.
Course Category	Skill Development
Development Needs	Global
Course Description	Data mining is the process of sorting through large data sets to identify patterns and relationships that can help solve business problems through data analysis. Data mining can be used to identify telecommunication fraud, improve marketing effectiveness, and identify network faults etc.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Know the basic concept of Data Mining and Association Rules	Lecture / Demonstration / Video Lecture/	Open book Test
CO 2	Understand the concepts of Classification and decision tree	Demonstration / Video Lecture/ Online Tutorial	Assignment
CO 3	Apply the concept of splitting the data into various clusters	Lectures /Video Lessons / Case Studies	Group Discussion
CO 4	Analyse various type of Mining like Web Mining and Text Mining	Tutorial / Demonstration / Video Lessons	Quiz
CO 5	Assess Information Privacy and Data Mining	Tutorial / Demonstration / Case Studies	Seminar

Offered by	Computer Applications	
Course Content		**Instructional Hours / Week : 6**

Unit	Description	Text Book	Chapters
I	**Data Mining:** Introduction – What is Data Mining?- Why Data Mining – The Data Mining Process – Data Mining Applications – Data Mining Techniques – Some Data Mining Case Studies. Association Rules Mining: Introduction – Basics – Apriori Algorithm	**1**	1,2
	Instructional Hours		**18 Hrs**
Suggested Learning Methods: Video lectures			
II	Classification – Introduction – Decision Tree – Building a decision tree – The tree induction Algorithm – Split Algorithm based on Information Theory – Split Algorithm based on the Gini Index – Overfitting and Pruning –Decision Tree Rules.	1	3
	Instructional Hours		**18 Hrs**
Suggested Learning Methods: Online Tutorial			
III	Cluster Analysis: What is Cluster Analysis? – Desired Features of Cluster Analysis – Types of Data – Computing Distance – Types of Cluster Analysis Methods – Partitional Method – The k-Means Method – Hierarchical Methods – Density-Based Methods.	1	4
	Instructional Hours		**18 Hrs**
Suggested Learning Methods: Case studies			

IV	Web Data Mining – Introduction – Web Terminology and Characteristics –Locality and Hierarchy in the Web – Web Content Mining – Web Usage Mining – Web Structure Mining – Web Mining Software.	1	5
	Instructional Hours		**18 Hrs**

Suggested Learning Methods: Video Lectures

V	Information Privacy and Data Mining: Introduction – What is information Privacy? – Basic Principles to product Information Privacy – Uses and Misuses of Data Mining – Primary aims of data mining - Pitfalls of Data Mining –Technological solutions.	1	9
	Instructional Hours		**18 Hrs**

Suggested Learning Methods: Case Studies

	Total Hours	**90 Hrs**

Text Books	1. Introduction to Data Mining and Case Studies by G. K. Gupta, Published by Prentice Hall of India Private Limited, New Delhi.
Reference Books	1. Data Mining Techniques by Arun K Purari , Published by University Press India Private Limited. 2. Data Mining – A Tutorial-based Primer by Richard J. Roiger& Michael W. GeatzPublished by Pearson Education.
Web. URLs	https://www.tutorialspoint.com/data_mining/index.htm

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Class Participation	Total
8	8	10	8	8	8	**50**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	L	M	M	-	-	M	H	H	M	M
CO2	M	M	M	M	H	M	-	-	H	H	H	M	H
CO3	H	L	M	H	M	M	-	-	M	H	H	M	M
CO4	M	H	L	M	L	L	-	-	H	M	H	H	M
CO5	M	M	H	H	M	H	-	-	H	H	M	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title
21U3CAV612/ 22U3CAV611	**Project and Viva-Voce**

Semester: VI	**Credits: 4**	**CIA: 50 Marks**	**ESE: 50 Marks**

Course Objective:

     To give project based learning which makes the students to apply practically what they learned.

Course Outcomes (CO):

CO1	Remember the fundamental concepts of algorithm and designs
CO2	Understand the optimal methods and Software Engineering concepts to be applied
CO3	Apply the knowledge and what they learned
CO4	Analyze the Economical and Technical feasibility
CO5	Develop software based applications and Deployment of software

Offered by: Computer Applications

Course Content   **Instructional Hours/Week: 6**

Project Work and Viva-Voce

Project Guidelines
 	
Project shall be Application / System Oriented/ Web enabled online applications
 	
Individual project is permissible. There should be no team project.
 	
Report should be in the following sequence
 	
     ▪ Declaration
     ▪ Certificate from the company/organization
     ▪ Bonafide Certificate
Guidelines to prepare documentation:
 	
     ▪ The cover should be in the silver gray colour and hard binding
     ▪ Font type   : Times New Roman
     ▪ Font size   : 12
     ▪ Sub heading size   :14
     ▪ Heading size   :16
     ▪ Margin   : top,bottom,right-2.5 cm, left -3 cm
     ▪ Line spacing between two lines - 1.5
     ▪ Every paragraph should start with one tab space.

<u>Sample Templates</u>

Title of the Project

A project report submitted to the Bharathiar University in the partial fulfillment

of the requirements for the award of the degree of

BACHELOR OF COMPUTER APPLICATIONS

Submitted by

Name of the Student

(Reg. No.)

Under the Guidance of

Guide Name (Designation)

NEHRU ARTS AND SCIENCE COLLEGE

(Autonomous)

(Reaccredited by NAAC with "A" Grade, ISO 9001-2008 & ISO 14001 : 2004 Certified)

RECOGNIZED BY UGC & AFFILIATED TO BHARATHIAR UNIVERSITY

"NEHRU GARDENS", T. M. PALAYAM, COIMBATORE – 641 105.

Month & year

TABLE OF CONTENTS

Declaration

I, (*Student Name , Reg.No.*) hereby declare that the project entitled (*Title Of The Project*) submitted to Bharathiar University in partial fulfillment for the award of the Bachelor Degree of Computer Applications is an independent project report done by me during the project duration of the period of study in Nehru Arts and Science College, Coimbatore (Recognized by UGC &Affiliated to Bharathiar University)under the guidance of (*Name Of The Guide*) during the academic year 2022-23.

