## 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. |

## 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. |

# NEHRU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution affiliated to Bharathiar University)
(Reaccredited with "A" Grade by NAAC, ISO 9001:2015 & 14001:2004 Certified
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

**(Applicable to the students admitted during the year 2021-2022)**

**B. Sc. Computer Science (Data Science)**

| Semester | Part | Subject Code | Name of the Subject | Instruction hours / week | Duration of Examination | Examination Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CIA | ESE | Total | |
| I | I | 21U1TAM101/ 21U1HIN101/ 21U1MAL101/ 21U1FRN101 | Language I | 5 | 3 | 50 | 50 | 100 | 4 |
| | II | 21U2ENG101 | English I | 5 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3CKC101 | Core Paper I: Python Programming | 4 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3CJC102 | Core Paper II: Data Structures | 4 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTP101 | Core Paper III: Practical in Python Programming | 4 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3MKA101 | Allied Paper I: Statistics for Computer Science | 5 | 3 | 50 | 50 | 100 | 4 |
| | IV | 21U4ENV101 | Ability Enhancement Compulsory Course: Environmental Studies | 2 | 3 | 50 | - | 50 | 2 |
| | IV | 21U4HVY201 | Value Education: Human Values and Yoga Practice I | 1 | - | - | - | - | - |
| | | | | **30** | | | | **650** | **26** |
| II | I | 21U1TAM202/ 21U1HIN202/ 21U1MAL202/ 21U1FRN202 | Language II | 5 | 3 | 50 | 50 | 100 | 4 |
| | II | 21U2ENG202 | English II | 5 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTC203 | Core Paper IV: Operating System | 4 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTC204 | Core Paper V: Object Oriented Programming with Java | 4 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTP202 | Core Paper VI: Practical in JAVA Programming | 4 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3MIA202 | Allied Paper II: Discrete Mathematics | 5 | 3 | 50 | 50 | 100 | 4 |
| | IV | 21U4HRC202 | Ability Enhancement Compulsory Course: Human Rights and Constitution of India | 2 | 3 | 50 | - | 50 | 2 |
| | IV | 21U4HVY201 | Value Education: Human Values and Yoga Practice- I | 1 | 2 | 50 | - | 50 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **30** | | | | **700** | **28** |
| III | III | 21U3DTC303 | Core Paper VII: Introduction to Data Science | 5 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTC304 | Core Paper VIII: RDBMS and MySQL | 6 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTP305 | Core Paper IX: Practical in RDBMS and MySQL | 5 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3MKA303 | Allied Paper III: Linear Algebra and Basics of Calculus | 5 | 3 | 50 | 50 | 100 | 4 |
| | IV | 21U4DTS301 | Skill Based Paper I: Practical in Web Programming using PHP and MySQL | 4 | 3 | 30 | 45 | 75 | 3 |
| | IV | 21U4NM3BT1/ 21U4NM3AT1/ 21U4NM3CAF/ 21U4NM3GTS/ 21U4NM3WRT | # @Basic Tamil - I / ##Advanced Tamil - I/ * NME: Consumer Affairs / Gandhian Thoughts / Women's Rights | 2 | 3 | 50 | | 50 | 2 |
| | IV | 21U4CK3ED1/ 21U4CK3ED2 | Extra Departmental Course | 2 | 3 | - | 50 | 50 | 2 |
| | IV | 21U4HVY402 | Value Education: Human Values and Yoga Practice II | 1 | - | - | - | - | - |
| | IV | 21U4DTVALC | **Skill Enhancement: Value Added Course - Institute Industry Linkage | - | - | - | - | - | - |
| | | | | **30** | | | | **575** | **23** |
| IV | III | 21U3DTC406 | Core Paper X: Data Mining | 6 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3CKC407 | Core Paper XI: R Programming | 6 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTP407 | Core Paper XII: Practical in R Programming | 6 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3MKA404 | Allied Paper IV: Probability Distributions and Inferential Statistics | 6 | 3 | 50 | 50 | 100 | 4 |
| | IV | 21U4DTS402 | Skill Based Paper II: Practical in Internet of Things | 3 | 3 | 30 | 45 | 75 | 3 |
| | IV | 21U4NM4BT2/ 21U4NM4AT2/ 21U4NM4GEN | # @Basic Tamil - II / ##Advanced Tamil - II/ General Awareness | 2 | 3 | 50 | | 50 | 2 |
| | IV | 21U4HVY402 | Value Education: Human Values and Yoga Practice II | 1 | 2 | 50 | - | 50 | 2 |
| | IV | 21U4DTVALC | ** Skill Enhancement: Value Added Course - Institute Industry Linkage | - | - | - | - | - | Grade |
| | | | | **30** | | | | **575** | **23** |
| V | III | 21U3DTC508 | Core Paper XIII: Machine Learning | 6 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTC509 | Core Paper XIV: Introduction to Artificial Intelligence | 5 | 3 | 30 | 45 | 75 | 3 |
| | III | 21U3DTC510 | Core Paper XV: Data Visualization | 3 | 3 | 25 | 25 | 50 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | III | 21U3DTP511 | Core Paper XVI: Practical in Machine Learning | 5 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTE501/ 21U3DTE502/ 21U3CJE503/ 21U3DTE504 | Discipline Specific Elective Paper I | 6 | 3 | 50 | 50 | 100 | 4 |
| | IV | 21U4DTS503 | Skill Based Paper III: Practical in TABLEAU and MONGODB | 5 | 3 | 30 | 45 | 75 | 3 |
| | III | 21U3DTV512 | In-plant Training | - | - | 50 | - | 50 | 2 |
| | | | | **30** | | | | **550** | **22** |
| VI | III | 21U3DTC613 | Core Paper XVII: Big Data Analytics | 5 | 3 | 30 | 45 | 75 | 3 |
| | III | 21U3DTC614 | Core Paper XVIII: Deep Learning | 4 | 3 | 30 | 45 | 75 | 3 |
| | III | 21U3DTE605/ 21U3DTE606/ 21U3CKE607/ 21U3CKE608 | Discipline Specific Elective Paper II | 6 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3CKE609/ 21U3CKE610/ 21U3CKE611/ 21U3CKE612 | Discipline Specific Elective Paper III | 6 | 3 | 50 | 50 | 100 | 4 |
| | III | 21U3DTV615 | Project and Viva-Voce | 4 | 3 | 30 | 45 | 75 | 3 |
| | IV | 21U3DTS604 | Skill Based Paper IV: Practical in Big Data Analytics | 5 | 3 | 30 | 45 | 75 | 3 |
| | V | 21U5EXT601 | Extension Activities | - | - | 50 | - | 50 | 2 |
| | | | | **30** | | | | **550** | **22** |
| Total | | | | | | | | 3600 | 144 |
| **Additional Credit** (Optional) | | | **Semester II-V** | | | | | $8^{\$}$ | |

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

##**Advanced 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.

**LIST OF DISCIPLINE SPECIFIC ELECTIVE PAPERS:**

| Elective Papers | Course Code | Name of the Course |
|---|---|---|
| Elective Paper I | 21U3DTE501/ | Soft Computing |
| | 21U3DTE502/ | Digital Image Processing |
| | 21U3CJE503/ | Healthcare Analytics |
| | 21U3DTE504 | Distributed System Concepts and Design |
| Elective Paper II | 21U3DTE605/ | Computer Networks |
| | 21U3DTE606/ | Social and Web Media Analytics |
| | 21U3CKE607/ | Cloud Computing |
| | 21U3CKE608 | Cyber Security |
| Elective Paper III | 21U3CKE609/ | Software Engineering |
| | 21U3CKE610/ | Pattern Recognition |
| | 21U3CKE611/ | Software Testing |
| | 21U3CKE612/ | Software Project Management |

**Extra Departmental Course**

| S. No. | Semester | Course Code | Course Title |
|---|---|---|---|
| 1 | III | 21U4CK3ED1 | Multimedia Tools - Practical |
| 2 | | 21U4CK3ED2 | Web Development using HTML - Practical |

**Self Study Paper offered by Department of Computer Science**

| S. No. | Semester | Course code | Course Title |
|---|---|---|---|
| 1 | Semester II to V | 21UDTSS01 | Libre Office |
| 2 | | 21UDTSS02 | Quantitative Aptitude |

**Chairman**
**Board of Studies in Computer Science**
**Nehru Arts and Science College**
**Coimbatore**

| Course Code | Title | | |
|---|---|---|---|
| 21U1TAM101 | Part I – Tamil - I | | |
| Semester : I | Credits : 4 | CIA : 50 Marks | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective** : மொழி இலக்கியத்தின் வாயிலாக அறம் சார் பண்பு மற்றும் ஆளுமை மிக்க மாணவர்களை உருவாக்குதல்

**Course Outcomes** :

| | |
|---|---|
| CO1 | தமிழ் இலக்கியங்கள் வாயிலாக சமூகச் சீர்திருத்தச் சிந்தனைகள் பெறப்படும். |
| CO2 | அற இலக்கியங்களின் வழி தமிழர்களின் வாழ்வியல் பண்புகளைக் கற்று அறிதல். |
| CO3 | பெண்ணியக் கவிஞர்களின் படைப்புத் திறனை மாணவர்களுக்கு உணர்த்துதல் |
| CO4 | சிறுகதைகளின் வழி சமூக கருத்துகளை மாணவர்களுக்கு அறிவுறுத்தல் |
| CO5 | தமிழ் இலக்கிய வரலாற்றுத் திறனை வளர்த்தல் |

**Offered by : தமிழ்த்துறை**

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

| Unit | Description |
|---|---|
| I | **சங்க இலக்கியம்**<br>1. ஐங்குறுநூறு - கிள்ளைப்பத்து (281-290) பாடல்கள்<br>2. பதிற்றுப்பத்து - இரண்டாம் பத்து (11 -15 ஐந்து பாடல்கள்)<br>3. பத்துப்பாட்டு - முல்லைப்பாட்டு - முல்லைப்பாட்டு முழுவதும் (1-103 வரிகள்)<br>4. சிறுபாணாற்றுப்படை - சேரநாட்டின் வளமை |
| | **Instructional Hours 15** |
| II | **அற இலக்கியம் - நீதிநூல்கள்**<br>1. அறன் வலியுறுத்தல் - (31-40 குறட்பாக்கள்)<br>2. புகழ் - (231 - 240 குறட்பாக்கள்)<br>3. வாய்மை - (291 - 300 குறட்பாக்கள்)<br>4. நாலடியார் - பொருட்பால் 11 ஆவது அதிகாரம் (கூடா நட்பு 1 - 10)<br>5. நான்மணிக்கடிகை - முதல் ஐந்து பாடல்கள் |
| | **Instructional Hours 15** |
| III | **பெண்ணியம்**<br>1. பூச்சி வாழ்க்கை - ஆண்டாள் பிரியதர்சனி (சுயம் பேசும் கிளி)<br>2. தொட்டிச்செடி - கவிஞர் இளம்பிறை<br>3. அம்மா - சுகிர்தராணி<br>4. நீரில் அலையும் முகம் - அ.வெண்ணிலா |
| | **Instructional Hours 15** |
| IV | **சிறுகதைகள்**<br>1. குட்டி ரேவதி - நிறைய அறைகள் உள்ள வீடு<br>2. ஜெயமோகன் - யானை டாக்டர்<br>3. ச.தமிழ்ச்செல்வன் - வெயிலோடு போய்<br>4. வண்ணநிலவன் - எஸ்தர்<br>5. உமா மகேஸ்வரி - மரப்பாச்சி |
| | **Instructional Hours 15** |
| V | **தமிழ் - இலக்கிய வரலாறு**<br>1. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்<br>2. சிறுகதையின் தோற்றமும் வளர்ச்சியும்<br>3. படிமம் குறியீடு பற்றிய - விளக்கம் |
| | **Instructional Hours 15** |
| | **Total Hours 75** |

**பாடத்தொகுப்பு**

இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல் **"இளந்தளிர்"**
தொகுப்பு: தமிழ்த்துறை ,நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர்

**பார்வை நூல்கள்**


1. ஐங்குநூறு - உரையாசிரியர் ஔவை துரைசாமிப்பிள்ளை, பதிப்பாசிரியர்கள் முதுமுனைவர் இரா.இளங்குமரனார், முனைவர்.பி.தமிழகன் தமிழ் மண் அறக்கட்டளை, சென்னை.17
2. திருவள்ளுவர் - திருக்குறள் பரிமேலழகர் உரை, சாரதா பதிப்பகம், ஜி - 4 சாந்தி அடுக்ககம், ஸ்ரீ கிருஷ்ணாபுரம் தெரு, இராயப்பேட்டை, சென்னை - 014
3. ஆண்டாள் பிரியதர்ஷினி - சுயம் பேசும் கிளி கவிதைத் தொகுப்பு, ராகவேந்திரா வெளியீடு 163 2 பொன்விழா அச்சகம், பொன்னி வெளியீடு, பாக்குட்டசாலை, அண்ணாநகர், சென்னை.
4. கவிஞர் இளம்பிறை - தொட்டிச்செடி, பொன்னி வெளியீடு, சென்னை - 91
5. சுகிர்தராணி - தீண்டப்படாதமுத்தம், காலச்சுவடு பதிப்பகம், நாகர்கோயில்.
6. அ.வெண்ணிலா - நீரில் அலையும் முகம் முதல் கவிதைத் தொகுப்பு - 2000
7. தமிழண்ணல் - புதியநோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை - 625 001.
8. நிறைய அறைகள் உள்ளவீடு - குட்டிரேவதி எழுத்து பிரசுரம் 11மாடல் நகர் 10 வது வீதி, சென்னை.
9. யானை டாக்டர் - ஜெயமோகன் வம்சி பதிப்பகம் நியு செஞ்சுரி புக்கவுஸ் சென்னை.
10. வெயிலோடு போய் - ச.தமிழ்ச்செல்வன் சிறுகதைகள் தொகுப்பு பாரதி புத்தகாலயம் 7 இளங்கோ சாலை சுப்பராயன் நகர் சென்னை
11. எஸ்தர் - வண்ணநிலவன் சிறுகதைகள், நற்றிணைப் பதிப்பகம், 172, ஆர்கட் ரோடு, கன்னினாபுரம் வடபழனி - 2
12. மரப்பாச்சி - உமா மகேஸ்வரி, தமிழினி பதிப்பகம், 342 டி.டி.கே சாலை, சென்னை.14


## Tools for Assessment (50 Marks)

| CIA I | CIA II | CIA III | Seminar | Assignment | 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 | M | H | - | - | - | - | L |
| **CO2** | - | - | M | - | H | L | H | H | - | - | - | - | L |
| **CO3** | - | - | L | - | M | M | H | H | - | - | - | - | L |
| **CO4** | - | - | H | - | H | M | M | L | - | - | - | - | L |
| **CO5** | - | - | H | - | H | L | H | H | - | - | - | - | L |

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

| Course Designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U1HIN101 | PART – I : HINDI - I | | |
| Semester : I | Credits:4 | CIA : 50 Marks | ESE : 50 Marks |

**(Common to all UG Programmes)**

**कोर्स लक्ष्य** : छात्र–छात्राओं में राष्ट्रीय भावना का विकास करना तथा राष्ट्रभाषा हिंदी एवं उससे संबंधित साहित्य की जानकारी प्रदान करना

**कोर्स परिणाम** :

| | |
|---|---|
| **CO1** | सामाजिक, सांस्कृतिक और राजनैतिक परिवेश से छात्र. साहित्य के माध्यम से बोधवान होंगे। |
| **CO2** | व्याकरण के शिक्षण के माध्यम से छात्रों में शुद्ध भाषा में बोलने की क्षमता को विकसित होगी। |
| **CO3** | अंतर्राष्ट्रीय भाषा अंग्रेज़ी से राष्ट्रभाषा हिंदी में सामग्री का अनुवाद करके छात्र हिंदी की ज्ञान संपदा बढ़ाने में कामयाब होंगे। |
| **CO4** | विविध अनुशासनों में अनुवादों को सुचारु बनाने के लिए पारिभाषिक शब्दावली का ज्ञान होगा। |
| **CO5** | विद्यार्थी हिन्दी में अच्छा बोल सकेंगे। |