PLACE: Signature of the student
DATE:

DEPARTMENT OF COMPUTER APPLICATIONS

NEHRU ARTS AND SCIENCE COLLEGE

(Reaccredited by NAAC with "A" Grade, ISO 9001-2008 & ISO 14001: 2004 Certified)

RECOGNIZED BY UGC & AFFILIATED TO BHARATHIAR UNIVERSITY

"NEHRU GARDENS", T. M. PALAYAM, COIMBATORE – 641 105.

CERTIFICATE

This is to certify that the project report entitled (*Title Of The Project*), is a bonafied work done by (*Student Name, Reg. No.*) in partial fulfillment of the requirement of the award of the degree of Bachelor of Computer Applications, Bharathiar University, Coimbatore during the academic year (Academic Year).

Internal Guide   Head of the Department

Certify that we examined the Candidate in the Project Work / Viva-Voce Examination held at NEHRU ARTS AND SCIENCE COLLEGE on _____

Internal Examiner   External Examiner

Total Hours: 90 Hrs

Tools for Assessment (50 Marks)

Review I	Review II	Review III	Document Preparation	Total
10	10	10	20	50

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD

Course Code	Title		
21U3CKE605/ 22U3CKE605	**Discipline Specific Elective Paper II - Software Quality Assurance**		
Semester: VI	**Credits: 3**	**CIA:30 Marks**	**ESE: 45 Marks**
(Common to B. Sc. CS / IT / BCA)			
Course Objective	To describe Quality Assurance, understand quality components and apply the quality models.		
Course Category	Employability		
Development Needs	Global		
Course Description	Develop Problem Solving Skills to solve the computer based problems at Global needs.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Knowledge about the concept, factors, of Quality Assurance	Video Lecture	Assignment
CO 2	Understand various components of Quality Assurance	Case Based	Group Discussion
CO 3	Analyze Testing process in Quality Assurance	Video Lessons	Seminar
CO 4	Analyze various Software Quality metrics	Case Studies	Quiz
CO 5	Interpret the various on Standards for Software Quality.	Lecture	Quiz

Offered by	**Computer Science**

Course Content	Instructional Hours / Week : 6

Unit	Description	Text Book	Chapters
I	**Software Quality:** Define **S**oftware-Software error,faults and failures-Classification of the causes of software errors- Software Quality Definition and objectives – software quality assurance and software engineering. **Software Quality factors:** Need for comprehensive software quality requirements – classification of software requirements into software quality factors – product operation software quality factors- product revision software quality factors – product transition software quality factors.	1	2,3
	Instructional Hours		**18**

Suggested Learning Methods: Assignment

Unit	Description	Text Book	Chapters
II	**Components of SQA system :** SQA system and architecture – Pre-project components – software project life cycle components – Infrastructure components for error prevention and improvement – Management SQA components – SQA standards, system certification and assessment components – Organizing for SQA – the human components.	1	4
	Instructional Hours		18

Suggested Learning Methods: Group Discussion

III	**Software testing – strategies:** Definition and objectives- software testing strategies – software test classifications – White box testing – Black box testing. **Software testing – implementation:** Testing process – Test-Case Design – Automated testing – Alpha – beta site testing programs.	1	9,10
		Instructional Hours	**18**

Suggested Learning Methods : Seminar

IV	**Software Quality metrics:** Objectives of quality measurement – Classification of software quality metrics – Process metrics- Product metrics- Implementation of Software Quality metrics – Cost of Software Quality metrics-Classical model of Software Quality.	1	21,22
		Instructional Hours	18

Suggested Learning Methods : Quiz

V	**Quality management standards:** scope –Main standards of software quality management - ISO 9000-3 – certification according to ISO 9000-3 standard – Capability Maturity model principles, structure and processes area – Bootstrap Methodology.	1 2	23 4
		Instructional Hours	18

Suggested Learning Methods : Quiz

	Total Hours	90 Hrs

Text Books	1. Daniel Galin, **"Software Quality Assurance From Theory to Implementation"**, Pearson education Ltd., 2004. 2. Claude Y. Laporte and Alain April, **"Software Quality Assurance"**, IEEE Press wiley, 2018.
Reference Books	1. Stephen H. Kan, **"Metrics and Models in Software Quality Engineering"**, 2nd Edition, Pearson, 2003. 2.Kshirasagar Naik and Priyadarshi Tripathy (Eds), **"Software Testing andQuality Assurance: Theory and Practice"**, John Wiley, 2008
Web. URLs	Software Quality Assurance (SQA) - TAE (tutorialandexample.com)

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
4	4	7	5	5	5	30

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	H	H	H	L	M	M	L	M	M	H	H	M	M
CO2	M	M	M	M	H	M	M	M	H	H	H	M	H
CO3	H	L	M	H	M	M	L	H	M	H	H	M	M
CO4	M	H	L	M	L	L	H	M	H	M	H	H	M
CO5	M	M	H	H	M	H	M	H	H	H	M	H	H

H-High; M-Medium; L-Low

Course designed by		**Verified by**	

Course Code	Title		
21U3CKE606/ 22U3CKE606	**Discipline Specific Elective Paper II: Information Security**		
Semester: VI	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**
(Common to B. Sc. IT / CS / AIML / BCA)			
Course Objective	To enable the students to understand the various aspects of Information Security in the local and global scenario.		
Course Category	Skill Development /Employability/Entrepreneurship		
Development Needs	Global		
Course Description	Description about Course category and Development Needs		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand the basics of Information Security	Smart Board	Assignment
CO 2	Identify the legal, ethical and professional issues in Information Security	Video Lessons	Seminar
CO 3	Survey the standards available	Smart Board	Seminar
CO 4	Assess the technologies essential to provide Information Security	Case study Assignments	Group Discussion
CO 5	Analyze hacking threats and attacks and determine appropriate methods to combat them	Fishbowl Techniques	Assignment

Offered by	**Artificial Intelligence and Machine Learning**		

Course Content		Instructional Hours / Week : 6	

Unit	Description	Text Book	Chapters
I	**Introduction to Information security:** History-What is Information Security?-Critical Characteristics of Information, NSTISSC Security Model-Components of an Information System, Securing the Components-Balancing Security and Access-The SDLC-The Security SDLC.	1	1
	Instructional Hours		**18 Hrs**
	Report Presentation		
II	**Need for Security:** Introduction- Business Needs-Threats-Attacks. **Legal, Ethical and Professional Issues:** Introduction-Laws and ethics-types of law-international laws and legal bodies-Ethics and information security.	1	2, 3
	Instructional Hours		**18 Hrs**
	Case Study Preparation		
III	**Risk Management:**Introduction-overview-Identifying and Assessing Risk- Assessing- Control strategies- selecting strategy.	1	4
	Instructional Hours		**18 Hrs**
	Video Lectures		
IV	**Planning for Security:** Introduction-Information Security Policy-Blueprint for Security-Security education-training and awareness-Continuity strategies, Risk appetite, Management discussion points, documenting results.	1	5
	Instructional Hours		**18 Hrs**
	Group Discussion		
V	**Implementing Information security:** Introduction- Project management for information security-Technical and non-technical aspects of implementation.	1	10, 12

	Information security maintenance: Introduction- Security management models-Maintenance model.		

Instructional Hours	**18 Hrs**
Video Presentation	
Total Hours	**90 Hrs**

Text Books	1. Michael E. Whitman and Herbert J. Mattord, "**Principles of Information Security**" Second Edition, Thomson Publishers. **Unit I:** Chapter 1; **Unit II:** Chapter 2, 3; **Unit III:** Chapter 4; **Unit IV:** Chapter 5; **Unit V:** Chapter 10,12.
Reference Books	1. Surya Prakash Tripathi and RitendraGoel "Introduction to Information Security and Cyber Laws",2014, Dreamtech Press 2. V.K. Pachghare, "Cryptography and Information Security", 2nd Revised edition, Prentice-Hall of India Pvt.Ltd 3. Mark S. Merkow, "Information Security: Principles and. Practices", Second Edition, Pearson Education
Web. URLs	http://almuhammadi.com/sultan/sec_books/Whitman.pdf

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	H	H	H	H	M	M	M	M	M
CO2	M	M	H	M	H	M	M	M	M	H	M	M	H
CO3	H	H	M	H	M	M	L	H	L	M	H	M	M
CO4	H	H	L	M	H	M	H	M	H	H	M	H	M
CO5	H	M	M	H	M	H	L	H	H	M	M	M	M

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U3CKE607/ 22U3CKE607	**Discipline Specific Elective Paper - II: Cloud Computing**		
Semester: VI	**Credits: 3**	**CIA:30 Marks**	**ESE: 45 Marks**
(Common to B. Sc CS / IT / BCA/ AIML / DS)			
Course Objective	To exploring cloud computing driven commercial systems and applications and insight into the basics of cloud computing along with virtualization.		
Course Category	Employability		
Development Needs	Global		
Course Description	This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	To make the students to understand the Cloud Computing and types,	Lectures	Poster Presentation
CO 2	To understand the cloud architecture	Tutorial	Assignment
CO 3	To identify the applications of abstraction & Virtualization	Video Lessons	Seminar
CO 4	To apply cloud computing in real-time.	Tutorial	Case Study
CO 5	To make the students to understand the Cloud Computing and types,	Lectures	Case Study
Offered by	**Computer Science**		

Course Content		Instructional Hours / Week : 6	
Unit	**Description**	**Text Book**	**Chapters**
I	**Defining Cloud Computing:** Defining Cloud Computing - Cloud Types - Examining the Characteristics of Cloud Computing - Disadvantages of cloud computing - Assessing the Role of Open Standards. **Assessing the Value Proposition:** Measuring the Cloud's Value : The laws of cloudonomics - Cloud computing obstacles - Behavioral factors relating to cloud adoption.	1	1,
	Instructional Hours		18
Suggested Learning Methods: **Video lectures**			
II	**Understanding Cloud Architecture :**Exploring the Cloud Computing Stack - Connecting to the Cloud. **Understanding Services and Applications by Type :** Defining Infrastructure as a Service (IaaS) - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - Defining Identity as a Service (IDaaS) - Defining Compliance as a Service (CaaS).	1	3,4
	Instructional Hours		18
Suggested Learning Methods: Practice using Models			
II	**Understanding Abstraction and Virtualization :**Using Virtualization Technologies - Load Balancing and Virtualization - Understanding Hypervisors - Understanding Machine Imaging -	1	5,7

	Porting Applications. **Exploring Platform as a Service:** Defining Services - Using PaaS Application Frameworks.		
		Instructional Hours	18

Suggested Learning Methods : Develop small programmes using visualization tools

IV	**Using Google Web Services:** Exploring Google Applications - Surveying the Google Application Portfolio - Exploring the Google Toolkit - Working with the Google App Engine. **Using Amazon Web Services :** Understanding Amazon Web Services - Amazon Web Service Components and Services - Working with the Elastic Compute Cloud (EC2) - Working with Amazon Storage Systems - Understanding Amazon Database Services.	1	8,9
		Instructional Hours	18

Suggested Learning Methods : Apply the concept of web services

V	**Using Microsoft :**Cloud Services - Exploring Microsoft Cloud Services - Defining the Windows Azure Platform - Using Windows Live. **Understanding Cloud:** Security - Securing the Cloud - Securing Data - Establishing Identity and Presence.	1	10,12
		Instructional Hours	18

Suggested Learning Methods : case study

	Total Hours	90 Hrs
Text Books	1. Barrie Sosinsky,**"Cloud Computing Bible"**,Wiley Publishing ,Inc., 2011.	
Reference Books	1. Ray J Rafaels, **"Cloud Computing: From Beginning to End"**, 2015. 2. Arshdeep, Bahga and VijaiMadisetti, **"Cloud Computing: A Hands-on Approach"**, 2014.	
Web. URLs	https://www.google.com/aclk?sa=l&ai=DChcSEwjs9YzgzM39AhURGysKHSKeD80YABAAGgJzZg&sig=AOD64_34L3BK3sqlRPOzXJBGvRJkfq3cnQ&q&adurl&ved=2ahUKEwiNoIfgzM39AhXF8DgGHWa0C8AQ0Qx6BAgEEAE	