**Offered by : Hindi Department**

**अध्ययन विषयवस्तु** **निर्देशात्मक घंटे / सप्ताह: 5**

| इकाई | विवरण | |
|---|---|---|
| I | लडाई–सर्वेश्वरदयाल सक्सेना | |
| | **निर्देशात्मक घंटे** | **20** |
| II | एकांकी संग्रह – 1. शिवाजी का सच्चा स्वरूप (सेठ गोविन्ददास) 2. माँ (विष्णु प्रभाकर) 3. घोंसले 4. रीढ़ की हड्डी (जगदीशचन्द्र माथुर) 5. सिपाही की माँ. मोहन राकेश | |
| | **निर्देशात्मक घंटे** | **20** |
| III | व्याकरण : संज्ञा, सर्वनाम, विशेषण, क्रिया, वचन, लिंग, काल, वाच्य, प्रत्यय, उपसर्ग, 'ने' का प्रयोग | |
| | **निर्देशात्मक घंटे** | **15** |
| IV | अनुवाद : अंग्रेज़ी–हिंदी (अनुवाद अभ्यास–3) (1-15) | |
| | **निर्देशात्मक घंटे** | **10** |
| V | **पारिभाषिक शब्दावली** | |
| | **निर्देशात्मक घंटे** | **10** |
| | **कुल घंटे** | **75** |

**पाठ्यपुस्तक:**

1. **लडाई** : सर्वेश्वरदयाल सक्सेना
2. **एकांकी संग्रह**
3. **अनुवाद अभ्यास**–३, दक्षिण भारत हिंदी प्रचार सभा, चेन्नै–17.
4. आलेखन व टिप्पणी

**संदर्भ ग्रंथ :**

1. डॉ. एन.ई. विश्वनाथ अय्यर, **अनुवाद कला,** पब्लिशर, संस्करण 2000
2. भोलानाथ तिवारी, **अनुवाद विज्ञान,** संस्करण 2000
3. रामदेव, **व्याकरण प्रदीप**। प्रकाशन : हिंदी भवन, 36, टागौर टाउन, इलहाबाद –2
4. **नूतन गद्य संग्रह**, सुमित्रा प्रकाशन, सुमित्रा निवास, 16/4 हास्टिंग्स रोड, इलहाबाद –211 001. संस्करण 2006

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Project | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 8 | 8 | 8 | 50 |

**Mapping**

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

H-High; M-Medium; L-Low

| Course Designed by | Verified by HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U1MAL101 | Part - I : Malayalam - I | | |
| Semester : I | Credit : 4 | CIA : 50 Marks | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective** : ആധുനികാലത്തെ മലയാളകഥകളെ കുറിച്ചും സംസ്കാരത്തെ കുറിച്ചും അവബോധം ഉണ്ടാക്കുന്നു

**Course Outcomes:**

| | |
|---|---|
| CO1 | കഥ യുടെ സംവേദനം ആസ്വാദകന്റെ അഭിരുചിയെ പൂർത്തിയാക്കുന്നു |
| CO2 | പ്രകൃതിയുമായി ബന്ധപ്പെടുന്ന കഥാപരിസരം |
| CO3 | ഭക്ഷണവും അതിന്റെ സംസ്കാരവും കൂട്ടായ്മ ഉണ്ടാക്കുന്നു |
| CO4 | ഭക്ഷണത്തിന്റെ മൂല്യം അർത്ഥവത്താക്കുന്നു |
| CO5 | ആശയ വിപുലനം |

**Offered by : Malayalam Department**

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

| Unit | Description | |
|---|---|---|
| I | ചെറുകഥകൾ - സമകാല കഥകൾ | |
| | **Instructional Hours** | **15** |
| II | ചെറുകഥകൾ - സമകാല കഥകൾ | |
| | **Instructional Hours** | **15** |
| III | സംസ്കാര പഠനം | |
| | **Instructional Hours** | **15** |
| IV | സംസ്കാര പഠനം | |
| | **Instructional Hours** | **15** |
| V | ഉപന്യാസം, വിവർത്തനം, ആശയവിപുലനം | |
| | **Instructional Hours** | **15** |
| | **Total Hours** | **75** |

പാഠപുസ്തകങ്ങൾ :

1. ചെറുകഥകൾ - സമകാല ചെറുകഥകൾ (10 ചെറുകഥകൾ)
2. സംസ്കാര പഠ നം കേരള ഭക്ഷണത്തിന്റെ സംസ്കാരചരിത്രം ഡോ.സി. ഗണേഷ്, ഡി.സി.ബുക്സ് കോട്ടയം

സഹായകഗ്രന്ഥങ്ങൾ :

1. എം അച്യുതൻ - ചെറുകഥ ഇന്നലെ ഇന്ന് - ഡി.സി.ബുക്സ് കോട്ടയം
2. എരുമേലി പരമേശ്വരൻ പിള്ള - മലയാള സാഹിത്യം കാലഘട്ടങ്ങളിലൂടെ - ഡി.സി.ബുക്സ് കോട്ടയം

3. പുതിയ കഥ പുതിയ വായന - എഡി : ഡോ.ഷീബാ ദിവാകരൻ പുസ്തകലോകം പ്രസദ്ധീകരണം

**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 | - | - | - | - | - | - | L |
| **CO2** | - | - | H | L | H | M | - | - | - | - | - | - | L |
| **CO3** | - | - | - | M | M | H | - | - | - | - | - | - | L |
| **CO4** | - | - | L | M | L | H | - | - | - | - | - | - | L |
| **CO5** | - | - | L | - | H | - | - | - | - | - | - | - | L |

H-High; M-Medium; L-Low

| Course designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U1FRN101 | Part - I : French - 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 Outcomes:**

Students will be able to

| | |
|---|---|
| **CO1** | Learn basic French grammar along with French civilisation |
| **CO2** | Know the gender of nouns |
| **CO3** | Learn Negation, articles and understand the usage of preposition. |
| **CO4** | Learn Futur proche, Pronominal verb, |
| **CO5** | Know to self introduce and translate simple sentences. |

**Offered by : French Department**

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

| Unit | Description | |
|---|---|---|
| **I** | Mes cinq sens en action | |
| | **Instructional Hours** | **15** |
| **II** | S'ouvrir aux autres | |
| | **Instructional Hours** | **15** |
| **III** | Partager son lieu de vie | |
| | **Instructional Hours** | **15** |
| **IV** | Vivre au quotidien | |
| | **Instructional Hours** | **15** |
| **V** | S'ouvrir a la culture | |
| | **Instructional Hours** | **15** |
| | **Total Hours** | **75** |

**Text Book :**

1. Saison 1 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | 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** | - | - | M | - | L | - | H | M | - | - | - | - | - |
| **CO2** | - | - | H | - | - | L | L | - | - | - | - | - | - |
| **CO3** | - | - | H | - | L | - | H | - | - | - | - | - | - |
| **CO4** | - | - | H | - | - | L | M | M | - | - | - | - | - |
| **CO5** | - | - | M | - | M | - | M | M | - | - | - | - | - |

H-High; M-Medium; L-Low

| Course designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U2ENG101 | Part II - 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 Outcomes:**

| | |
|---|---|
| **CO1** | Recognize listening, and reading proficiency through the prose discourses. |
| **CO2** | Use and interpret imaginative, and creative skills through the poetic genre. |
| **CO3** | Enhance the students to use English effectively through short story. |
| **CO4** | Execute and exercise grammatical skills in academics and career. |
| **CO5** | Evaluate the LSRW skills through literature. |

**Offered by : English department**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Prose**<br>**Leigh Hunt** – Getting Up On Cold Morning<br>**Rajagopalachari** – Tree Speaks<br>**Swami Vivekananda** – The Secret of Work | 1 | 1-3 |
| | **Instructional Hours** | | **15** |
| II | **Poetry**<br>**D.G Rossetti** – The Blessed Damozel<br>**Maya Angelou** -Phenomenal Women<br>**A. K. Ramanujan** – A River | 1 | 4-6 |
| | **Instructional Hours** | | **15** |
| III | **Short Stories**<br>**O. Henry** – The Last Leaf<br>**R. K. Narayan** – The Missing Mail<br>**Oscar Wilde -** The Happy Prince | 1 | 7-9 |
| | **Instructional Hours** | | **15** |
| IV | **Grammar and Vocabulary**<br>**Parts of Speech**<br>Tenses – Present, Past, Vocabulary of the specific domain, Punctuations, Kinds of Sentences. | 1 | 10-13 |
| | **Instructional Hours** | | **15** |

| | | | |
|---|---|---|---|
| V | **Oral & Written Communication**<br>**Listening** : (UNIT I – IV)<br>**Listening** – Comprehension practice from Poetry, Prose, Short-stories, observing / viewing E-content (with subtitles), Guest / Invited Lectures, Conference / Seminar Presentations & Tests and DD National News Live, BBC, CNN, VOA etc<br>**Speaking** – In a Group Discussion Forum, speak about Tongue Twisters, Critical Thinking, and Seminar Presentations on Classroom-Assignments, and Peer-Team interactions.<br>**Reading** – Pronunciation practice and enhancement from Poetry, Prose, Short-stories, Magazines, News Paper etc<br>**Writing** – Asking & Giving Directions/Instructions, Developing Hints, and Filling Forms. | 1 | 14-17 |
| | | **Instructional Hours** | **15** |
| | | **Total Hours** | **75** |

**Books for study:**

Unit I – V : Compiled by the PG & Research Department of English

**Books for Reference:**

1. 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)

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Speaking | Reading | 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** | M | - | H | H | M | M | H | H | L | - | L | L | M |
| **CO2** | H | - | H | H | M | H | H | H | L | - | L | L | M |
| **CO3** | H | - | H | M | H | H | H | H | L | - | L | L | M |
| **CO4** | H | L | H | M | H | H | H | H | L | - | L | L | M |
| **CO5** | H | L | H | H | H | H | H | H | L | - | L | L | M |

H-High; M-Medium; L-Low

| Course Designed by | Verified by HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKC101 | Core Paper I: Python Programming | | |
| Semester: I | Credits: 4 | CIA:50 Marks | ESE: 50 Marks |

**(Common to B. Sc. CS / AIML / DS / IT / DCFS / BCA)**

**Course Objective:**

To develop algorithmic solutions to simple computational problems using Python

**Course Outcome:**

| | |
|---|---|
| **CO1** | Understand the basics of Python and write simple Python program. |
| **CO2** | Develop Python programs using control statement and list method. |
| **CO3** | Apply tuples, Functions, Set iterators to develop simple applications. |
| **CO4** | Apply Python Strings, multithreading and exceptions for problem solving |
| **CO5** | Manipulate Files and perform Event Handling. |

**Offered by: Information Technology**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| 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** |
| 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. | 1 | 3,4,5 |
| | **Arrays**-Sequences - Python Lists: Read a List type from a Keyboard-Accessing Elements of a List- Modifying Elements of a List – Basic **Operations** – Built-in-Functions – Python List Methods. | 2 | 9 |
| | **Instructional Hours** | | **12** |
| III | **Tuples**-Need of a Tuple-Sequence of Unpacking – Methods – Sample programs. Dictionaries: Making a Dictionary-Basic Operations-Dictionary Operations – Sets-Iterators and Generators-Sample Programs. **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** |
| IV | **Strings in Python:** Reading – Accessing – Modifying – Finding-Iterating through a String-Build-in String Functions. | 2 | 8 |
| | **Errors and Exceptions**-Multithreading | 1 | 14,15 |
| | **Instructional Hours** | | **12** |

| | | | |
|---|---|---|---|
| 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.<br>**Events:** Event Objects-Binding callbacks to events-Event names-Keyboard events-Mouse Events-Sample Programs | 1 | 13,17 |
| | | **Instructional Hours** | **12** |
| | | **Total Hours** | **60** |

**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.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Quiz | Assignment | Seminar | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CJC102 | Core Paper II: Data Structures | | |
| Semester: I | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**(Common to B. Sc. AIML / DS)**

**Course Objective:**

To enable the students to understand about the various techniques such as Linked list, Searching and Sorting and apply them to solve complex programs.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Understand the representation of arrays, stacks and queues. |
| **CO2** | Solve the problem using Queues & Lists. |
| **CO3** | Demonstrate different type of tree representation and graph |
| **CO4** | Design algorithm to perform different types of sorting |
| **CO5** | Illustrate Symbol Table, Hash Table and File organization applied to solve real-world problems. |

**Offered by: Artificial Intelligence and Machine Learning**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction:** Overview - How to create Programs - How to Analyze 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** |
| 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** | |
| 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** |
| 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** |

| | | | |
|---|---|---|---|
| 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** |
| | | **Total Hours** | **60** |

**Text Book(s):**

1. Ellis Horowitz & Sartaj Sahni, **Fundamentals of Data Structures**, Galgotia Publication.
2. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J.Augenstein, **Data Structure using C**, Pearson Education, 2009.

**Unit I:** Sections: 1.1 to 1.4, 2.1 to 2.4 and 3.1 to 3.4 (Text Book 1: Chapter 1, 2 and 3)
**Unit II:** Sections: 3.1 to 3.4, 4.1 to 4.5 (Text Book 2: Chapter 3 and 4)
**Unit III:** Sections: 5.1 to 5.6 (Text Book 2: Chapter 5)
**Unit IV:** Section: 7.1 to 7.8, 8.1 to 8.3 (Text Book 1: Chapter 7 and 8)
**Unit V:** Section: 9.1 to 9.3, 10.1, 10.3 (Text Book 1: Chapter 9 and 10)

**Reference Book(s):**

1. Ellis Horowitz, SartajSahni & Sanguthevar Rajasekaran, **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.

## Tools for Assessment (50 Marks)

| CIA I | CIA II | CIA III | Quiz | Assignment | Seminar | 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 | 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 |

**L – Low; M – Medium; H – High**

| Course Designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTP101 | Core Paper III: **Practical in Python Programming** | | |
| **Semester: I** | **Credits: 4** | **CIA:50 Marks** | **ESE: 50 Marks** |

**Course Objective:** To introduce the concepts of python programming constructs.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Develop simple program for student information |
| **CO2** | Understand and apply the concept of the different conditional statement. |
| **CO3** | Apply the concept of looping constructs and functions for solving basic programs |
| **CO4** | Develop the program for sorting of Strings, Lists and tuples |
| **CO5** | Create a program for Linear and Binary Search Techniques |

**Department offered:** Computer Science

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

| | |
|---|---|
| 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 numbersin 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, then create object of that class and call simple print function defines in class. | |
| **Total Hours** | **60** |

**Tools for Assessment (50 Marks)**

| Laboratory Performance- Application of Logic | Laboratory Performanc e- Program Creativity | Laboratory Performance- Program Debugging | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 8 | 10 | 10 | 6 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3MKA101 | Allied Paper I: Statistics for Computer Science | | |
| Semester: I | Credits: 4 | CIA:50Marks | ESE:50 Marks |

**(Common to B. Sc. CS / DS / AIML)**

**Course Objective:**

To enable the students to learn and visualize the fundamental ideas of statistical methods.

**Course Outcome:** The Students should be able to

| | |
|---|---|
| CO1 | Implement the basic concepts of measures of Central tendency and dispersion |
| CO2 | Understand the concepts of Correlation and Regression |
| CO3 | Calculate probability using Baye's theorem |
| CO4 | Know probability distributions and Mathematical Expectations |
| CO5 | Analyse the properties of MGF and CGF |

**Offered by :** Mathematics

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | Statistics – Introduction – frequency distribution-Diagrammatic and Graphical Presentation of data-Measures of Central tendency-Arithmetic mean- Median-Mode. | 1 | 2 |
| | Measures of dispersion – Range-Standard deviation – Quartile deviation- Coefficient of variation. | 1 | 2 |
| | **Instructional Hours** | | **15** |
| II | Correlation: Definition –Scatter diagram-Karl Pearson's correlation co-efficient-Rank correlation co-efficient – Properties. | 1 | 10 |
| | Regression: Introduction – Construction of regression equations – Properties. | 1 | 11 |
| | **Instructional Hours** | | **15** |
| III | Probability: Introduction- Axioms of probability- Conditional probability- Addition theorem- Multiplication theorem-Independent event. | 1 | 3 |
| | Baye's theorem | 1 | 4 |
| | **Instructional Hours** | | **15** |
| IV | Random variables – Discrete random variables-probability mass function- Continuous random variables – probability density function | 1 | 5 |
| | Mathematical Expectation –Addition and Multiplication theorems-variance – Co-variance. | 1 | 6 |
| | **Instructional Hours** | | **15** |
| V | Generating Functions- Moment generating and cumulants -Characteristic functions and their properties-Chebychev's inequality-Weak law of large numbers. | 1 | 7 |
| | Central limit theorem | 1 | 9 |
| | **Instructional Hours** | | **15** |
| | **Total Hours** | | **75** |

**Text Book:**

1. S. C. Guptha and V.K. Kapoor , **Fundamentals of Mathematical Statistics**, S. Chand and Sons, Reprint, 2009.

**Reference Book:**

1. P.R.Vittal , **Mathematical statistics**, Margham Publications, Chennai .

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Seminar | Class Participation | Periodical Quizzes | 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 | L | H | H | H | H | H | H | H | H | M | M |
| CO2 | H | H | L | H | H | H | H | H | H | H | H | M | M |
| CO3 | H | M | L | M | M | H | M | H | H | H | H | H | H |
| CO4 | H | H | L | H | H | H | H | H | H | H | H | H | H |
| CO5 | H | M | L | M | M | H | M | H | H | H | H | H | H |

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

| Course Designed by | Verified by HOD | Checked by | Approved 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).<br>**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.<br>**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.<br>**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 | - | - | - | - | L |
| **CO2** | L | - | L | H | H | H | H | L | - | - | - | - | L |
| **CO3** | L | - | L | H | H | H | H | L | - | - | - | - | L |
| **CO4** | L | - | L | H | H | H | H | L | - | - | - | - | L |
| **CO5** | L | - | L | H | H | H | H | L | - | - | - | - | L |

H-High; M-Medium; L-Low

| Course designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U1TAM202 | PART – I TAMIL – II | | |
| Semester : II | Credits : 4 | CIA : 50 Marks | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective:** மொழி இலக்கியத்தின் வாயிலாக அறம்சார் பண்பு மற்றும் ஆளுமைமிக்க மாணவர்களை உருவாக்குதல்

**Course Outcomes:**

| | |
|---|---|
| **CO1** | பக்தி இலக்கியங்கள் வழி வாழ்வியல் நெறிகளை மாணவர்களுக்கு எடுத்துரைத்தல் |
| **CO2** | சிற்றிலக்கியங்களின் மூலம் தமிழர்களின் வாழ்க்கை கூறுகளை எடுத்துரைத்தல் |
| **CO3** | தமிழ் நாவல்களின் வழி சமுதாயச் சிந்தனைகளைக் கூறுதல் |
| **CO4** | இலக்கண அறிவை வளர்த்தல் |
| **CO5** | தமிழ் இலக்கிய வரலாற்றுத் திறனை மேம்பாடு அடையச் செய்தல் |

**Offered by : தமிழ்த்துறை**

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

| Description |
|---|
| **Unit I பக்தி இலக்கியங்கள்** |
| 1. திருமந்திரம் - மூன்றாம் தந்திரம் (அதிகாரம் 2) அட்டமாசித்திகள்<br>2. நாலாயிரத் திவ்யப்பிரபந்தம் - பெரியாழ்வார் - திருப்பல்லாண்டு<br>3. மாணிக்கவாசகர் - எட்டாம் திருமுறை - அச்சோப்பதிகம்<br>4. திருநாவுக்கரசர் - திருவரங்கமாலை – நான்காம் திருமுறை - தேவாரம் |
| **Instructional Hours :15** |
| **Unit II சிற்றிலக்கியங்கள்** |
| 1. கலம்பகம் - நந்திக்கலம்பகம் (91 -100 பாடல்கள்)<br>2. பள்ளு – முக்கூடற்பள்ளு (350 – 360)<br>3. குறவஞ்சி – திருக்குற்றாலக்குறவஞ்சி (1-10)<br>4. பிள்ளைத்தமிழ் - மீனாட்சியம்மை (1 -10)<br>5. பட்டினத்தார் பாடல்கள் (358 – 367) |
| **Instructional Hours: 15** |
| **Unit III நாவல்**<br>1. செல்லாதபணம் - இமையம் (வெ.அண்ணாமலை) |
| **Instructional Hours :15** |
| **Unit IV இலக்கணம்** |
| 1. வல்லினம் மிகும் இடங்கள்<br>2. வல்லினம் மிகா இடங்கள்<br>3. தொடை வகைகள் |
| **Instructional Hours :15** |
| **Unit V இலக்கிய வரலாறு பாடத்திட்டத்தைத் தழுவியது** |
| 1. சிற்றிலக்கியம் - அறிமுகம்<br>2. புதினத்தின் தோற்றமும் வளர்ச்சியும்<br>3. விண்ணப்பங்கள், மடல்கள், எழுதச் செய்தல். |
| **ஐளெவசரஉவழையெட ர்ழரசள : 15** |
| **Total Hours :75** |

**பாடத்தொகுப்பு**

இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல் **"இளந்தளிர்"**
தொகுப்பு: தமிழ்த்துறை,நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர்.

**பார்வை நூல்கள்:**


1. திருமந்திரம் - மாணிக்கவாசகர் அருளிய திருவாசகம் - சித்தாந்த பண்டிதர் திரு.ப.இராமநாத பிள்ளை விளக்க உரையுடன் கழக வெளியீடு, திருநெல்வேலி, தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்புக் கழகம் லிமிடெட், 522 டி.டி.கேசாலை, சென்னை - 600 018
2. புலவர்த.திருவேங்கட இராமனுஜதாசன் - நாலாயிரதிவ்யப் பிரபந்தம் முதல் ஆயிரம் மூலமும் உரையும், உமாபதிப்பகம், 171,புதிய எண்.18 பவளக் காரத்தெரு, மண்ணடி, சென்னை - 001
3. தாயுமானவர் இயற்றிய பராபரக்கண்ணி -ஸ்ரீமத் சுவாமி சித்பவானந்தர் விரிவுரையுடன் ஸ்ரீ ராம கிருஷ்ண தபோவனம், திருப்பராய்த்துறை - 639115 திருச்சி மாவட்டம்
4. நந்திக்கலம்பகம் - மணிவாசகர் பதிப்பகம், ராஜவீதி, கோயமுத்தூர் - 641 001
5. முனைவர்.கதிர்முருகு-முக்கூடற்பள்ளு மூலமும் உரையும், சாரதா பதிப்பகம், சென்னை.
6. புலியூர்க்கேசிகன் தெளிவுரை-திருக்குற்றாலக்குறவஞ்சி, செல்லப்பா பதிப்பகம், சென்னை.
7. சாந்தலிங்கசுவாமிகள் - சாந்தலிங்க அடிகளார், திருமடம் வெளியீடு, பேரூர், கோவை - 10
8. அ.மாணிக்கம் உரையாசிரியர் - பட்டினத்தார் பாடல்கள் மூலமும் உரையும், வர்த்தமானன் பதிப்பகம், 40, சரோஜினி தெரு, தியாகராயநகர், சென்னை -17.
9. தமிழண்ணல் - புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை
10. நல்லதமிழ் எழுத வேண்டுமா? – அ.கி. பரந்தாமனார், அல்லி நிலையம், சென்னை - 007
11. முனைவர்.பாக்கியமேரி - தமிழ் இலக்கிய வரலாறு - என்.சி.பி.எச். வெளியீடு. கோவை - 600098
12. திருவருட்பா - அருள் விளக்கம், மணிவாசகர் பதிப்பகம், சென்னை.
13. மு.வ. தமிழ் இலக்கிய வரலாறு சாகித்ய அகாதெமி, புதுதில்லி - 110 001.
14. செல்லாதபணம் -இமையம் கிரியா பப்ளிகேசன்ஸ், சென்னை.


## Tools for Assessment (50 Marks)

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

## Mapping

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

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U1HIN202 | PART – I : HINDI - II | | |
| Semester : II | Credits : 4 | CIA : 50 Marks | ESE : 50 Marks |

**(Common to all UG Programmes)**

**कोर्स लक्ष्य** : भारतीयता की साहित्य के माध्यम से पहचान कराना। कहानी के माध्यम से समकालीन समय के सच की पहचान कराना। हिंदी से अंग्रेज़ी में अनुवाद के माध्यम से भारतीय ज्ञान संपदा को अंतर्राष्ट्रीय स्तर तक पहुँचाने में छात्र को समर्थ बनाना। दैनन्दिन की बातचीत में हिंदी का निर्बाध प्रयोग करने में छात्र को सक्षम बनाना।

**कोर्स परिणाम** :

| | |
|---|---|
| **CO1** | छात्रों में साहित्यिक अभिरुचि के साथ सामाजिक बोध बढ़ेगा। पत्राचार के क्षेत्र में वे स्वावलम्बी हो सकेंगे। |
| **CO2** | भारतीय भाषा के ज्ञान को विदेश तक पहुँचाने के क्षेत्र में क्षमता हासिल करेंगे। |
| **CO3** | राष्ट्रभाषा हिंदी से अंतर्राष्ट्रीय भाषा अंग्रेज़ी में सामग्री का अनुवाद करके छात्र हिंदी की ज्ञान संपदा बढ़ाने में कामयाब होंगे। |
| **CO4** | रोज़मरा जीवन में हिंदी को बोल पाने में कामयाब होंगे। |
| **CO5** | छात्र लघु कथाएँ लिखने में पारंगत होंगे। |

**Offered by : Hindi Department**

**अध्ययन विषयवस्तु** **निर्देशात्मक घंटे / सप्ताह: 5**

| इकाई | विवरण | |
|---|---|---|
| I | आधुनिक काव्य : रश्मिरथी, रामधारीसिंह दिनकर | |
| | **निर्देशात्मक घंटे** | **25** |
| II | कहानी – 1. पूस की रात (प्रेमचन्द), 2. आकाशदीप (जयशंकर प्रसाद) 3. अकेली (मन्नू भंडारी), 4. खेल (जैनेन्द्र कुमार) 4. सच बोलने की भूल (यशपाल) 5. चीफ की दावत (भीष्म साहनी) 6. आरोहण (संजीव) 7.( कफन प्रेमचंद ) | |
| | **निर्देशात्मक घंटे** | **20** |
| **III** | पत्र लेखन : (सरकारी पत्र, निजी पत्र, संपादक को पत्र, ज्ञापन, परिपत्र) | |
| | **निर्देशात्मक घंटे** | **10** |
| **IV** | अनुवाद : हिंदी से अंग्रेज़ी | |
| | **निर्देशात्मक घंटे** | **10** |
| **V** | बोलचाल हिंदी – 1. साक्षात्कार 2. अध्यापक–विद्यार्थी 3. ग्राहक–दूकानदार 4. डॉक्टर–मरीज 5. मुसाफिर–यात्री | |
| | **निर्देशात्मक घंटे** | **10** |
| | **कुल घंटे** | **75** |

**पाठ्यपुस्तक :**

1. रामधारीसिंह दिनकर, रश्मिरथी।
2. **कहानी**
3. **अनुवाद अभ्यास–3,** (दक्षिण भारत हिंदी प्रचार सभा)
4. आदर्श पत्र लेखन
5. व्याकरण

**संदर्भ ग्रंथ :**

1. प्रोफ. नीरज एम., **प्रामाणिक आलेखन और टिप्पणी**, राजपाल एंड सन्स, काश्मीर गेट, नई दिल्ली।
2. नीलम कपूर, **प्रयोजनमूलक हिंदी**, श्री नटराज प्रकाशन, साउथ गारडी, नई दिल्ली–2
3. डॉ. मधुधवन, **नवीन एकांकी संग्रह**, सुमित्रा प्रकाशन, अशोक नगर, अलहाबाद–1

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | 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** | - | - | M | - | L | H | M | - | - | - | - | - | L |
| **CO2** | - | - | L | - | L | M | H | - | - | - | - | - | L |
| **CO3** | - | - | H | - | M | H | M | - | - | - | - | - | L |
| **CO4** | - | - | H | - | - | M | - | - | - | - | - | - | L |
| **CO5** | - | - | M | - | L | - | L | - | - | - | - | - | L |

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

| Course Designed by | Verified by HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U1MAL202 | Part - I : Malayalam - II | | |
| Semester : II | Credits : 4 | CIA : 50 Marks | ESE : 50 Marks |

**Course Objective**: വിദ്യാർത്ഥികളിൽ മലയാള ഭാഷയുടെ വികാസവും മലയാള സാഹിത്യത്തിൽ നോവലുകൾക്കുള്ള സ്ഥാനവും വായനാശീലവും വർദ്ധിപ്പിക്കുന്നു.

**Course Outcomes**:

| | |
|---|---|
| CO1 | സമൂഹത്തിലെ ഒരു വിഭാഗത്തിന്റെ ജീവിതം |
| CO2 | പ്രകൃതിയും മറ്റു ജീവജാലങ്ങളുടെയും മാറ്റങ്ങൾ |
| CO3 | പ്രകൃതി നാശത്തിനെതിരായി ഒന്നിച്ചു പ്രവർത്തിക്കുന്നു |
| CO4 | സമൂഹത്തിലെ ഭാഷാസങ്കല്പം തിരിച്ചറിയുന്നു |
| CO5 | നല്ല ഭാഷ എങ്ങനെ സൃഷ്ടിക്കാമെന്ന് മനസ്സിലാക്കുന്നു |

**Offered by : Malayalam Department**

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

| Unit | Description | |
|---|---|---|
| I | നോവൽ - എൻമകജെ | |
| | **Instructional Hours** | **15** |
| II | നോവൽ - എൻമകജെ | |
| | **Instructional Hours** | **15** |
| III | നോവൽ - എൻമകജെ | |
| | **Instructional Hours** | **15** |
| IV | ഭാഷാപരിചയം – തെളിമലയാളം | |
| | **Instructional Hours** | **15** |
| V | ഭാഷാപരിചയം – തെളിമലയാളം | |
| | **Instructional Hours** | **15** |
| | **Total Hours** | **75** |

**പാഠപുസ്തകങ്ങൾ :**

1. അംബികാസുതൻ മാങ്ങാട് - എൻമകജെ - ഡി.സി.ബുക്സ് കോട്ടയം
2. എം.എൻ.കാരശ്ശേരി – തെളിമലയാളം - ഡി.സി.ബുക്സ് കോട്ടയം

**സഹായകഗ്രന്ഥങ്ങൾ :**

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 കാലഘട്ടത്തിലൂടെ - ഡി.സി.ബുക്സ് കോട്ടയം

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIAIII | Assignment | Seminar | 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 | H | - | - | - | - | - | - | L |
| **CO2** | - | - | H | M | H | M | - | - | - | - | - | - | L |
| **CO3** | - | - | M | M | M | H | - | - | - | - | - | - | L |
| **CO4** | - | - | L | H | L | H | - | - | - | - | - | - | L |
| **CO5** | - | - | L | M | L | H | - | - | - | - | - | - | L |

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

| Course designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U1FRN202 | Part - I : French - II | | |
| Semester : II | Credits : 4 | CIA : 50 Marks | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective**:

This course comprises of French grammar that aims to apply the grammatical structures in the language.