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
4	4	7	5	5	5	30

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	L	M	M	L	M	M	H	H	M	M
CO2	M	M	M	M	H	M	M	M	H	H	H	M	H
CO3	H	L	M	H	M	M	L	H	M	H	H	M	M
CO4	M	H	L	M	L	L	H	M	H	M	H	H	M
CO5	M	M	H	H	M	H	M	H	H	H	M	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U3CKE608/ 22U3CKE608	**Discipline Specific Elective Paper II – Cyber Security**		
Semester: VI	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**
(Common to B. Sc. CS / IT / AIML / DS / BCA)			
Course Objective	To make the students to understand Cryptography, Cyber crime and its significance in current scenario of IT and information security.		
Course Category	Employability / Skill Development		
Development Needs	Global		
Course Description	Develop Problem Solving Skills to solve the computer based problems at Global needs.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Remember the information and various representation	Flipped Classroom	Just – A – Minute Presentation
CO 2	Understand the concept of computer networks and overview of internet	Tutorials	Poster Presentation
CO 3	Understand the information storage , data communication and data modulation techniques	Video Lessons	Assignment
CO 4	Understand the knowledge about the Cryptography, Cyber Crime and Information Security	Flipped Classroom	Seminar
CO 5	Understand the importance of Information Security Framework	Lectures	Quiz

Offered by	**Computer Science**

Course Content	**Instructional Hours / Week : 6**

Unit	Description	Text Book	Chapters
I	**Information and its Representation:** What is information – Quality of Information - Value of Information - Information Processing - Information Processing cycle in computers - information Representation and codes - Number Representation - Binary Representation of Positive integers - Signed Binary Integers - Positive Binary Fractions - signed Binary Fractions - Representing Fractions in Binary - Representation of Alphanumeric - Data - Current Trends in Information Technology – semiconductor - Technology - Information storage - Networking - Applications of - IT - IT Applications in Business - Modeling and simulation	1	1
	Instructional Hours	**18 Hrs**	
Suggested Learning Methods : Video lectures about the basics of Cyber Security			
II	**Computer Networks and Internet:** An overview - What is – computer Network – Basic networking components - what is Internet - Internet Protocols - Internet protocol types - OSI Reference versus TCP/IP Model - OSI model layers - TCP/IP	1	2
	Instructional Hours	**18 Hrs**	
Suggested Learning Methods : Practice using Flow Charts			
III	**Information storage and communication:** Information storage - purpose of storage - Types of storage Devices - File organization - Internal file structure - External file structure and	1	3

	file extension - Data communication - an overview - what is data communication - signals - Basic - Data Communication Model - Modulation Techniques.		

Instructional Hours		**18 Hrs**

Suggested Learning Methods : Develop small programmes on internal file structure

IV	**Cryptography Systems**: Introduction-Cryptography Systems Types-Symmetric Cryptography - Asymmetic or Public Key, Cryptography-Hash Functions-Why three Encryption Techniques? – Public key Algorithms – RSA Public Key Algorithm – Digital Signature – Diffie – Hellman - ElGamal-EDCSA-XTR. **Cyber Law and Ethics**: Introduction to cybercrime - Prevention - preventive steps for Individuals - preventive steps for organizations and government - How to protect the computer against threats.	1	5 & 6

Instructional Hours		**18 Hrs**

Suggested Learning Methods : Apply the Cryptographic techniques in models

V	Information security Framework - Information security and privacy - security Framework - Information systems security Framework – Framework for Network security access. Access control Techniques- Computer Security and Access Control-Access control Techniques-Biometric Authentication-Authentication Tokens-Token types and usage-Digital signature-Embodiments and vendors-Related Authentication Technologies.	1	8 & 9

Instructional Hours		**18 Hrs**

Suggested Learning Methods : Case Study

Total Hours		**90 Hrs**

Text Books	1. Pankaj Agarwal, **"Information Security & Cyber Laws"**, Acme Learning Private Limited, First Edition,2010
Reference Books	1.Amy Rose, Deborah Arrand, Kristin E. Ohlim, Malloy, Michael G. Solomon, Mike Chapple, **"Information Security Illuminated"**, Jones & Barlett Publishers, 2005. 2.Lawrence C. Miller, **"Cyber Security for Dummies"**, John Wiley & Sons, Inc.
Web. URLs	https://www. javapoint.com/what-is-cyber-security

Tools for Assessment (30 Marks)						
CIA I	**CIA II**	**CIA III**	**Assignment**	**Seminar**	**Quiz**	**Total**
4	4	7	5	5	5	**30**

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	H	H	H	L	M	M	L	M	M	H	H	M	M
CO2	M	M	M	M	H	M	M	M	H	H	H	M	H
CO3	H	L	M	H	M	M	L	H	M	H	H	M	M
CO4	M	H	L	M	L	L	H	M	H	M	H	H	M
CO5	M	M	H	H	M	H	M	H	H	H	M	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
21U3CAE609/ 22U3CAE609	**Discipline Specific** **Elective Paper III: Artificial Intelligence**		
Semester: VI	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**
Course Objective	To enable the students to understand the Artificial Intelligence as a Problem Solving techniques.		
Course Category	Employability		
Development Needs	Global		
Course Description	The course also contains a balanced look at AI's impact on existing jobs, as well as its potential to create new and exciting career fields in the future. Students will leave the course with a solid understanding of what AI is, how it works, areas of caution, and what they can do with the technology.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Knowledge about overview of Artificial Intelligence	Lecture / Demonstration / Flipped Classroom	Assignment
CO 2	Gain Knowledge about Problem Solving methods	Demonstration / Constructivist Approach/ Tutorial	Seminar
CO 3	Understand how to represent Knowledge and its works	Lectures / Demonstration / Video Lessons	Quiz
CO 4	Understand how to use reasoning methods by constructing plans	Tutorial / Demonstration / Case Studies	Program Execution
CO 5	Understand methods of Knowledge Generation using Learning	Lecture / Demonstration / Class Projects	Program Execution

Offered by	**Computer Applications**		

Course Content		**Instructional Hours / Week : 6**	

Unit	Description	Text Book	Chapters
I	**Introduction:** What is AI?- The foundation of AI- AI Problems. Intelligent Agent: Introduction-How Agent should act-Structure of Intelligent Agent	1 2	1,2 1
		Instructional Hours	**18 Hrs**
Suggested learning methods: Video lectures about the basic of models			
II	**Problem Solving by searching:** Problem Solving Agents- Formulating Problems-Examples: 8 queens problem. Search Strategies- Game Playing: Minim ax-Alpha-Beta Pruning.	1	3,5
		Instructional Hours	**18 Hrs**
Suggested learning methods: Video lectures about the basic of models			
III	**Knowledge and Reasoning:** A Knowledge based agent- Representation, Reasoning and Logic. Propositional Logic-Very simple Logic- Introduction to First Order Logic.	1	6,7
		Instructional Hours	**18 Hrs**
Suggested learning methods: Video lectures about the basic of models			
IV	**Planning:** A simple planning agent – From Problem solving to Planning – Basic Representation of Planning – A partial Order Planning Algorithm- Example. **Learning:** A General model of Learning Agent – Inductive Learning – Learning from Decision Trees.	1	11
		Instructional Hours	**18 Hrs**
Suggested learning methods: Video lectures about the basic of models			

V	Expert Systems- Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.	3	1,2

	Instructional Hours	18 Hrs
Suggested learning methods: Video lectures about the basic of models		
	Total Hours	90 Hrs

Text Books	1. Stuart J.Russell, Peter Norvig, **"Artificial Intelligence – A Modern Approach"**, Prentice Hall Incorporation.
	2. Elaine Rich, Kevin Knight, Shivasankar B.Nair, **"Artificial Intellignence", Third Edition**, Tata-McGraw, 2009.
	3. Donald A.Waterman, 'A Guide to Expert Systems', Pearson Education
Reference Books	1. Deepak Khemani, **"A First course in Artificial Intelligence"**, McGraw Hill Education Pvt Ltd, 2013.
Web. URLs	https://www.newtondesk.com/artificial-intelligence-tutorial-and-study-notes-pdf/

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Class Participation	Seminar	Assignment	Total
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U3CAE610/ 22U3CAE610	**Discipline Specific Elective Paper III: Software Project Management**		
Semester: VI	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**
Computer Applications			
Course Objective	To understand the various phases of software project management, planning, evaluation techniques, activity planning and risk management principles.		
Course Category	Skill Development		
Development Needs	Global		
Course Description	The course provides an in-depth examination of software project management principles and an overview of project planning. It explains the waterfall model, spiral model and COCOMO model. Enlightens the importance of software quality and the techniques to enhance it.		

Course Outcomes		Teaching Methods	Assessment Methods
CO1	Remember the importance of software project management.	Lecture	Assignment
CO2	Understand software approaches, estimation and risk management.	Demonstration	Seminar
CO3	Apply activity planning and resource allocation.	Video Lessons	Assignment
CO4	Analyze the activity planning and managing peoples in Software environment.	Tutorial	Seminar
CO5	Understand software quality and its plan.	Lecture	Quiz

Offered by	Computer Applications		
Course Content		**Instructional Hours / Week : 6**	

Unit	Description	Text Book	Chapters
I	**Introduction to Software Project Management:** Introduction – Why is software project management important? – What is a project? – Software projects versus other types of project – Activities covered by software project management – Some ways of categorizing software projects – What is Management?. **Project Evaluation and Programme Management:** Evaluation of individual projects – Cost-benefit evaluation techniques – Risk evaluation. **Overview of Project Planning.**	1	1,2,3
	Instructional Hours		**18 Hrs**
Suggested learning methods: Video Lectures			
II	**Selection of an appropriate project approach:** Introduction – Choosing methodologies and technologies – Structure versus speed of delivery – The waterfall model – The spiral model. **Software Effort Estimation:** The basis for software estimating – Software effort estimation techniques – Albrecht function point analysis – COCOMO model. **Risk Management**: Risk – Categories of risk – A framework for dealing with risk – Risk identification – Risk assessment – Risk planning – Risk management – Evaluating risks to the schedule – Applying the PERT technique.	1	4,5,7
	Instructional Hours		**18 Hrs**
Suggested learning methods: Case Study Preparation and Video Presentation			

III	**Activity Planning:** Introduction – Objectives – Project schedules – Project and activities – Sequencing and scheduling activities – Network planning models – Formulating a network model – The forward pass – The backward pass – Identifying critical activities. **Resource Allocation:** The nature of resources – Identifying resource requirements – Scheduling resources – Publishing the resource schedule – Cost schedules – The Scheduling Sequence.	1	6,8
	Instructional Hours		**18 Hrs**
Suggested learning methods: Case Study Preparation and Video Presentation		
IV	**Monitoring and Control:** Creating the framework – Collecting the data – Visualizing progress – Cost monitoring – Prioritizing monitoring – Change control. **Managing people in software environments:** Organizational behavior: a background – Selecting the right person for the job – Motivation – The Oldham-Hackman job characteristics model. **Working in teams:** Decision Making – Organizational structures – Leadership.	1	
	Instructional Hours		**18 Hrs**
	Suggested learning methods: Case Study Preparation and Video Presentation		
V	**Software Quality:** Introduction – The importance of software quality – Defining software quality – ISO 9126 – Product versus process quality management – Techniques to help enhance software quality – Quality plans.	1	13
	Instructional Hours		**18 Hrs**
	Suggested learning methods: Case Study Preparation and Video Presentation		
	Total Hours		**90 Hrs**

Text Books	1. Bob Hughes, Mike Cotterell "Software Project Management", Tata McGraw Hill Education Pvt. Ltd., Fifth Edition, 2010.
Reference Books	1. Kelkar.S.A "Software Project Management – A Concise Study", Prentice Hall of India Publication, Third Edition, 2012. 2. Joel Henry "Software Project Management A Real World guide to Success", Pearson Education Publication, First Edition, 2003.
Web. URLs	https://www.javatpoint.com/software-project-management

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Quiz	Assignment	Seminar	Total
4	4	7	5	5	5	30