**Course Outcomes**:

Students will be able to

| | |
|---|---|
| **CO1** | Acquire an understanding of French culture and use basic verbs. |
| **CO2** | Describe about a place, learn pronom en, y and adjectives. |
| **CO3** | Recall the tenses and learn Imparfait tense |
| **CO4** | Narrate about the weather and learn pronom COD and COI |
| **CO5** | Draft short passages, translate and comprehend . |

**Offered by : French Department**

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

| Unit | Description | |
|---|---|---|
| **I** | Gouter a la campagne | |
| | **Instructional Hours** | **15** |
| **II** | Voyager dans sa ville | |
| | **Instructional Hours** | **15** |
| **III** | Faire du neuf avec du vieux | |
| | **Instructional Hours** | **15** |
| **IV** | Changer d'air | |
| | **Instructional Hours** | **15** |
| **V** | Devenir eco-citoyen | |
| | **Instructional Hours** | **15** |
| | **Total Hours** | **75** |

**Text Book:**

1. Saison 1 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | 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 | - | - | M | H | - | - | - | - | - | - |
| **CO2** | - | - | H | - | L | - | M | L | - | - | - | - | - |
| **CO3** | - | - | H | - | - | - | M | M | - | - | - | - | - |
| **CO4** | - | - | H | - | L | M | H | L | - | - | - | - | - |
| **CO5** | - | - | H | - | - | M | H | - | - | - | - | - | - |

H-High; M-Medium; L-Low

| Course designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U2ENG202 | Part II - 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 Outcomes:**

| | |
|---|---|
| **CO1** | Mastering life skills through prose discourse. |
| **CO2** | Acquire ethics and values through poetic genre. |
| **CO3** | Recognise the nuances of English language through short stories. |
| **CO4** | Enhance fluency over language with self-confidence. |
| **CO5** | Examine how the language is used in literature and develop LSRW Skills |

**Offered by : English department**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Prose**<br>Sachin Tendulkar - Learning the Game<br>Mahatma Gandhi - Women Not the Weaker Sex<br>Issac Asimov - The Fun They had | 2 | |
| | **Instructional Hours** | | **15** |
| II | **Poetry**<br>Robert Frost - Stopping by Woods on a Snowy Evening<br>William Blake - A Poison Tree<br>Oliver Goldsmith - The Village School Master | 2 | |
| | **Instructional Hours** | | **15** |
| III | **Short Stories**<br>Mark Twain - The Cat and the Painkiller<br>Japanese Folk Tale - The Envious Neighbour<br>Khushwant Singh – Karma | 1 | |
| | **Instructional Hours** | | **15** |
| IV | **Grammar**<br>Active and Passive Voices<br>Direct and Indirect Speech<br>Sentence Connectors and Linkers | 1 | |
| | **Instructional Hours** | | **15** |
| V | **Oral & Written Communication (Unit I –IV)**<br>**Listening** – Comprehension practice from Poetry, Prose, Online Voice Practice, observing/viewing E-content (with subtitles), | 2 | |

| | | |
|---|---|---|
| | Guest/Invited Lectures, Conference/Seminar Presentations & Tests, and DD National News Live, BBC, CNN, VOA etc<br>**Speaking** – In Group Discussion Forum, participate in the Turn Taking, and Conversation Management, Debating, Defending/Mock Viva-Voice, Seminar Presentations on Classroom-Assignments, and Peer-Team-interactions.<br>**Reading** – Different Reading Strategies in Poetry, Prose, Novel, Newspaper etc<br>**Writing**– Dialogue/Conversation Writing, Advertisement Writing, and Creative Writing (autobiography, article etc,) for publication in Mass Media. | |
| | **Instructional Hours** | **15** |
| | **Total Hours** | **75** |

**Books for study:**

**Unit I – V : Compiled by the PG & Research Department of English**

**Books for Reference:**

1. 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)

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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** | M | M | H | H | M | M | H | H | L | - | L | L | M |
| **CO2** | H | M | H | H | M | H | H | H | L | - | L | L | M |
| **CO3** | H | M | H | M | H | H | H | H | L | - | L | L | M |
| **CO4** | H | H | H | M | H | H | H | H | L | - | L | L | M |
| **CO5** | H | M | H | H | H | H | H | H | L | - | L | L | M |

H-High; M-Medium; L-Low

| Course Designed by | Verified by HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC203 | Core Paper IV: Operating Systems | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:**

To develop the fundamentals of Operating Systems, mechanisms of OS and distributed operating system and implement simple OS mechanisms

**Course Outcomes:**

| | |
|---|---|
| CO1 | List the different architectural components involved in OS design |
| CO2 | Understanding the applications to run in parallel using process |
| CO3 | Learn the mechanism of OS to handle process and threads and their communication |
| CO4 | Develop and implement resource management techniques for timesharing |
| CO5 | Examine protocols of Distributed OS and file sharing in distributed Applications |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction: Types of Operating System-** History of Operating System- **Features of OS- Applications of OS-** Computer Architecture- Hardware Level- Context of a Program- Interrupts | 1 | 1,2 |
| | **Instructional Hours** | | **12** |
| II | **Operating System Functions and Structures:** Different Services of Operating System- Uses of System calls- Issue of Portability- User's view of the Operating System- Graphical User Interface- Operating System Structure- Virtual Machine- Booting | 2 | 3 |
| | **Instructional Hours** | | **12** |
| III | **Process Management**: – Inter process communication:-The Producer-Consumer Problems-Solutions to the Producer-Consumer Problems-Classical IPC problems- Deadlock-Introduction- Graphical Representation of a Deadlock- Deadlock Prerequisites- Deadlock Strategies | 2 | 6,7 |
| | **Instructional Hours** | | **12** |
| IV | **Memory Management:** Single Contiguous Memory Management- Fixed Partitioned Memory Management- Variable Partitions- Paging- Segmentation | 2 | 8 |
| | **Instructional Hours** | | **12** |
| V | **Case Study:** Unix-History-Overview-File system-Process states and State Transition-Executing and terminating-Booting and login-Process scheduling and memory management | 2 | 13 |
| | **Instructional Hours** | | **12** |
| | **Total Hours** | | **60** |

**Text Book(s):**

1. Andrew S. Tanenbaum, **Modern Operating System,** Third Edition, Pearson Educational Inc. 2009.
   Unit I: Section 1.1, 1.4 (Chapter 1)
2. Achyut S. Godbole, **Operating System,** TATA McGraw Hill Publishing Company Ltd., Second Edition 2006.
   Unit I: Section 1.1 to 1.5, 2.1 to 2.8 (Chapter 1 and 2)
   Unit II: Section 3.1 to 3.9 (Chapter 3)
   Unit III: Section 6.1 to 6.3, 7.1 to 7.4 (Chapter 6 and 7)
   Unit IV: Section 8.1 to 8.7 (Chapter 8)
   Unit V: Section 13.1 to 13.4, 13.6 to 13.10 (Chapter 13)

**Reference Book(s):**

1. William Stallings, **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

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Quiz | Assignment | Seminar | 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 | 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 HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC204 | Core Paper V: Object Oriented Programming with Java | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**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 Outcomes:**

| | |
|---|---|
| CO1 | Remember the fundamental concepts of Object-oriented Programming |
| CO2 | Gains the knowledge about different data types, statements, concepts and dBase Connectivity |
| CO3 | Able to develop programs for the different concepts |
| CO4 | Analyse the program complexity for the problem given |
| CO5 | Skill to debug and execute the program for the given problem |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| 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 | 1 | 1,2,3 |
| | **Instructional Hours** | | **12** |
| 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** |
| III | **Inheritance, Interfaces, Packages:** Putting Classes together, **Exception Handling, Multithreaded Programming,** | 1 | 10,11 & 12 |
| | **Instructional Hours** | | **12** |
| IV | **Applet Programming, Graphics Programming** | | 13,14 &15 |
| | **Instructional Hours** | | **12** |
| V | **GUI using Java AWT:** What is AWT in Java, Class Hierarchy Layout Manager, Label class, TextField class, Button Class, Choice class, List Class, Checkbox Class. **Database Access Using JDBC and SQL:** Database Basics, Client-Server System-Two- tier, Three-tier, Multi-tier system, Database Access and Java – What does JDBC do – JDBC Components – Creating a Table – Data Retrieval – Examples. | 2 | 6, 21 |
| | **Instructional Hours** | | **12** |
| | **Total Hours** | | **60** |

**Text Book(s):**

1. E. Balagurusamy, **Programming with Java – A Primer**, Tata McGraw Hill Publication, 3rd Edition, 2007
2. Keyur Shah, Java 2 Programming, Tata McGraw – Hill Publication, 2007.

**Reference Book(s):**

1. Patrick Naughton & Hebert Schildt, **The Complete Reference Java 2,** Tata McGraw Hill Publication**,** 3rd Edition , 2002.
2. John R. Hubbard, **Programming with Java**, Tata McGraw Hill Publication, 2nd Edition,2009

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Quiz | Assignment | Seminar | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTP202 | Core Paper VI: Practical in JAVA Programming | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:**

To enable the students to develop problem solving skills and programming ability in Java Language

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Develop the applications using programming concepts |
| **CO2** | Develop the applications for database connectivity |
| **CO3** | Able to debug the program |
| **CO4** | Execute and evaluate the problem given |
| **CO5** | Implement the concepts to solve the real word problems |

**Offered by: Data Science**

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

| S. No. | 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 multiple inheritance using Interfaces |
| 4 | Write a program to implement the concept of Exception Handling using predefined exception. |
| 5 | Write a Java Program to create an Exception called payout-of-bounds and throw the exception |
| 6 | 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 |
| 7. | Write a Java Program to draw several shapes in the created windows |
| 8 | Write a Java program to import classes from user defined package and creating package. |
| 9 | Write a Java program for using Graphics class to display basic shapes and fill them, - draw different items using basic shapes, set background and foreground colours. |
| 10 | Write a Java Program to create a frame with four text field's name, street, city and pin code with suitable tables. Also add a button called my details. When the button is clicked its corresponding values are to be appeared in the text fields |
| 11 | Write a Java Program to create a frame to implement checkbox group |
| 12 | Write a Java program of database connectivity using JDBC-ODBC drivers |
| | **Total Hours : 60** |

**Tools for Assessment (50)**

| Laboratory Performance- Application of Logic | Laboratory Performanc e- Program Creativity | Laboratory Performance- Program Debugging | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 8 | 10 | 10 | 6 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3MIA202 | Allied Paper II : Discrete Mathematics | | |
| Semester: II | Credits : 4 | CIA: 50 Marks | ESE: 50 Marks |

**(Common to B. Sc. CS / AIML / DS / IT / DCFS / BCA)**

**Course Objective:**

To learn about the discrete structure for computer-based applications.

**Course Outcome:** Students should be able to

| | |
|---|---|
| **CO1** | Learn the basic concepts of Set theory |
| **CO2** | Implement the basic ideas of Mathematical Logic in Computer Science |
| **CO3** | Classify different types of Relations and Functions |
| **CO4** | Understand the concepts of Grammar and Automata theory. |
| **CO5** | Know the concepts of Graph theory |

**Offered by:** Mathematics

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Set Theory:** Introduction-Set & its Elements-Set Description-Types of sets-Venn-Euler Diagrams-Set operations & Laws of set theory. | 1 | 1 |
| | Fundamental products- Partitions of sets – Min sets- Algebra of sets and Duality-Inclusion and Exclusion principle. | 1 | 1 |
| | **Instructional Hours** | | **15** |
| II | **Mathematical Logic:** Introduction- prepositional calculus – Basic logical operations- Tautologies-Contradiction – Argument-Method of proof- Predicate calculus. | 1 | 12 |
| | **Instructional Hours** | | **15** |
| III | **Relations:** Binary Relations – Set operation on relations-Types of Relations – Partial order relation – Equivalence relation – Composition of relations. | 1 | 3 |
| | Functions – Types of functions – Invertible functions – Composition of functions. | 1 | 4 |
| | **Instructional Hours** | | **15** |
| IV | **Languages:** Operations on languages – Regular Expressions and regular languages. | 1 | 15 |
| | **Grammar:** Types of grammars – Grammar Construction-Finite state machine – Finite -State automata. | 1 | 15 |
| | **Instructional Hours** | | **15** |
| V | **Graph Theory:** Basic terminology – paths, cycle & Connectivity – Sub graphs – Types of graphs. | 1 | 9 |
| | Trees – Properties of trees – Binary trees. | 1 | 10 |
| | **Instructional Hours** | | **15** |
| | **Total Hours** | | **75** |

**Text Books:**

1. J.K. Sharma, **Discrete Mathematics**, Macmillan India Ltd, 2nd edition, 2005.
   Unit I : Chapter 1, Section: 1.1-1.7, 1.9,1 .10, 1.12, 1.14
   Unit II: Chapter 12, Section: 12.1 – 12.3 & 12.8, 12.9, 12.11, 12.12 & 12.14
   Unit III: Chapter 3, Section: 3.3 - 3.7, 3.11
   Chapter 4, Section: 4.1 – 4.5
   Unit IV: Chapter 15, Section: 15.1-15.7
   Unit V: Chapter 9, Section: 9.1 – 9.5
   Chapter 10, Section: 10.1-10.3

**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 Combinatorics** , McGraw Hill International Edition, 2008**.**

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Seminar | Class Participation | Periodical Quizzes | 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 | 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 HOD | Checked by | Approved 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<br>*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<br>*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<br>*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 | - | - | - | - | L |
| **CO2** | - | - | - | L | H | H | H | H | - | - | - | - | L |
| **CO3** | - | - | - | L | H | H | H | H | - | - | - | - | L |
| **CO4** | - | - | - | L | H | H | H | H | - | - | - | - | L |
| **CO5** | - | - | - | L | H | H | H | H | - | - | - | - | L |

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

| Course Designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4HVY201 | Value Education: Human Values and Yoga Practice I | |
| Semesters: I & II | Credits: 2 | CIA: 50 Marks |

**(Common to all UG Programme)**

**Course Objective:**

- To help the students appreciate the essential complementarily 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 develop life skills. |
| **CO4** | To understand and Practice Meditation & Surya Namaskar. |
| **CO5** | To understand and apply the knowledge for physical health and well-being through Simple exercises. |

**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. | |
| | **Instructional Hours** | **6** |
| II | **Individual and Society** - Theories of Society - Social Relationships and Society - Empathy: Compassion towards other being - Environmental Ethics and Nature. | |
| | **Instructional Hours** | **6** |
| III | Cultural Education - Purity India - Patriotism - Time management. Greatness of Womanhood - Food is medicine- Individual peace -World Peace. | |
| | **Instructional Hours** | **6** |
| IV | **Power of Meditation**- Development of mind in stages - Mental Frequencies Methods for Concentration. Meditation Practices - Surya Namaskar. | |
| | **Instructional Hours** | **6** |
| V | **Simplified Physical Exercise**s – Kayakalpa Practices - Training for Potentialising the Mind. | |
| | **Instructional Hours** | **6** |
| | **Total Hours** | **30** |

**Text book:**

1. **"Value Education I ",** 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 | - | - | - | - | L |
| **CO2** | - | - | - | L | M | H | M | H | - | - | - | - | L |
| **CO3** | - | - | - | L | M | H | H | H | - | - | - | - | L |
| **CO4** | - | - | - | L | L | H | M | H | - | - | - | - | L |
| **CO5** | - | - | - | L | L | H | M | H | - | - | - | - | L |

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC303 | Core Paper VII: Introduction to Data Science | | |
| Semester: III | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:**

To learn the basic concepts of Machine Learning, Data Science and Data Analysis

**Course Outcomes:**

| | |
|---|---|
| CO1 | Understand and comprehend the basics of machine learning |
| CO2 | Improve the proficiency with statistical analysis of data |
| CO3 | Apply data science concepts and methods to solve problems in real-world contexts |
| CO4 | Understands the concepts of social media analytics |
| CO5 | Develop real-world applications using data visualization |

**Offered by:** Data Science

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | Introduction: What is Data Science, Big Data and Data Science hype and getting past the hype Why now. Datafication, Current landscape of perspectives, Skill sets needed, Statistical Inference, Populations and samples, Statistical modeling, probability distributions, Introduction to R | 1 | 1 |
| | **Instructional Hours** | | **15** |
| II | Exploratory Data Analysis and the Data Science Process, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process Case Study: RealDirect (online real estate _rm), Three Basic Machine Learning Algorithms, Linear Regression, k-Nearest Neighbors (kNN), k-means | 1 | 3 |
| | **Instructional Hours** | | **15** |
| III | Additional Machine Learning Algorithm and Usage in Applications, Motivating application: Filtering Spam, Why Linear Regression and k-NN are poor choices for Filtering Spam, Naive Bayes and why it works for Filtering Spam, Data Wrangling: APIs and other tools for scrapping the Web, Feature Generation and Feature Selection Extracting Meaning From Data), Motivating application: user (customer) retention, Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms, Filters; Wrappers; Decision Trees; Random Forests | 2 | 7,8 |
| | **Instructional Hours** | | **15** |
| IV | Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis, Exercise: build your own recommendation system, Mining Social-Network Graphs, Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighborhood properties in graphs. | 2 | 9,12 |
| | **Instructional Hours** | | **15** |

| | | | |
|---|---|---|---|
| **V** | Data Visualization, Basic principles, ideas and tools for data visualization, Examples of inspiring (industry) projects. Exercise: create your own visualization of a complex dataset, Data Science and Ethical Issues, Discussions on privacy, security, ethics. A look back at Data Science, Next-generation data scientists. | 3 | 13 |
| | | **Instructional Hours** | **15** |
| | | **Total Hours** | **75** |

**Text Book(s):**

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
2. Jure Leskovek, Anand Rajaraman and Je_rey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
3. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013.