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M	L	M	H	H	H	H	M	M
CO2	H	H	M	M	M	L	M	H	H	H	H	M	M
CO3	H	H	M	M	M	L	M	H	H	H	H	H	H
CO4	H	H	M	M	M	L	M	H	H	H	H	H	H
CO5	H	H	M	M	M	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title
21U3CAE611/ 22U3CAE611	**Discipline Specific Elective Paper III: Bioinformatics**

Semester: VI	Credits: 3	CIA: 30 Marks	ESE: 45 Marks

Course Objective	To explore the functional areas of Bioinformatics and to be familiarized with Biological Databases.
Course Category	Employability
Development Needs	Global
Course Description	The student will be able to apply basic principles of biology, computer science and mathematics to address complex biological problems

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand the basic concepts of Bioinformatics and its applications.	Lecture / Demonstration / Flipped Classroom	Assignment
CO 2	To interpret various Biological Databases.	Demonstration / Constructivist Approach/ Tutorial	Seminar
CO 3	To learn about the various file formats and data representation standards	Lectures / Demonstration / Video Lessons	Quiz
CO 4	To Illustrate about Database Similarity Searching	Tutorial / Demonstration / Case Studies	Program Execution
CO 5	To demonstrate the working nature of sequence alignment	Lecture / Demonstration / Class Projects	Program Execution

Offered by	Computer Applications

Course Content	Instructional Hours / Week : 6

Unit	Description	Text Book	Chapters
I	**Bioinformatics:** Introduction to Bioinformatics – Goal – Scope – Applications – Limitations –DNA Sequence Analysis: Why analyses DNA? – Gene Structure & DNA Sequence – Features of DNA Sequence Analysis. Examples of related tools and software. Data generation; Generation of large scale molecular biology data.	**1&2**	1&5
	Instructional Hours		**18 Hrs**
Suggested learning methods : Video lectures about the basic of models			
II	**Introduction to data types and Source:** Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. Introduction to Biological Databases: Types of Database – Biological Database – Pitfalls of Biological Database – Information retrieval from Biological databases. Nucleic acid databases ,Protein databases (Primary, Composite, and Secondary). Specialized Genome databases: Structure databases	1	2
	Instructional Hours		**18 Hrs**
Suggested learning methods : Video lectures about the basic of models			

III	**Format and Annotation:** Conventions for databases indexing and specification of search terms; Common sequence file formats; Files for multiple sequence alignment; Files for structural data; Flat files, relational, object oriented databases and controlled vocabularies. File Format (Genbank, DDBJ, FASTA, PDB, SwissProt). Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search. The challenges of data exchange and integration. Ontologies, interchange languages and standardization efforts.	2	6
	Instructional Hours		**18 Hrs**
Suggested learning methods : Video lectures about the basic of models		
IV	**Database Similarity Searching:** Unique Requirements of database searching – Heuristic database searching – Basic local alignment search tool (BLAST) – FASTA – Comparison of FASTA & BLAST – Database searching with smith – Waterman method.	1	4
	Instructional Hours		**18 Hrs**
	Suggested learning methods : Video lectures about the basic of models		
V	**Introduction to Sequences, alignments and Dynamic Programming**; Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm). Methods for presenting large quantities of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol), Anatomical visualization. Representation of patterns and relationship: Regular Expression, Hierarchies, and Graphical models.	1	2,3&5
	Instructional Hours		**18 Hrs**
	Suggested learning methods : Video lectures about the basic of models		
	Total Hours		**90 Hrs**

Text Books	1. JinXiong **"Essential Bioinformatics",** Cambridge University Press 2016
	2. T K Attwood & D J Parry Smith, **"Introduction to Bioinformatics",** Pearson Education 2007.
Reference Books	Jean-Michel Claverie , Cedric Notredame **Bioinformatics – A Beginner's Guide** Wiley Computer Publishing 2009..
Web. URLs	https://thebiologynotes.com/category/bioinformatics

Tools for Assessment (30 Marks)

Program Debugging	Problem solving	Mini Project	Test 1	Test 2	Observation Note Book	Total
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course Designed by	Verified by

Course Code	Title
22U3CAE612	**Discipline Specific Elective Paper III: Mobile Application Development**
Semester: VI	**Credits: 3** **CIA: 30 Marks** **ESE: 45 Marks**

Course Objective	To inculcate programming algorithm process and structure of VB.Net and ASP.Net.
Course Category	Employability
Development Needs	Global
Course Description	To understand the concept of GUI Design Tool, also to make them aware of controls in VB.NET by coding programs and develop interface using Visual Basic .NET.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Remember the .Net Controls and statements	Lecture / Demonstration / Flipped Classroom	Assignment
CO 2	Understand the Structures and OOPs Concepts	Demonstration / Constructivist Approach/ Tutorial	Seminar
CO 3	Develop and implement windows, console and web-based application	Lectures / Demonstration / Video Lessons	Quiz
CO 4	Examine webpage, file management, ADO.Net for Database Connection	Tutorial / Demonstration / Case Studies	Program Execution
CO 5	Understand and ability to design ASP Page	Lecture / Demonstration / Class Projects	Program Execution

Offered by	**Computer Applications**

Course Content	**Instructional Hours / Week : 6**

Unit	Description	Text Book	Chapters
I	Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User, Basic User Interface Screen elements, Designing User Interfaces with Layouts.	1	1-2
	Instructional Hours		**18 Hrs**
Suggested learning methods :Video lectures about the basic of models			
II	Intents and Services: Android Intents and Services, Characteristics of Mobile Applications, Successful Mobile Development. Storing and Retrieving Data: Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider. Communications Via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web.	1	3-5
	Instructional Hours		**18 Hrs**
Suggested learning methods :Video lectures about the basic of models			
III	Gallery, drawing 2D and 3D Graphics and Multimedia, Drawing and Working with Animation. Networking, Telephony and Location, Android Networking, Web and Telephony API. Search, Location and Mapping, Communication, Identity, Sync and social media. Sensor and Hardware Programming.	1	6-8