**Web Reference:**

1. https://www.w3schools.com/datascience/

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Class Participation | 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 | 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 HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC304 | Core Paper VIII: RDBMS and MySQL | | |
| Semester: III | Credits:4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:**

To inculcate fundamental knowledge in RDBMS concepts and designed for students to writing SQL queries using MySQL.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | List and explain the fundamental concepts of a relational database system |
| **CO2** | Explain the basic concepts of relational data model, entity-relationship model and relational database design |
| **CO3** | Improve the database design by normalization |
| **CO4** | Understanding of SQL syntax used with MySQL |
| **CO5** | Explain the basic functions of MySQL database program |

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction:** Introduction to DBMS – Information-Data and Data Management-File-based data management – Database System - DBMS - Components of a DBMS- Database User-Database Architecture and Design- Data Abstraction - Physical and Logical Data Independence | 1 | |
| | **Instructional Hours** | | **18** |
| II | **Data Models:** Data Models-Introduction-Conceptual, Physical Models-Hierarchical Model - Network Model-Relational Model – E-R Model **Entity – Relationship (E-R) Modeling:** Introduction – E-R Model - Components of an E-R Model-Relationships- Relationships, E-R conventions- Composite Entities - Entity List-E-R diagrams, E-R Modeling Symbols | 1 | |
| | **Instructional Hours** | | **18** |
| III | **Data Integrity, Constraints and Normalization:** Introduction-Integrity Constrains - Normalization-Keys-Relationships-Normalization - Keys-Relationships-First Normal Form(1NF)-Second Normal form(2NF) -Third Normal Form(3NF)- Boyce-Codd Normal Form (BCNF) | 1 | |
| | **Instructional Hours** | | **18** |
| IV | **MySQL:** Introduction to MySQL - Identifier in MySQL - Creating a Database - Selecting Database-Creating Tables-Data Types in in MySQL-Using INSERT-Using DELETE-Using Truncate - Using Update-Overview of SELECT - Simple Queries - Selecting Particular Column - Using WHERE Clause to Select particular Rows-Using GROUPBY Clause - HAVING - ORDER BY – LIMIT. | 2 | |
| | **Instructional Hours** | | **18** |

| | | | |
|---|---|---|---|
| V | **MySQL Queries and Functions:** Using Joins to Run Queries over Multiple table-Understanding the different Join Types-Operator in My SQL-Control Flow functions-String Functions-Numeric Function-Date and Time Functions<br>**PL/SQL Concepts :** Cursors, Stored Procedures, Database Triggers | 2 | |
| | **Instructional Hours** | | **18** |
| | **Total Hours** | | **90** |

**Text Book(s):**

1. Alexis Leon and Mathews Leon 'Fundamentals of database Management Systems', Vijay Nicole Imprints Private Limited, Chennai,2006.
2. Luke Welling and Laura Thomson ,'My SQL Tutorial, Pearson Education, First Edition,2006

**Unit I:** Sections: 1.1 to 1.4, 2.1 to 2.4 (Chapter 1 and 2)
**Unit II:** Sections: 3.1 to 3.7, 4.1 to 4.10 (Chapter 3 and 4)
**Unit III:** Sections: 7.1 to 7.3, 9.1, 9.5 to 9.12 (Chapter 7 and 9 )
**Unit IV:** Section: 4.1 to 4.9, 5.1 to 5.6 (Chapter 4 and 5)
**Unit V:** Sections: 7.1 to 7.3, 8.1 to 5.5 (Chapter 7 and 8)

**Reference Book(s):**

1. Abraham Silberschatz , Henry F.Korth and S.Sudarshan,'Database System Concepts', Tata Mc Graw Hill,Sixth Edition,2013.
2. C.J.Date, A.Kannan and S.Swamynathan, “An Introduction to Database Systems”, Eight Edition, Pearson Education, 2006.
3. Hugh E. Williams, Saied M.M. Tahaghoghi ,'Learning MySQL',O'Reilly Media, Inc ,Second Edition ,2006

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTP305 | Core Paper IX Practical in RDBMS and MySQL | | |
| Semester: IV | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:**

To make the students to understand Relational Database Management System concepts using Oracle and able to do the various operations on Tables.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Remember to transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a RDBMS. |
| **CO2** | Understand the processes of Database Development and Administration using SQL and PL/SQL. |
| **CO3** | Apply the Programming and Software Engineering skills and techniques using SQL. |
| **CO4** | Analyze the relational data model with optimal and feasible solutions |
| **CO5** | Evaluate the Optimal Solutions |

**Offered by: Computer Application**

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

| Prog. No. | List of Programs |
|---|---|
| **1** | Create a table for Employee details with Employee Number as primary key and following fields: Name, Designation, Gender, Age, Date of Joining and Salary. Insert at least ten rows and perform various queries using any one Comparison, Logical, Set, Sorting and Grouping operators. |
| **2** | Create tables for library management system which demonstrate the use of primary key and foreign key. Master table should have the following fields: Accno, Title, Author and Rate. Transaction table should have the following fields: User id, Accno, Date of Issue and Date of Return. Create a Report(Select verb) with fields Accno, Title, Date of Issue for the given Date of Return with column formats. |
| **3** | Write a PL/SQL to update the rate field by 20% more than the current rate in inventory table which has the following fields: Prono, ProName and Rate. After updating the table a new field (Alter) called for Number of item and place for values for the new field without using PL/SQL block. |
| **4** | Write a PL/SQL program to check whether given string is palindrome or not |
| **5** | Write a PL/SQL program to find factorial of numbers using function and procedure. |
| **6** | Create a PL/SQL Program to perform updation using various triggers. |
| **7** | Create a database trigger to implement on master and transaction tables which are based on inventory management system for checking data validity. Assume the necessary fields for both tables. |
| **8** | Write a PL/SQL to split the student table into two tables based on result (One table for ―Pass and another for ―Fail). Use cursor for handling records of student table. |
| **9** | Write a PL/SQL to raise the exceptions in Bank Account Management table |
| **10** | Write a PL/SQL to handle package |
| **11** | Write a PL/SQL Cursor for referencing fields in a record |
| **12** | Write a PL/SQL trigger for entering mark in the student table |
| | **Total Hours 75** |

**Tools for Assessment (50)**

| Laboratory Performance - Application of Logic | Laboratory Performance - Program Creativity | Laboratory Performance - Program Debugging | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 8 | 10 | 10 | 6 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3MKA303 | Allied Paper III: Linear Algebra and Basics of Calculus | | |
| Semester: III | Credit: 4 | CIA:50 Marks | ESE: 50 Marks |

**Course Objective:**

It enables the students to learn about the Matrices and its properties and curvature .

**Course Outcome:**

| | |
|---|---|
| CO1 | Identifying the properties of Matrices. |
| CO2 | Outlining the concepts of Cayley – Hamilton and Diagonalizable of matrices. |
| CO3 | Recognising the basics of Differentiation |
| CO4 | Checking for Maxima and Minima of single variable functions. |
| CO5 | Implementing Rolle's and Mean value theorem to expand functions. |

**Offered by:** Mathematics

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | Matrices: Introduction- Type of Matrices- Matrix Operations- Determination- Inverse of a Matrix-Solving Simultaneous linear Equations- Cramer's rule problem- Rank of a Matrix. | 1 | 4 |
| | **Instructional Hours** | | **15** |
| II | Characteristic root and Characteristic Vector of a Matrix - Cayley–Hamilton theorem - Diagonalizable Matrix – Orthogonal Matrices- Problems. | 1 | 4 |
| | **Instructional Hours** | | **15** |
| III | Limits and continuity – Differentiation - Single value variable. | 2 | 1,2 |
| | **Instructional Hours** | | **15** |
| IV | Successive differentiation- Leibnitz Formula (Statement only) -Maxima and Minima for functions of single variables-Problems | 2 | 3,5 |
| | **Instructional Hours** | | **15** |
| V | Rolle's Theorem- Mean value theorem- Generalized Mean value theorem-Taylor's Theorem- Maclaurin's series for functions of single variables- Problems | 2 | 6,7 |
| | **Instructional Hours** | | **15** |
| | **Total Hours** | | **75** |

**Text Book:**

1. P.Kandasamy and Thilagavathy , **Mathematics for B.Sc. Branch I – Vol. II**(For B.Sc-I semester), S.Chand and Company Ltd, New Delhi, 2004.

2.T.K. Manicavachagom Pillay, S.Narayanan,**Calculus Volume-I**, S.Viswanathan

(Printers and publishers) Pvt. Ltd. Reprint (2005)

**Reference Books:**

1. P. Kandasamy, K.Thilagavathy, K.Gunavathi, Engineering Mathematics, Volume I, S.Chand Company, 2006.
2.Shanthi Narayanan & J.N.Kapoor , **A Text book of Calculus**-, S. Chand & Co.

3. G. Balaji, Engineering Mathematics – I , G. Balaji Publishers Pvt. Ltd, 3rd Edition , 2015.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Seminar | Class Participation | Periodical Quizzes | 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 | L | M | M | M | M | M | H | H | H | M | M |
| CO2 | H | M | L | M | M | M | M | M | H | H | H | M | M |
| CO3 | M | M | L | M | H | M | M | M | H | H | H | H | H |
| CO4 | H | H | L | H | H | M | M | H | H | H | H | H | H |
| CO5 | M | M | L | M | M | M | M | M | H | H | H | H | H |

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U4DTS301 | Skill Based Paper I:<br>Practical in Web Programming using PHP and MySQL | | |
| Semester: III | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**Course Objective:**

To make the students to improve the skill set in developing Web sites using the open-source software PHP and MySQL.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | To Understand how to code a PHP application and other programming concepts. |
| **CO2** | To Understand how to work with arrays and string functions. |
| **CO3** | To Create applications using forms, files, sessions and cookies. |
| **CO4** | To Design and Implement database applications. |
| **CO5** | To Create dynamic web Pages. |

**Offered by: Data Science**

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

| S. No. | List of Practical |
|---|---|
| 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 subqueries, 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. |
| | **Total Hours 60** |

**Tools for Assessment (30 Marks)**

| Web page Development | Debugging | Mini Project | Test I | Test II | Observation | Total |
|---|---|---|---|---|---|---|
| 5 | 5 | 5 | 6 | 6 | 3 | 30 |

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM3BT1 | Part IV – BASIC TAMIL - I | |
| Semester: III | Credits: 2 | CIA : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective:** தமிழ் மொழியைக் கற்பித்தல் - மொழித்திறனை வளர்த்தல்

**Course Outcomes:**

| | |
|---|---|
| CO1 | தமிழ் எழுத்துக்கள் அறிமுகம் செய்தல் மற்றும் வாசித்தல் ஆகியவற்றின் பயன்பாட்டை அறியச் செய்தல். |
| CO2 | பிறமொழி கற்றல் ஆர்வம் தூண்டல். |
| CO3 | பிறமொழி அறிவுத் திறன் மேம்படச் செய்தல். |
| CO4 | வார்த்தை அமைக்கும் திறன் பெறச் செய்தல். |
| CO5 | கையெழுத்துத்திறன் பெறச் செய்தல். |

**Offered by : தமிழ்த்துறை**

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

| Unit | Description |
|---|---|
| I | **தமிழ் மொழியின் அடிப்படைக் கூறுகள்** |
| | 1. எழுத்துக்கள் - உயிர் எழுத்துக்கள்<br>2. மெய் எழுத்துக்கள்<br>3. உயிர்மெய் எழுத்துக்கள் |
| | **Instructional Hours 10** |
| II | **சொல் அமைத்தல்** |
| | 1. ஓர் எழுத்து ஒரு மொழி<br>2. இரண்டு முதல் ஐந்து எழுத்துச் சொற்கள்<br>3. தமிழ் மாதங்கள் பெயர், கிழமைகளின் பெயர்<br>4. வண்ணங்கள் பெயர்<br>5. சொல் அக்கம் |
| | **Instructional Hours 5** |
| III | **தொடரமைப்பு** |
| | 1. எழுவாய்<br>2. செயப்படுபொருள்<br>3. பயனிலை |
| | **Instructional Hours 5** |
| IV | **குறிப்பு எழுதுதல்** |
| | 1. தொடரமைப்பு<br>2. பத்தி அமைப்பு |
| | **Instructional Hours 5** |
| V | **பிழை நீக்குதல்** |
| | 1. ஒற்றுப்பிழை<br>2. வாக்கியப் பிழை |
| | **Instructional Hours 5** |
| | **Total Hours 30** |

**பாடத்தொகுப்பு :**

இளங்கலை தமிழ் மாணவர்களுக்குரிய பாட நூல் **"அரிச்சுவடி"**
தொகுப்பு: தமிழ்த்துறை, நேரு கலை அறிவியல் கல்லூரி, கோயம்புத்தூர்.

**பார்வை நூல்கள்:**

1. பவணந்தி முனிவர், நன்னூல் பூலியூர்க்கேசிகன் உரை,சாரதா பதிப்பகம், சென்னை - 40.
2. தொல்காப்பியம், கணேசஐயர் பதிப்பு, உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 113.
3. அ.கி.பரந்தாமனார் - நல்லதமிழ் எழுதவேண்டுமா? அல்லி நிலையம், சென்னை - 007.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Writing Skills | Reading Skills | Translation Knowledge | 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 | M | H | H | - | - | - | - | L |
| CO2 | - | - | H | - | M | M | L | H | - | - | - | - | L |
| CO3 | - | - | H | - | L | M | M | H | - | - | - | - | L |
| CO4 | - | - | M | - | L | M | H | M | - | - | - | - | L |
| CO5 | - | - | H | - | M | M | H | H | - | - | - | - | L |

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

| Course Designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM3AT1 | Part IV – Advanced Tamil - I | |
| Semester : III | Credits : 2 | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective** : புதுக்கவிதை உருவாக்கும் திறன் வளர்த்தல்- மொழித்திறன் மேம்படுத்தல்

**Course Outcomes** :

| | |
|---|---|
| CO1 | புதுக்கவிதை உருவாக்கும் திறன் வளர்த்தல் |
| CO2 | தொடர் மற்றும் பத்திகளில் பிழையின்றி எழுதச் செய்தல் |
| CO3 | மொழியைப் பிழையின்றிப் பேச, எழுதும் திறன்பெறச் செய்தல் |
| CO4 | கடிதம் எழுதுதல் மற்றும் மொழியறிவைப் பெறுதல். |
| CO5 | படைப்பாக்கத்திறன் அறிவுபெறச் செய்தல். |

**Offered by : தமிழ்த்துறை**

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

| Unit | Description | |
|---|---|---|
| I | **புதுக்கவிதை**<br>1. பாரதியார்–புதுமைப்பெண்<br>2. பாரதிதாசன் - இருண்டவீடு | |
| | **Instructional Hours** | **10** |
| II | **பிழை நீக்குதல்**<br>1. வார்த்தைப் பிழை நீக்கம்<br>2. தொடர் பிழை நீக்கம்<br>3. பத்தி எழுதச் செய்தல் | |
| | **Instructional Hours** | **5** |
| III | **இலக்கணப் பயிற்சி அளித்தல்**<br>1. தொகைநிலைத் தொடர்<br>2. தொகாநிலைத் தொடர்<br>3. ஆகுபெயர், ஆகுபெயர் வகைகள் | |
| | **Instructional Hours** | **5** |
| IV | **கடிதம் எழுதுதல்**<br>1. பாராட்டுக் கடிதம்<br>2. நன்றிக் கடிதம்<br>3. அழைப்புக் கடிதம்<br>4. அலுவலகக் கடிதம் | |
| | **Instructional Hours** | **5** |
| V | **இலக்கிய வரலாறு**<br>1. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்<br>2. பாரதியார்- குறிப்பு வரைக.<br>3. பாரதிதாசன் - குறிப்பு வரைக. | |
| | **Instructional Hours** | **5** |
| | **Total Hours** | **30** |

**பாடத்தொகுப்பு**

இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல் **"திரட்டு"**
தொகுப்பு: தமிழ்த்துறை, நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர் - 105

**பார்வை நூல்கள்**


1. பாரதியார் - பாரதியார் கவிதைகள், அபிராமிபதிப்பகம்,7- பி,கொடிமரத் தெரு, சென்னை - 013
2. பவணந்திமுனிவர் - நன்னூல் பூலியூர்க்கேசிகன் உரை, சாரதா பதிப்பகம், சென்ஐ - 040
3. தமிழண்ணல் - புதியநோக்கில் தமிழ் இலக்கிய வரலாறு,மீனாட்சி புத்தக நிலையம், மதுரை - 001.
4. அ.கி. பரந்தாமனார்-நல்லதமிழ் எழுத வேண்டுமா? அல்லிநிலையம், சென்னை - 600 007.

5. கா..கோ.வேங்கடராமன்- தமிழ் இலக்கிய வரலாறு தமிழ்மண் பதிப்பகம் - நாமக்கல்.
6. மாணவர் தமிழ் இலக்கணம் - புலவர்.கவியழகன், எம்.ஏ.,சூடாமணி பிரசுரம், சென்னை - 083.

## Mapping

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

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

| Course Designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM3CAF | Non Major Elective : Consumer Affairs | |
| Semester : III | Credits : 2 | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Outcomes:**

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

| | |
|---|---|
| **CO1** | Know their rights and responsibilities as a consumer |
| **CO2** | Gain knowledge about Legal framework of protecting consumer rights |
| **CO3** | Understand the procedure about redressal of consumer complaints |
| **CO4** | Learn about Consumer related regulatory agencies and norms |
| **CO5** | Comprehend business firms, interface with consumers |

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

| Unit | Description | Text Book |
|---|---|---|
| I | **Conceptual Framework**<br>**Consumer and Markets:** Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. | 1 |
| | Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process | 1 |
| | **InstructionalHours** | **6** |
| II | **The Consumer Protection Law in India**<br>**Objectives and Basic Concepts:**<br>Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, deficiency in service, unfair trade practice. | 1 |
| | **InstructionalHours** | **6** |
| III | **Grievance Redressal Mechanism under the Indian Consumer Protection Law**<br>Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Offences and penalties. | 1 |
| | **InstructionalHours** | **6** |
| IV | **Role of Industry Regulators in Consumer Protection –** industry self-regulation (ISR), Protection policies, Consumer Protection Agencies<br>i. Telecommunication: TRAI<br>ii. Food Products: FSSAI<br>iii. Insurance : IRDA and Insurance Ombudsman | 1 |
| | **Instructional Hours** | **6** |

| | | |
|---|---|---|
| V | **Contemporary Issues in Consumer Affairs**<br>**Consumer Movement in India:** Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing. | 1 |
| | **Quality and Standardization:** Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance. | 1 |
| | **Instructional Hours** | **6** |
| | **Total Hours** | **30** |

**Text book**

1. "Consumer Affairs", Compiled by Department of Business Administration, Nehru Arts and Science College.

**Suggested Readings**


1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone,Penguin Books.


**Mapping**

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

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM3GTS | Non Major Elective : Gandhian Thoughts | |
| Semester : III | Credits : 2 | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective:**

To make the Students understand the philosophies of Gandhiji and fulfill their duties and responsibilities towards the society.

**Course Outcomes:**

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

| | |
|---|---|
| **CO1** | Aware about the significance of Gandhian thought |
| **CO2** | Understand the applicability of Gandhian methods in the contemporary economic and social demines. |
| **CO3** | Analyze the area of truth, non-violence and peace. |
| **CO4** | Familiarize with the view of Gandhiji on women |
| **CO5** | Delineate the framework of democracy in Gandhian perspective |

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

| Unit | Description | Text Book |
|---|---|---|
| **I** | **Educational Philosophy of Gandhiji:** Definitions on Education - What is True Education? - Gandhiji's New Scheme of Education - Wardha Scheme of Education - Main Aims of Gandhian Education - Why Gandhiji's Scheme of Education was Called 'Basic Education?' - Features of the Wardha Scheme of Education - Features of Basic Education - The Methodology of Basic Education - The Content of Basic Education - Routine Work of a Basic School | **1** |
| | **Instructional Hours** | **6** |
| **II** | **Gandhian Concept of Correlation of Studies -** Technique of Correlation - The Place of Teacher in Basic Education - Merits of Basic Education - Educational Scenario after Independence - Influences of Gandhiji on Education Commissions - Basic Schools in the Present Society - Education for Peace – A Gandhian View - Why Basic Education is called a Holistic Model | **1** |
| | **Instructional Hours** | **6** |
| **III** | **Gandhiji's View on Truth and Non-Violence :** Gandhiji's Words about Truth - Meaning of Truth, Truth is God - Truth and God - The Importance of Truth in Human Life - Absolute and Relative Truth - Realisation of the Self - Liberation. | **1** |
| | **Instructional Hours** | **6** |
| **IV** | **Mahatma Gandhi's Views on Women :** Status of Women in Pre Independence India - Gandhi's Perception of Women - Role of Women in Family – Perception of Gandhi - Value of Equality - Women in Politics - Gandhiji's Vision to Abolish Social Evils against Women - Role of Women as Envisaged by Gandhi. | **1** |
| | **Instructional Hours** | **6** |

| | | |
|---|---|---|
| V | **Gandhiji's View on Democracy :** Problem of Majority and Minority – Democracy, Gandhian strategies for democratic decentralization, **Gram Swaraj:** City and Village - Gram Swaraj - Critique of Industrialisation - Critique of Machinery, Participatory Democracy Swarajyam Grama Rajya and Ramarajya. | **1** |
| | **Instructional Hours** | **6** |
| | **Total Hours** | **30** |

**Text Book(s):**

1. "Gandhian Thoughts", Compiled by Nehru Arts and Science College.

**Mapping**

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

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM3WRT | Non Major Elective : Women's Rights | |
| Semester : III | Credits : 2 | ESE : 50Marks |

**(Common to all UG Programmes)**

**Course Objective:**

To facilitate the awareness about the social, economical, political, intellectual or cultural contributions of Women in India.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Aware of basic constitutional rights |
| **CO2** | Gain awareness on Political rights |
| **CO3** | Understand individual and familial rights |
| **CO4** | Grasp the provisions for Women's Rights in India |
| **CO5** | Develop an understanding of the Protection Mechanisms for women |

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

| Unit | Description | Text book | Chapter |
|---|---|---|---|
| I | **Constitutional Rights of Women in India**: Indian constitution relating to women - Fundamental rights - Directive principles of state policy - right to equality - rights against exploitation - cultural and educational rights - the right to constitutional remedy - University Declaration of Human Rights - Enforcement of Human Rights for Women and Children - Role of Cells and Counseling Centers - Legal AID cells, Help line, State and National level Commission | 4 | 2 |
| | **Instructional Hours** | | **6** |
| II | **Political Rights of Women in India:** Political Rights of Women in India - Electoral process - women as voters - candidates and leader - pressure group, 73rd and 74th amendment and representation of women in local self-government – women in Rural and urban local bodies - Reservation of women - party ideologies and women's issues. | 5 | 1 |
| | **Instructional Hours** | | **6** |
| III | **Women's Rights: Access to Justice** Introduction–Criminal Law–Crime Against Women Domestic Violence – Dowry Related Harassment and Dowry Deaths - Molestation – Sexual Abuse and Rape Loopholes in Practice– Law Enforcement Agency | 3 | **7** |
| | **Instructional Hours** | | **6** |
| IV | **Women's Rights** Violence Against Women – Domestic Violence The Protection of Women from Domestic Violence Act, 2005, The Marriage Validation Act, 1982 - The Hindu Widow Re-marriage Act, 1856- The Dowry ProhibitionAct,1961 | 3 | 5 |
| | **Instructional Hours** | | **6** |

| | | | |
|---|---|---|---|
| **V** | **Special Women Welfare Laws**<br>Sexual Harassment at Work Places, Rape and Indecent Representation, The Indecent Representation (Prohibition) Act, 1986, Immoral Trafficking, The Immoral Traffic (Prevention) Act, 1956 - Acts Enacted for Women Development and Empowerment, Role of Rape Crisis Centers. Protection of Children from sexual Offences Act 2012 | 3 | 9 |
| | **Instructional Hours** | | **6** |
| | **Total Instructional Hours** | | **30** |

**Text Books:**

1. Nitya Rao **Good Women do not Inherit Land** Social Science Press and OrientBlackswan2008
2. International Solidarity Network **Knowing Our Rights** An imprint of KaliforWomen2006
3. P. D. Kaushik **"Women Rights"** Book well Publication 2007 UN Centre for Human Rights, Discrimination against Women (Geneva: World Campaign for Human Rights,1994).
4. Agnes, Flavia. (1992). "Give us "Give us This Day Our Daily Bread: Procedures and Case Law on Maintenance". Majlis, Bombay.
5. Agnes, Flavia. (1999). "Law and Gender Inequality: The Politics of Women"s Rights in India". OUP, New Delhi

**Reference Books:**

1. Aruna Goal **Violence Protective Measures for Women Development and Empowerment,** Deep and Deep Publications Pvt.2004
2. Monica Chawla **Gender Justice**, Deep and Deep Publications Pvt. Ltd. 2006
3. Preeti Mishra **Domestic Violence Against Women,** Deep and Deep Publications Pvt.2007
4. Clair M.Renzetti, JeffreyL. Edleson, Raquel Kennedy Bergen, Source Book on **Violence Against Women** Sage Publications 2001

**Mapping**

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

H-High; M-Medium; L-Low

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC406 | Core Paper X: Data Mining | | |
| Semester: IV | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:**

To enable the students to explore data using data mining techniques to solve the business problems.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Know basic concept of Data Mining and its Association Rules |
| **CO2** | Understand the different types of Clustering |
| **CO3** | Apply the learnt method in splitting the data and creating Decision Tree |
| **CO4** | Analyse various type of Mining like Web Mining and Text Mining |
| **CO5** | Assess knowledge of What, When and Where the data applied |

**Course Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction and Association Rules :** Introduction- What is Data Mining – Data Mining Definition – KDD Vs Data Mining – DBMS Vs Data Mining – Data Mining Techniques – Data Mining Application Areas. **Association Rules**- What is Association Rules - Methods to Discover Association rules – A Priori Algorithm – Partition Algorithm – Pincer Search Algorithm. | 1 | 3, 4 |
| **Instructional Hours** | | | **18** |
| II | **Clustering Techniques:** Introduction - Clustering Paradigms – Partitioning Paradigm – m k Medoid Algorithm – CLARA – CLARANS – Hierarchical Clustering – DBSCAN – BIRCH – CURE. | 1 | 5 |
| **Instructional Hours** | | | **18** |
| III | Decision Tree – What is Decision Tree – Tree Construction Principle – Best Split – Splitting Criteria – Decision Tree Construction – CART – ID3 – CHAID – Decision Tree Construction with Pre-sorting. | 1 | 6 |
| **Instructional Hours** | | | **18** |
| IV | Web Mining – Web Content Mining – Web Structure Mining – Web Usage Mining. **Text Mining** – Unstructured Text - Episode Rule Discovery for Texts – Hierarchy of Categories – Text Clustering. | 1 | 8 |
| **Instructional Hours** | | | **18** |
| V | **Temporal and Spatial Data Mining**: What is Temporal Data Mining – Temporal Association Rule – Sequence Mining – GSP Algorithm. **Spatial Mining** – Spatial Mining Tasks – Spatial Clustering – Spatial Trends. | 1 | 9 |
| **Instructional Hours** | | | **18** |
| **Total Hours** | | | **90** |

**Text Book(s):**

1. Data Mining Techniques by Arun K Purari , Published by University Press India Private Limited.

**Reference Book(s):**

1. Insight into Data Mining Theory and Practice by Soman, Diwakar and Ajay, Published by Prentice Hall of India Private India

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Class Participation | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKC407 | Core Paper XI: R Programming | | |
| Semester: IV | Credits:4 | CIA: 50 Marks | ESE: 50 Marks |

**(Common to B. Sc. CS / DS)**

**Course Objective:**

To expose the student with the fundamental concepts of R Programming

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Recognize the basics of R Programming |
| **CO2** | Understand the concept of Matrices and Lists |
| **CO3** | Use of data frames and functions |
| **CO4** | Describe the file operations and graphs |
| **CO5** | Distinguish between Linear and Non Linear Models |

**Department offered: Computer Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introducing to R :** Introducing to R – R Data Structures – Help Functions in R – Vectors – Scalars – Declarations – Recycling – Common Vector Operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorized if-then else – Vector Element names. | I | 1-2 |
| | **Instructional Hours** | | **18** |
| II | **Matrices :** Creating matrices – Matrix Operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns - Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists | I | 3-4 |
| | **Instructional Hours** | | **18** |
| III | **Data Frames:** Creating Data Frames – Matrix-like operations in frames – merging Data frames – Applying functions to Data Frames – Factors and Tables – Factors and levels – Common Functions used with factors – Working with tables – Other factors and table related functions – Control statements – Arithmetic and Boolean operators and values – Default Values for arguments – Returning Boolean Values – Functions are objects – Environment and scope issues – Writing Upstairs – Recursion – Replacement functions – Tools for Composing function code – Math and Simulation in R. | I | 5-8 |
| | **Instructional Hours** | | **18** |
| IV | **Classes:** S3 Classes – S4 Classes – Managing your objects – Input/output – accessing keyboard and monitor – reading and writing files – accessing the internet – String Manipulation – Graphics Creating Graphs – Customizing Graphs – Saving Graphs to files – Creating Three-Dimensional plots. | I | 9-12 |
| | **Instructional Hours** | | **18** |

| | | | |
|---|---|---|---|
| V | **Interfacing :** R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear Models – Time Series and Auto-Correlation – Clustering. | II | 15-17<br>20-22 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book(s):**

1. Norman Matloff, ―The Art of R Programming: A Tour of Statistical Software Design‖, No Starch Press, 2011.
2. Jared P. Lander, ―R for Everyone: Advanced Analytics and Graphics‖, Addison-Wesley Data & Analytics Series, 2013.

UNIT I : Chapter 1-2
UNIT II : Chapter 3-4
UNIT III : Chapter 5-8
UNIT IV : Chapter 9-12
UNIT V : Chapter 15-17, 20-22

**Reference Book(s):**

1. Mark Gardner, Beginning R – The Statistical Programming Language‖, Wiley, 2013.
2. Robert Knell, Introductory R: A Beginner‘s Guide to Data Visualization, Statistical Analysis and programming in R, Amazon Digital South Asia Services Inc, 2013. Richard Cotton(2013). Learning R, O‘Reilly Media.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Class Participation | Assignment | Seminar | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTP407 | Core Paper XII: Practical in R Programming | | |
| Semester: IV | Credits: 4 | CIA:50 Marks | ESE:50 Marks |

**Course Objective:**

To enable the students to write queries and create reports from the database using R Programme

**Course Outcome:**

| | |
|---|---|
| **CO1** | Understand the basic R programming constructs |
| **CO2** | Have knowledge about data analysis and statistics solutions. |
| **CO3** | Impart the skills in programming using R in statistics and data analysis |
| **CO4** | Extract data from files and other sources and perform various data manipulation tasks on them. |
| **CO5** | To code Statistical functions in R and apply it in real time applications. |

**Offered by:** Data Science

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

| S. No | List of Programs |
|---|---|
| **1.** | Creating Vectors, Matrices, Factors and plotting graphs |
| **2.** | Write an R-Program to demonstrate working with operators (Arithmetic, Relational, Logical, Assignment operators). |
| **3.** | Create an R-Program<br>To Check if a Number is Odd or Even<br>To check if the given Number is a Prime Number |
| **4.** | Develop an R-Program<br>To find the Factors of a Number<br>To find L.C.M and HCF of two numbers |
| **5.** | Create an R program for performing string operations |
| **6.** | Using an R Program, make a Simple Calculator |
| **7.** | With the help of an R-Program using recursive function<br>Find the Factorial of a Number<br>Find Fibonacci sequence |
| **8.** | Convert decimal to binary and vice versa Using R Program |
| **9.** | Develop an R Program to create a Vector and to find sum, mean for the elements in a Vector |
| **10.** | Demonstrate matrix operations Using R (Addition, Subtraction, Multiplication, Division and Transpose). |
| **11.** | Write an R Program<br>a. To create a Data Frame. |
| **12.** | Write an R Program for analyzing dataset using various charts. |
| | **Total Hours: 90 Hrs** |

**Tools for Assessment (50)**

| Laboratory Performance | | | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| Application of Logics | Program Creativity | Code Debugging | | | | |
| 8 | 8 | 8 | 10 | 10 | 6 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3MKA404 | Allied Paper IV: Probability Distributions and Inferential Statistics | | |
| Semester: IV | Credit: 4 | CIA:50Marks | ESE:50 Marks |

**Course Objective:**

To enable the students to learn and visualize the nature of the probability distributions and the concept of estimation and their properties.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Memorizing the concepts of Binomial and Poisson distributions |
| **CO2** | Discussing the moment generating functions of Normal distribution |
| **CO3** | Classifying the theory of Statistical Inference |
| **CO4** | Explaining the parameters of Point estimation |
| **CO5** | Experimenting the test for statistical hypothesis. |

**Offered by:** Mathematics

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | Binomial , Poisson and Negative – Binomial distributions - Moments , m.g.f cumulants , additive property , recurrence relation for the probabilities – simple problems | 1 | 2 |
| | **Instructional Hours** | | **18** |
| II | Normal distribution – limiting form of Binomial distribution, properties, median, mode, moments, m.g.f. cumulants, mean deviation, area property, simple problems. | 1 | 10 |
| | Rectangular distribution – moments, m.g.f, characteristic function, mean deviation – bivariate normal distribution. | 1 | 8 |
| | **Instructional Hours** | | **18** |
| III | Concept of Statistical Inference – Parametric estimation – Sampling distribution – Standard Error . Deviation of Standard Error of mean , variance , proportion, difference between mean variances and Proportions – concept of ordered statistics. | 1 | 3 |
| | **Instructional Hours** | | **18** |
| IV | Point Estimation : Estimator , properties of point estimator – unbiasedness, consistency | 1 | 17 |
| | Crammer Rao inequality – efficiency – asymptotic efficiency and sufficiency of the estimator – Rao Blackwell theorem | 1 | 6 |
| | **Instructional Hours** | | **18** |

| | | | |
|---|---|---|---|
| V | Statistical Hypothesis: Test of a statistical hypothesis- Power of the test. Likelihood Ratio test: Test for the mean and variance of a normal distribution- Test for the equality of means and variances of two normal populations. | 1 | 18 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book:**