			Instructional Hours	**18 Hrs**
	Suggested learning methods :Video lectures about the basic of models			
IV	Sensor and Hardware Programming, Create ―Hello World‖ application. That will display ―Hello World‖ in the middle of the screen in the emulator. Create an application with login module. (Check username and password), Create a menu with 5 options and and selected option should appear in text box. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.	1	9-13	
			Instructional Hours	**18 Hrs**
	Suggested learning methods :Video lectures about the basic of models			
V	Connecting Databases with android, Create an application with three option buttons, on selecting a button colour of the screen will change.Create and Login application as above. On successful login, pop up the message. Create an application to Create, Insert, update, Delete and retrieve operation on the database.	1	14-18	
			Instructional Hours	**18 Hrs**
	Suggested learning methods :Video lectures about the basic of models			
			Total Hours	**90 Hrs**

Text Books	1. Budi Kurniawan,**A Beginner's Tutorial, Android Application Development** ,Brainy Software, 2015
Reference Books	1. Charlie Collins, Michael Galpin, Matthias Kappler, **Android in Practice** ,Manning,2011 2. AnubhavPradhan, Anil V. Deshpande, **Composing Mobile Apps: Learn,Explore, Apply using Android,**Wiley,Publications,2014. 3. Jeff Mcwherter, Scott Gowell, **Professional Mobile Application Development** ,Wrox Publisher,2012
Web. URLs	https://www.javatpoint.com/android-tutorial

Tools for Assessment (30 Marks)

Program Debugging	**Problem solving**	**Mini Project**	**Test 1**	**Test 2**	**Observation Note Book**	**Total**
4	4	7	5	5	5	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
22U4CAZ604	**Skill Based Paper IV: Practical in R Programming**		
Semester: VI	**Credits: 3**	**CIA: 30 Marks**	**ESE: 45 Marks**

Course Objective	To enable the students to gain an in-depth understanding of data structure used in R and learn to import/export data using R.
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global
Course Description	To make the students to understand the fundamentals of R Programming

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Remember various data types, conditional and looping statements	Demonstration	Program Creativity
CO 2	Understand about R-studio, workspace setup and the various R packages	Demonstration	Debugging
CO3	Apply data Structures: Vectors, Lists, Matrices and Arrays and Factors and Data Frame in R language and manipulate	Demonstration	Program Creativity
CO4	Analyze the feasible logics	Demonstration	Program Creativity
CO5	Evaluate the optimal solution of the problem	Demonstration	Program Creativity

Offered by	Computer Applications

Course Content	Instructional Hours / Week: 6

Unit	List of Practical
1	Write a R Program to take input from the user (name and age) and display the values. Also print version of R installation.
2	Write a R Program to create a sequence of number from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.
3	Write a Program to check whether the given number is Armstrong Number or not.
4	Write a R Program to create a simple bar plot of five subjects mark.
5	Write a R Program to create a list and to append, modify and delete the elements in the list.
6	Write a R Program to find the sum of 'n' natural numbers
7	Write a R Program to multiply two vectors of integers type and length 3.
8	Write a Program to create a matrix addition and subtraction.
9	Write a Program to check whether the given number is palindrome or not using function.
10	Write a Program to create the Data Frame and extract the value.
11	Write a Program to Find Sum, Mean and Product of Vector
12	Write a Program to Sample from a Population

Suggested Learning Methods: Solving Case studies, Peer tutoring and pair programming	

						Total Hours	**90 Hrs**
Tools for Assessment (30 Marks)								

Application of Logic	**Program Creativity**	**Program Debugging**	**Test 1**	**Test 2**	**Observation Note Book**	**Total**
5	5	5	6	6	3	**30**

Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	-	M	M	-	-	H	M	H	H	M	M
CO2	M	H	-	M	M	-	-	H	M	H	M	H	M
CO3	H	H	-	M	H	-	-	H	H	H	H	H	H
CO4	H	H	-	M	H	-	-	H	H	H	H	H	H
CO5	H	H	-	M	H	-	-	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	**Verified by**

Course Code	Title		
21U4CK3ED1 / 22U4CK3ED1	**Skill Based Open Elective Courses** **Extra Departmental Course : Multimedia Tools - Practical**		
Semester: III	**Credits: 2**	**CIA: - -**	**ESE: 50 Marks**
Course Objective	To make the students to be a proficient in a broad range of design skills and animation.		
Course Category	Skill Development / Employability / Entrepreneurship		
Development Needs	Global		
Course Description	This course introduces the many applications that enhance the world of multimedia and the web, as well as the technological decisions that are needed to deploy them. Students learn how various tools are used to create a rich, dynamic Image/visual experience for users in many different formats.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Apply the graphical designs and functions using Photoshop, CorelDraw and Flash	Laboratory Practice	Program Creativity
CO 2	Create Professional design & animation	Laboratory Practice	Program Creativity
CO3	Frame banner using graphical designs and functions	Laboratory Practice	Program Creativity
CO4	Develop Professional design & animation	Laboratory Practice	Program Creativity
CO5	Create Animated Objects	Laboratory Practice	Program Creativity

Offered by	Computer Applications

Course Content	Instructional Hours / Week: 2

Unit	List of Practical for Photoshop & CorelDraw
	List of Practical for Photoshop
1	Create Sun Flower using Photoshop.
2	Animate Plane Flying the Clouds using Photoshop.
3	Create Plastic Surgery for Nose using Photoshop.
4	Create See thru text using Photoshop.
5	Create Web Page using Photoshop.
	List of Practical for CorelDraw
6	Create a 3D text in Corel Draw
7	Create a logo for your department in Corel Draw.
8	Create an advertisement for a Textile company in Corel Draw.
9	Using Corel Draw, design a business card for a company.
10	Using Corel Draw, design a banner for a marriage function.