1. S.C.Guptha and V.K. Kapoor , **Fundamentals of Mathematical Statistics**, S.Chand and Sons, Reprint, 2009.
   Unit V : sections – 18.2, 18.6.2,18.6.3,18.6.5,18.6.6

**Reference Book:**

1. P.R.Vittal , **Mathematical statistics**, Margham Publications, Chennai .

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Seminar | Class Participation | Periodical Quizzes | 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 | L | H | H | M | M | M | H | H | H | M | M |
| CO2 | H | H | L | H | H | M | M | M | H | H | H | M | M |
| CO3 | H | H | L | H | H | H | M | H | H | H | H | H | H |
| CO4 | M | H | L | H | M | M | M | M | H | H | H | H | H |
| CO5 | H | H | L | H | H | H | M | H | H | H | H | H | H |

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U4DTS402 | Skill Based Paper II: Practical in Internet of Things | | |
| Semester: IV | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**Course Objective:**

On the successful completion of the course the students will able to design IoT applications

**Course Outcomes (CO)**

| | |
|---|---|
| **CO1** | Familiar with Arduino board working |
| **CO2** | Implement the design of digital meter |
| **CO3** | Interfacing with various sensors |
| **CO4** | Design with Tinkercad |
| **CO5** | Implementing IoT applications |

**Offered by: Data Science**

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

| S.No. | Experiments |
|---|---|
| | **Internet of Things Practical**<br>(Any 8 Experiments) |
| 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 |
| | **Total Hours: 60** |

**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**

| 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.**

| Prepared by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM4BT2 | Part IV – Basic Tamil - II | |
| Semester : IV | Credits : 2 | CIA : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective:** அற இலக்கியங்களை அறிமுகப்படுத்தல்

**Course Outcomes:**

| | |
|---|---|
| CO1 | நீதிநூல்களின் வழி போதனைகளை மாணவர்களுக்கு எடுத்துரைத்தல் |
| CO2 | திருக்குறளின் சிறப்புகளை எடுத்துரைத்தல் |
| CO3 | நீதிக்கதைகளைக் கூறுவதன் மூலம் மாணவர்களுக்கு நற்சிந்தனைகளை வளர்த்தல் |
| CO4 | கிராமியக் கதைகளைக் கூறுவதன் மூலம் மாணவர்களுக்கு நல்அறிவை வளர்த்தல் |
| CO5 | தமிழ் ஆங்கில மொழிப் பயிற்சியின் மூலம் இருமொழித்திறனை வளர்த்தல் |

**Offered by : தமிழ்த்துறை**

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

| Unit | Description |
|---|---|
| I | **நீதி நூல்கள்**<br>1. பாரதியார் - ஆத்திச்சூடி – முதல் 12 வரிகள்<br>2. கொன்றைவேந்தன் முதல் 7 வரிகள் |
| | **Instructional Hours 10** |
| II | **திருக்குறள்**<br>கடவுள் வாழ்த்து - அகரமுதல எனத் தொடங்கும் - அதி. - 1 குறள் - 1<br>வான் சிறப்பு - நீரின்றி அமையாது உலகு - அதி. - 2 குறள் - 10<br>அன்புடைமை - அன்பின் வழியது உயிர்நிலை - அதி. - 8 குறள் - 10<br>கல்வி - கண்ணுடையார் என்பர் - அதி. - 40 குறள் - 3<br>இனியவை கூறல் - இனிய உளவாக இன்னாத - அதி. - 10 குறள் - 10 |
| | **Instructional Hours 5** |
| III | **நீதிக்கதைகள்**<br>முல்லாவின் வேடிக்கைக் கதைகள், பீர்பால் கதைகள் |
| | **Instructional Hours 5** |
| IV | **கிராமியக் கதைகள்**<br>1. பரமார்த்தகுரு கதைகள்<br>2. நாட்டுப்புறக் கதைகள் அறிமுகம் |
| | **Instructional Hours 5** |
| V | **மொழிப் பயிற்சி**<br>1. பிறமொழிச்சொற்களுக்கு தமிழ்ச்சொல் எழுதுதல்<br>2. தன்விவரம் எழுதுதல்<br>3. எங்கள் கல்லூரி |
| | **Instructional Hours 5** |
| | **Total Hours 30** |

**பாடத்தொகுப்பு :**

இளங்கலை தமிழ் மாணவர்களுக்குரிய பாட நூல் **"அரிச்சுவடி"**

**தொகுப்பு**: தமிழ்த்துறை, நேரு கலை அறிவியல் கல்லூரி, கோயம்புத்தூர்.

**பார்வை நூல்கள் :**


1. ஔவையார் ஆத்திச்சூடி மணிவாசகர் பதிப்பகம்,கோயம்புத்தூர் இராஜவீதி - 01.
2. திருக்குறள் - பரிமேலழகர் உரை,மணிவாசகர் பதிப்பகம்,சென்னை -600 018.
3. முல்லாவின் வேடிக்கைக் கதைகள் - முல்லை பி.எல்.முத்தையா சென்னை - 007.
4. நாட்டுப்புறவியல் ஓர் ஆய்வு - சு.சக்திவேல் பாரி நிலையம்,சென்னை - 01


**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Writing Skills | Reading Skills | Translation Knowledge | 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 | M | H | H | - | - | - | - | L |
| **CO2** | - | - | H | - | H | H | M | H | - | - | - | - | L |
| **CO3** | - | - | M | - | M | H | M | H | - | - | - | - | L |
| **CO4** | - | - | M | - | L | M | H | M | - | - | - | - | L |
| **CO5** | - | - | H | - | H | M | H | H | - | - | - | - | L |

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

| Course Designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM4AT2 | Part IV – Advanced Tamil - II | |
| Semester : IV | Credits : 2 | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective :** தமிழ் நூல்களின் வழி அறச் சிந்தனைகளை உருவாக்குதல் செம்மொழியினைச் செம்மைப்படுத்துதல்.

**Course Outcomes :**

| | |
|---|---|
| CO1 | அறச் சிந்தனைகளை மாணவர்களுக்கு ஏற்படுத்துதல் |
| CO2 | தமிழ் சிறுகதைகளின் மூலம் நல்ல சிந்தனைகளை உருவாக்குதல் |
| CO3 | மொழியைப் பிழையின்றிப் பேச, எழுதும் திறன் பெறச்செய்தல் |
| CO4 | இலக்கண அறிவை வளர்ப்பதன் மூலம் மரபுப் பிழையின்றி பேசவும், எழுதும் திறனை வளர்த்தல் |
| CO5 | படைப்பாக்கத்திறன் அறிவுபெறச் செய்தல். |

**Offered by :** தமிழ்த்துறை

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

| Unit | Description | |
|---|---|---|
| I | **பதினெண் கீழ்க்கணக்கு நூல் - திருக்குறள்**<br>1. வாய்மை<br>2. கூடாநட்பு<br>3. செய்நன்றியறிதல் | |
| | **Instructional Hours** | **10** |
| II | **சிறுகதை**<br>வெ.இறையன்பு - பூனாத்தி சிறுகதைகள்<br>1. விடுகதை<br>2. நண்பர்கள் | |
| | **Instructional Hours** | **5** |
| III | **எழுத்துப் பிழை நீக்க வழிகள்**<br>1. சொற்களைச் சரியாகப் பயன்படுத்தும் முறை<br>2. வினைச் சொற்கள், பெயர்ச்சொற்கள் | |
| | **Instructional Hours** | **5** |
| IV | **வழக்கறிதல்**<br>1. மரபு வழக்கு<br>2. இயல்பு வழக்கு<br>3. தகுதி வழக்கு அறிதல் | |
| | **Instructional Hours** | **5** |
| V | **படைப்பாற்றல் பயிற்சி**<br>குவிதை – சிறுகதை - நூல் மதிப்பீடு எழுதுதல் | |
| | **Instructional Hours** | **5** |
| | **Total Hours** | **30** |

**பாடத்தொகுப்பு**

இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல் **"திரட்டு"**
தொகுப்பு: தமிழ்த்துறை, நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர் - 105

**பார்வை நூல்கள்**

1. திருக்குறள் - பரிமேலழகர் உரை, மணிவாசகர் பதிப்பகம், சென்னை - 018
2. தமிழண்ணல் - புதியநோக்கில் தமிழ் இலக்கிய வரலாறு மீனாட்சி புத்தக நிலையம், மதுரை - 001.
3. அ.கி. பரந்தாமனார்– நல்லதமிழ் எழுதவேண்டுமா? அல்லிநிலையம், சென்னை -600 007.

4. பவணந்திமுனிவர், நன்னூல் பூலியூர்க்கேசிகன் உரை, சாரதா பதிப்பகம், சென்னை -040
5. வெ.இறையன்பு - பூனாத்தி, கவிதா பதிப்பகம், சென்னை.

## Mapping

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

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

| Course Designed by | Verified by | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4NM4GEN | Non Major Elective : General Awareness | |
| Semester : IV | Credits : 2 | ESE : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective:**

Enable the students to learn General knowledge and prepare for different competitive exams.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Determine Verbal Aptitude , Numerical Aptitude and Logical Reasoning |
| **CO2** | Recall basic Science, history , Tamil , Computer , Commerce concepts which would help to crack competitive Examinations |
| **CO3** | Acquire time Management skills to attempt competitive Examinations |
| **CO4** | Develop Aptitude and problem solving skills |
| **CO5** | Gain Knowledge about Current Affairs |

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

| S. No. | Topics |
|---|---|
| 1. | Verbal Aptitude |
| 2. | Numerical Aptitudeand Logical Reasoning |
| 3. | Abstract Reasoning |
| 4. | Tamil and Other Literature |
| 5. | General Science and Technology |
| 6. | Computer |
| 7. | Economics and Commerce |
| 8. | History and Freedom Struggle |
| 9. | Sports |
| 10. | Current Affairs |
| | **Total Hours : 30** |

**Text Book:** "General Awareness", compiled by Nehru Arts and Science College, Coimbatore

## Mapping

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

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U4HVY402 | Value Education : Human Values and Yoga Practice II | |
| Semesters : III & IV | Credits : 2 | CIA : 50 Marks |

**(Common to all UG Programmes)**

**Course Objective:**

To help the students appreciate the essential complementarily 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 understand the values of Self realization and Harmony |
| **CO2** | To transform as a positive personality and understand the importance of healthy mind |
| **CO3** | To know the ways for eradication of worries. |
| **CO4** | To learn and practice Asanas in day to day life. |
| **CO5** | To understand the benefits of Yogasanas for physical and mental well being. |

**Course Content** **Instructional Hours/Week : 1**

| Unit | Description | Chapter |
|---|---|---|
| **I** | **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-Citizens Charter-Emotional Intelligence. | |
| | **Instructional Hours** | **6** |
| **II** | **Character Formation Towards Positive Personality**: Truthfulness, Constructivity, Sacrifice, Sincerity, Self Control, Altruism, Tolerance, | |
| | **Instructional Hours** | **6** |
| **III** | **Eradication of worries** - Maintaining youthfulness – Greatness of friendship– Refinement of worries-Neutralization of anger-Intelligent quotient(IQ),Emotional quotient(EQ),Spiritual Quotient (SQ) | |
| | **Instructional Hours** | **6** |
| **IV** | **Standing Posture**: Tadasana, Padahastasana, Virabhadrasana; Sitting posture: Ustrasana, Ardha Matsyendrasana, Paschimottanasana. | |
| | **Instructional Hours** | **6** |
| **V** | **Supine posture**: Sarvangasana, Halasana, Chakrasana. **Prone posture**: Bhujangasana, shalabhasana; Dhanurasana; **Balancing postures**: Vrikshasana, Natarajasana, Utkatasana; Pranayama: Bhastrika, Bhramari, NadiShodhan. | |
| | **Instructional Hours** | **6** |
| | **Total Hours** | **30** |

**Textbook:**

1. **"Value Education II ",** 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 | - | - | - | - | L |
| **CO2** | - | - | - | L | M | H | M | H | - | - | - | - | L |
| **CO3** | - | - | - | L | M | H | H | H | - | - | - | - | L |
| **CO4** | - | - | - | L | L | H | M | H | - | - | - | - | L |
| **CO5** | - | - | - | L | L | H | M | H | - | - | - | - | L |

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

| Course Designed by | Verified by HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC508 | Core XIII: Machine Learning | | |
| Semester: V | Credits: 4 | CIA: 50 Marks | ESE:50 Marks |

**Course Objective:**

This course presents the foundations of learning, linear models, clustering, tree and rule-based model and reinforcement learning. It enables the student to learn techniques in machine learning.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | To understand the basic concept of Machine Learning Techniques |
| **CO2** | To analyze the standards in Machine Learning Techniques |
| **CO3** | To study the functions of various algorithm used in Machine Learning Techniques |
| **CO4** | To familiarize with the different technique in Machine Learning Techniques |
| **CO5** | To analyze the applications of Machine Learning Techniques |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| **I** | **Introduction :** What is Machine Learning-Examples of ML Application-Vapnik-Chervonenkis Dimension-Learning Multiple Classes-Dimension of a Supervised Machine Learning Algorithm-Bayesian Decision Theory Introduction-Classification-Losses and Risk-Association Rule-Maximum Likelihood Estimation. | 1 | 1, 2, 3, 4 |
| | | **Instructional Hours** | **18** |
| **II** | **Multivariate Method-** Multivariate Data-Parameter Estimation-Multivariate Normal Distribution-Multivariate Classification-Singular Value Decomposition and Matrix Factorization-Multidimensional Scaling-Linear Discriminant Analysis-Canonical Correlation Analysis **Clustering-** Mixture Density- k-Means Clustering-Expectation-Maximization Algorithm-Supervised Learning after Clustering-Spectral Clustering-Hierarchical Clustering | 1 | 5, 6, 7 |
| | | **Instructional Hours** | **18** |
| **III** | **Decision Tree-** Introduction-Univariate Tree-Pruning-Rule Extraction from Trees-Learning Rules from Data-Multivariate Trees-**Linear Discrimination Introduction-** Generalizing the Linear Model-Geometry of the Linear Discriminant-Pairwise Separation-Parametric Discrimination Revisited-Gradient Descent-Logistic Discrimination-Discrimination by Regression-Multilayer Perceptrons-Backpropagation Algorithm-Training Procedure | 1 | 9, 10, 11 |
| | | **Instructional Hours** | **18** |
| **IV** | **Kernel Machines-** Optimal Separating Hyperplane- v-SVM-Kernel Trick-Vectorial Kernels-Multiple Kernel Learning-Multiclass Kernel Machines-Kernel Machine for Regression-One Class Kernel Machines. Discrete Markov Process-Hidden Markov Models-Finding the state sequence-Learning Model Parameters-The HMM as a Graphical Model. | 1 | 13, 15 |
| | | **Instructional Hours** | **18** |

| | | | |
|---|---|---|---|
| V | **Reinforcement Learning-** Introduction –Single state case-Element of Reinforcement Learning-Model Based Learning-Temporal Difference Learning-Generalization-Partially Observable State. **Design and Analysis of Machine Learning Experiment-** Factors, Response and Strategy of Experiment-Response Surface Design-Randomization, Replication and Blocking-Guidelines of Machine Learning Experiment-Cross Validation and Resampling methods-Measuring Classifier Performance-Interval Estimation-Hypothesis Testing-Assessing a Classification Algorithm's Performance | 1 | 18, 19 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book:**

Introduction To Machine Learning by Ethem Alpaydin 3rd Edition

Unit I: Section 1.1, 1.2, 2.2, 2.5, 2.8, 3.1, 3.2, 3.3, 3.5, 4.2

Unit II: Section 5.1, 5.2, 5.4, 5.5, 6.6, 6.7, 6.8, 6.9, 7.1, 7.2, 7.3, 7.4, 7.6, 7.7, 7.8

Unit III: Section 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 11.5, 11.7, 11.8

Unit IV: Section 13.2, 13.4, 13.5, 13.6, 13.8, 13.9, 13.10, 13.12, 15.2, 15.3, 15.6, 15.7, 15.8

Unit V: Section 18.1, 18.2, 18.3, 18.4, 18.5, 18.6, 18.7, 19.2, 19.3, 19.4, 19.5, 19.6, 19.7, 19.8, 19.9, 19.10.