Suggested Learning Methods: Creative theme and poster development.	
Total Hours	30 Hrs

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
					Mapping								
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21U4CK3ED2 / 22U4CK3ED2	**Skill Based Open Elective Courses** **Extra Departmental Course: Web Development using HTML - Practical**		
Semester: III	**Credits: 2**	**CIA: - -**	**ESE:50 Marks**
Course Objective	To enable the student to create the static web pages and web applications.		
Course Category	Skill Development /Employability		
Development Needs	Global/Local		
Course Description	To develop skill set in HTML and apply the concepts to create applications in order to meet the Local and Global needs		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Remember about WebPages and Web sites.	Demonstration	Program Creativity
CO 2	Understand about different HTML Tags	Demonstration	Debugging
CO 3	Apply the tags which they understood to design web pages and web applications	Demonstration	Application of Logic
CO 4	Analyze the usage of Web tags	Demonstration	Program Development
CO 5	Evaluate website on real world problems according to dynamic content	Demonstration	Program Development

Offered by	**Computer Applications**

Course Content	**Instructional Hours / Week : 2**

Program List

1. Develop a HTML document which displays the entire header tags, it must open another HTML document.

2. Write names of several countries in a paragraph and store it as an HTML document, world.html. Each country name must be a hot text. When you click India (for example), it must open india.html and it should provide a brief introduction about India.

3. Design a HTML document describing you. Assign a suitable background design and background color and a text color and Image.

4. Write a HTML program using Marquee Behavior.

5. Write a HTML document to print your class Time Table.

6. Develop a Complete Web Page using Frames and Framesets which gives the Information about a Hospital using HTML.

7. Design a HTML document with link to send e-mail messages.

8. Write a HTML Program to illustrate the ordered list.

9. Write a HTML Program to print your Bio-Data in the following format: NAME Religion Community Street Town District State Address PIN Code Office Phone Residence Mobile Educational Qualification Degree University / Institute Month & year Grade / Mark.

10. Develop a HTML document to display a Registration Form for an inter-collegiate function.

Suggested Learning Methods: Solving Case studies and Program development	

	Total Hours	**30 Hrs**

Mapping													
CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
21UCASS01 / 22UCASS01	Self-Study Paper: Problem Solving and Programming		
Semester: II - V	Credits: 1		ESE: 50 Marks

Course Objective

To understand the basic concepts of problem-solving approaches and develop optimal program structure using conditional and iterative control structures and functions.

Course Outcomes

CO1	To understand the basic logics for coding a program
CO2	To design a computational solution for a given problem
CO3	To break a problem into logical modules that can be solved (programmed)
CO4	To transform a problem solution into programs involving programming constructs
CO5	To write programs using structures, strings, arrays, pointers and files for solving complex computational problem

Offered by: Computer Applications

Course Content

Unit	Description	Text Book	Chapter
I	**Introduction To Computer Problem Solving:** Introduction – The Problem Solving aspect – Top down design – Implementation of algorithm – Program Verification – The efficiency of algorithm – The analysis of algorithm.	1	1
II	**Programming, Algorithms and Flowcharts:** Programs and programming – building blocks for simple programs – programming life cycle phases – pseudo code representation – flow charts – algorithm – programming languages – compiler – interpreter, loader and linker – program execution – classification of programming language – structured programming concept.	2	1
III	**Basics of 'C', input / output & control statements:** Introduction – identifier – keywords – variables – constants – i/o statements – selection – iteration and repetitive execution – go to statement – nested loops – continue and break statements.	3	2-6
IV	**Arrays, Strings, Functions and Pointers:** Array – one dimensional characters arrays – multidimensional arrays – array of strings – two dimensional character array – functions – parameter passing mechanism scope – storage classes recursion – comparing iteration and recursion . **Pointers** – pointer operators - uses of pointers – arrays and pointers – pointers and strings – pointer indirection – pointers to functions – dynamic memory allocation.	3	7-10

V	**User-defined data types & files:** Structures – initialization – nested structures – structures and arrays – structures and pointers – union – typedef and enumeration types – bit fields – file management in C – files and streams – file handling functions – sequential access file – random access file – command line arguments.	3	13-14

Text Books:
1. R.G.Dromey , How To Solve It By Computer , Pearson education , fifth edition, 2007.
2. Pradip Dey, Manas Ghosh, Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
3. Kamthane, A.N., Programming with ANSI and Turbo C, Pearson Education, Delhi,2006

Reference Books:
1. Ashok N Kamthane , Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
2. Henry Mullish & Huubert L.Coope, The Sprit of C, Jaico Pub. House, 1996.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low.

Course Designed by	**Verified by**

Course Code	Title	
21UCASS02 / 22UCASS02	**Self-Study Paper: Web Design Using HTML**	
Semester: II - V	**Credits: 1**	**ESE: 50 Marks**

Course Objective:
        To offer students the fundamental knowledge of application development for the internet using HTML.

Course Outcomes:

CO1	Create an HTML Documents and establish adequate formatting for presentation purposes
CO2	Import, insert and modify images and tables
CO3	Establish and maintain internal and external link to available resources
CO4	Use special effect to make the expressive, evocative documents
CO5	Manager forms (Create forms, call programs)

Offered by: Computer Applications

Course Content:

Unit	Description	Text Book	Chapter
I	**Introduction to HTML:** History of HTML, HTML Generations, HTML Documents, Hyper Links.	1	4,5
II	**Head and Body:** Header Section, Title, Prologue, Links, Comment lines. **Designing the Body Section:** Heading Printing, Aligning the Headings, Horizontal Rule, Paragraph, Tab Setting, Images and Pictures.	1	6
III	**Ordered and Unordered Listing:** Lists, Unordered Lists, Headings in a List, Ordered Lists, Nested Lists. **Table Handling:** Tables, Table Creation in HTML, Width of the tables and cells, Column Specification, some sample tables.	1	7,8
IV	**DHTML and Style Sheets:** Defining Styles, Elements of Styles, Linking a style sheet to a HTML Document, In-line Styles, External Style Sheets, Internal Style Sheets, Multiple Styles. **Frames:** Frameset Definition, Frame definition, Nested framesets.	1	9,10
V	**A Web Page Design Project:** Frameset definition, Animals, Birds, Fish. **Forms:** Action attribute, Method attribute, Enctype attribute, Drop Down List, Sample Forms.	1	11,12

Text Book:
1. C. Xavier , **World Wide Web Design With Html**, Tata McGraw Hill Education Private Limited, New Delhi.

Reference Books:
1. Special Edition **Using Intranet HTML** / Mark Surfas, Mark Brown and John Juge

2. **Dynamic HTML Web Magic** / JefDou*yer – Hayden development group*

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low.

Course Designed by	Verified by