**Reference Books:**

Introduction to Machine Learning by Alex Smola and S.V.N. Vishwanathan published by the press Syndicate of the University of Cambridge

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC509 | Core Paper XIV: Introduction to Artificial Intelligence | | |
| Semester: V | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**Course Objective:**

To enable the students to understand the Artificial Intelligence as a Problem-Solving technique.

**Course Outcomes:**

| | |
|---|---|
| CO1 | Knowledge about overview of Artificial Intelligence |
| CO2 | Gain Knowledge about Problem Solving methods |
| CO3 | Acquire Knowledge representation and its working principle |
| CO4 | Analyze use of reasoning methods by constructing plans |
| CO5 | Implement the methods of Knowledge Generation using Learning |

**Offered by: Computer Applications**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction:** What is AI?- The foundation of AI- AI Problems. Intelligent Agent: Introduction-How Agent should act-Structure of Intelligent Agent | 1<br>2 | 1,2<br>1 |
| | **Instructional Hours** | | **15** |
| 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** | | **15** |
| 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** | | **15** |
| IV | **Planning:** A simple planning agent – From Problem solving to Planning – Basic Representation of Planning – A partial Order Planning Algorithm- Example**.** | 1 | 11 |
| | **Instructional Hours** | | **15** |
| V | **Learning:** A General model of Learning Agent – Inductive Learning – Learning from Decision Trees. | 1 | 18 |
| | **Instructional Hours** | | **15** |
| | **Total Hours** | | **75** |

**Text Book(s):**

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.

**Reference Book(s):**

1. Deepak Khemani, "A First course in Artificial Intelligence", McGraw Hill Education Pvt Ltd, 2013.

**Tools for Assessment (30 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC510 | Core Paper XV: Data Visualization | | |
| Semester: V | Credits:2 | CIA: 25 | ESE: 25 Marks |

**Course Objective:**

To understand the significance of data, analyzing and reasoning about data through visualizations makes complex data more accessible, understandable and usable.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Understanding Data visualization and its relationships |
| **CO2** | Exploring various data visualization techniques |
| **CO3** | Understanding the basics of D3 |
| **CO4** | Creating effective visualizations |
| **CO5** | Generating web-based visualizations using D3 |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Data Visualization:** Introduction – Need of coding and interaction on the Web - Using Sample Code to introduce D3 - Dos and Don'ts of D3 - Origins and Context- Alternatives - Easy Charts- Graph Visualizations – Geomapping - Almost from Scratch - Three-Dimensional - Tools built with D3. | 1 | 1.2 |
| | | **Instructional Hours** | **9** |
| II | **Technology Fundamentals:** The Web- HTML -Content Plus Structure-Adding Structure with Elements -Common Elements-Attributes-Classes and IDs -Comments-DOM -Developer Tools-Rendering and the Box Model-CSS-Selectors -Properties and Values-Comments-Referencing Styles-Inheritance, Cascading, and Specificity-JavaScript -Hello, Console -Variables-Other Variable Types-Arrays -Objects -Objects and Arrays -Mathematical Operators -Comparison Operators -Logical Operators -Control Structures -Functions -Comments -Referencing Scripts -JavaScript Gotchas -SVG -The SVG Element -Simple Shapes -Styling SVG Elements -Layering and Drawing Order -Transparency -A Note on Compatibility. | | 3 |
| | | **Instructional Hours** | **9** |
| III | **Setup:** Downloading D3 - Referencing D3 -Setting Up a Web Server - Terminal with Python -MAMP, WAMP, and LAMP - Diving in Data - Generating Page Elements -Chaining Methods -One Link at a Time -The Handoff -Going Chainless -Binding Data -In a Bind -Data -Please Make Your Selection-Bound and Determined -Using Your Data -High-Functioning -Data Wants to Be Held -Beyond Text. | | 4,5 |
| | | **Instructional Hours** | **9** |

| | | | |
|---|---|---|---|
| **IV** | **Drawing with Data:** Drawing divs -Setting Attributes -A Note on Classes - Back to the Bars - Setting Styles -The Power of data() -Random Data - Drawing SVGs -Create the SVG -Data-Driven Shapes -Pretty Colors, Making a Bar Chart -The Old Chart -The New Chart-Color -Labels -Making a Scatterplot -The Data -The Scatterplot -Size -Labels. | | 6 |
| | | **Instructional Hours** | **9** |
| **V** | **Scales:** Apples and Pixels-Domains and Ranges -Normalization-Creating a Scale - Scaling the Scatterplot - d3.min() and d3.max() -Setting Up Dynamic Scales - Incorporating Scaled Values -Refining the Plot -Other Methods -Other Scales -Square Root Scales -Time Scales Axes: Introducing Axes -Setting Up an Axis -Positioning Axes -Check for Ticks -Y Not? -Final Touches-Formatting Tick Labels -Time-Based Axes. | | 7,8 |
| | | **Instructional Hours** | **9** |
| | | **Total Hours** | **45** |

**Text Book(s):**

1. Scott Murray, **"Interactive Data Visualization for the Web",** O'Reilly Media, Inc, 2013

**Reference Book(s):**

1. Andy Kirk, "**Data Visualization A Handbook for Data Driven Design",** Sage Publications, 2016
2. Colin Ware **"Information Visualization Perception for Design"**,3 rd edition, Morgan Kaufman 2012.

**Tools for Assessment (25 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | Total |
|---|---|---|---|---|---|---|
| 4 | 4 | 5 | 4 | 4 | 4 | 25 |

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTP511 | Core Paper XVI: Practical in Machine Learning | | |
| Semester: V | Credits: 4 | CIA: 50 Marks | ESE:50 Marks |

**Course Objective:**

To make the students understand the different algorithms in Machine Learning Using R Language and develop familiarity in the same.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | List and apply basic concept in Machine Learning Using R Language |
| **CO2** | Classify the concept of Clustering in Machine Learning |
| **CO3** | Apply the Multivariate concept in Machine Learning Using R Language |
| **CO4** | Utilize concept OF Linear Discrimination in Machine Learning Using R Language |
| **CO5** | Develop small Projects in Machine Learning Using R Language |

**Offered by: Data Science**

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

| S. No. | List of Practical |
|---|---|
| 1 | Create a ML model for aviation incident risk prediction |
| 2 | Create a Classification of ransomware families |
| 3 | Create a Activity prediction system |
| 4 | Create a Electricity usage minimizing system for water pumps |
| 5 | Create a Music cognition system |
| 6 | Create a Intrusion detection system |
| 7 | Create a Personalized Market Basket Prediction |
| 8 | Create a Performance prediction system for mobile networks |
| 9 | Create a Stock price index forecasting system |
| 10 | Create an Intelligent asset allocation system |
| | **Total Hours:75** |

**Tools for Assessment (50 marks)**

| Laboratory Performance | | | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| Application of Logics | Program Creativity | Code Debugging | | | | |
| 8 | 8 | 8 | 10 | 10 | 6 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U4DTS503 | Skill Based Paper III:<br>Practical in TABLEAU and MONGODB | | |
| Semester: V | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**Course Objective:**

To implement and practice various concepts in python programming

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Creation of form for data entry using MongoDB |
| **CO2** | Creation of views for data records using MongoDB |
| **CO3** | Analyze data analysis techniques using MongoDB |
| **CO4** | Implement various data Visualization Implementation using Tableau |
| **CO5** | Implement Interactive Filter using tableau |

**Offered by:** Data Science

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

| S. No. | List of Programs |
|---|---|
| 1 | Create the following tables:<br>Order party: Order_number, Order_date, customer_code<br>Order: Order_number, Item_code, Quantity<br>The key to the second table is Order_number + Item_code<br>Create a form for data entry to both the tables |
| 2 | Create a view to know member name and name of the book issued to them. Use any inbuilt function and<br>operators like IN, ANY, ALL, EXISTS.<br>a. List the records of members who have not been issued any book using EXISTS operator.<br>b. List the members who have got issued at least one book (use IN/ANY operator).<br>c. List the books which have maximum Price using ALL operator.<br>d. Display Book Name, Member Name, Issue date of Book. Create a view of this query of the currently issued books. |
| 3 | Design an Electricity Bill Report generating system that generates electricity bills details of customers for a month using MongoDB. |
| 4 | Generate a Library Information System that generates report of the books available in the library using MongoDB. |
| 5 | Program to load and display dataset on tableau. |
| 6 | Program to implement Data Preparation using Data Interpreter on tableau |
| 7 | Program to Implement Interactive Filter using tableau |
| 8 | Program to plot a graph to show the Data in histogram using tableau |
| 9 | Program to show Data in Tree Map using tableau |
| 10 | Program to use a background image map using tableau **Total: 75 Hours** |

**Text Book(s):**

1. Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master, O'Reilly Media, 2018

**Reference Books:**

2. Practical MongoDB: Architecting, Developing, and Administering MongoDB, Apress, 2015

**Web Reference:**

1. https://www.mongodb.com/
2. https://www.tableau.com/

**Tools for Assessment (30 marks)**

| Laboratory Performance | | | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| Application of Logics | Program Creativity | Code Debugging | | | | |
| 5 | 5 | 5 | 6 | 6 | 3 | 30 |

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC613 | Core Paper XVII: Big Data Analytics | | |
| Semester: VI | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**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 Outcomes:**

| | |
|---|---|
| **CO1** | Know about the big data analytics |
| **CO2** | Tools in big data analytics using Hadoop |
| **CO3** | Data model in big data analytics using NoSql |
| **CO4** | Understanding and Know about Map Reduce Programming |
| **CO5** | Gain more knowledge about Hadoop streaming with R |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **INTRODUCTION TO BIG**: 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** | | **15** |
| 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** | | **15** |
| 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** | | **15** |
| IV | **MAP REDUCE Programming:** Introduction to MapReduce – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression | 2 | 4 |
| | **Instructional Hours** | | **15** |
| 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** | | **15** |
| | **Total Hours** | | **75** |

**Text Book(s):**

1. Radha Shankarmani, M Vijayalakshmi, "Big Data Analytics",Wiley Publications,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.

**Tools for Assessment (30 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTC614 | Core Paper XVIII: Deep Learning | | |
| Semester: VI | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**Course Objective:**
To understand Deep learning algorithms, the problem settings, state-of -the art models and their applications to solve real world problems

**Course Outcomes (CO):**

| | |
|---|---|
| **CO1** | Understand the fundamentals of Deep Learning |
| **CO2** | Exploring computer vision in deep learning |
| **CO3** | Gaining knowledge of the different modalities of Deep learning |
| **CO4** | Gaining knowledge about State-of the art models |
| **CO5** | Developing the skills to develop Deep Learning Multiple packages |

**Offered by: Data Science**
**Course Content** **Instructional Hours / Week: 4**

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| **I** | **Deep Learning:** Artificial intelligence, machine learning, and deep learning -Artificial intelligence - Machine learning- Learning representations from data- The "deep" in deep learning-Understanding how deep learning works, in three figures-What deep learning has achieved so far- Don't believe the short-term hype -The promise of AI - Before deep learning: a brief history of machine-learning -Probabilistic modeling - Early neural networks -Kernel methods -Decision trees, Random Forests and gradient boosting machines - Back to neural-networks -What makes deep learning different-The modern machine-learning landscape - Why deep learning? -Hardware - Data -Algorithms - A new wave of investment- The democratization of deep learning-Will it last? | 1 | 1 |
| | **Instructional Hours** | | **12** |
| **II** | **Deep learning for computer vision:** Introduction to convnets -The convolution operation-The max-pooling-operation - Training a convnet from scratch on a small dataset -The relevance of deep learning for small-data problems-Downloading the data - Building your network-Data preprocessing - Using data augmentation- Using a pretrained convnet-Feature extraction - Fine-tuning -Wrapping up -Visualizing what convnets learn-Visualizing intermediate activations – Visualizing convnet filters-Visualizing heatmaps of class activation | 1 | 5 |
| | **Instructional Hours** | | **12** |
| **III** | **Deep learning for text and sequences:** Working with text data -One-hot encoding of words and characters -Using word embeddings- Putting it all together: from raw text to word embeddings- Wrapping up - Understanding recurrent neural networks -A recurrent layer in Keras - Understanding theLSTM and GRU layers - A concrete LSTM example | 1 | 6 |

| | | | |
|---|---|---|---|
| | in Keras-Wrapping up- Advanced use of recurrent neural networks -A temperature-forecasting problem - Preparing the data - A common-sense, non-machine-learning-baseline -A basic machine-learning approach -A first recurrent baseline - Using recurrent dropout to fight overfitting - Stacking recurrent layers -Using bidirectional RNNs - Going even further -wrapping up - Sequence processing with convnets - Understanding 1D convolution for sequence data - 1D pooling for sequence data - Implementing a 1D convnet - Combining CNNs and RNNs to process long sequences | | |
| | **Instructional Hours** | | **12** |
| **IV** | **Advanced deep-learning best practices :** Going beyond the Sequential model: the Keras functional API -Introduction to the functional API- Multi-input models - Multi-output models- Directed cyclic graphs of layers - Layer weight sharing – Models as layers - Wrapping up - Inspecting and monitoring deep-learning models using Keras callbacks and TensorBoard -Using callbacks to act on a model during training - Introduction to TensorBoard: the TensorFlow visualization framework - Wrapping up- Getting the most out of your models -Advanced architecture patterns -Hyperparameter optimization - Model ensembling | 1 | 7 |
| | **Instructional Hours** | | **12** |
| **V** | **Generative deep learning:** Text generation with LSTM -A brief history of generative recurrent networks -How do you generate sequence data? - The importance of the sampling strategy -Implementing character-level LSTM text generation - Wrapping up - DeepDream -Implementing DeepDream in Keras - Wrapping up - Neural style transfer -The content loss- The style loss - Neural style transfer in Keras-Wrapping up - Generating images with variational autoencoders -Sampling from latent spaces of images -Concept vectors for image editing - Variational autoencoders -Wrapping up- Introduction to generative adversarial networks-A schematic GAN implementation - A bag of tricks-The generator -The discriminator - The adversarial network - How to train your DCGAN | 1 | 8 |
| | **Instructional Hours** | | **12** |
| | **Total Hours** | | **60** |

**Text Book(s):**

1. François Chollet, **"Deep Learning with Python",** M A N N I N G, 2017

**Reference Book(s):**

1. Keras Navin Kumar Manaswi , "**Deep Learning with Applications Using Python: Chatbots and Face, Object, and Speech Recognition with Tensorflow and Keras",** Apress, 2018

**Tools for Assessment (30 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTV615 | Project and Viva-Voce | | |
| Semester: VI | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**Course Objective:**

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

**Course Outcomes:**

| | |
|---|---|
| **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** | Developing a software-based applications and deployment of software |

**Offered by: Data Science**

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

**PROJECT WORK**

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 SCIENCE (DATA SCIENCE)

Submitted by

Name of the Student

(Reg. No.)

Under the Guidance of

Guide Name (Designation)

<College emblem>

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



**Total Hours: 60**

**Tools for Assessment (30 Marks)**

| Review I | Review II | Review III | Document Preparation | Total |
|---|---|---|---|---|
| 5 | 5 | 5 | 15 | 30 |

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTS604 | Skill Based Paper-IV: Practical in Big Data Analytics | | |
| Semester: VI | Credits: 3 | CIA: 30 Marks | ESE: 45 Marks |

**Course Objective:**
To impart the architectural concepts of Hadoop and introducing map reduce paradigm to practice business decisions and create competitive advantage with Big Data.

**Course Outcomes (CO):**

| | |
|---|---|
| **CO1** | Install Hadoop |
| **CO2** | Implement best practices for Hadoop development |
| **CO3** | Implement Map Reduce programs for processing big data |
| **CO4** | Practice programming tools PIG and HIVE in Hadoop eco system. |
| **CO5** | Analyze big data using linear models |

**Offered by: Data Science**

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

| S. No. | List of Practical |
|---|---|
| 1 | Install, configure and run Hadoop and HDFS |
| 2 | Implement the file management tasks in Hadoop |
| 3 | Implement word count / frequency programs using MapReduce |
| 4 | Implement matrix multiplication with Hadoop MapReduce |
| 5 | Implement an MR program that processes a weather dataset R |
| 6 | Implement basic Word Count MapReduce program to understand MapReduce Paradigm: To count words in a given file, To view the output file, and To calculate execution time. |
| 7 | Implement Linear and logistic Regression |
| 8 | Implement SVM / Decision tree classification techniques |
| 9 | Implement clustering techniques |
| 10 | Visualize data using any plotting framework |
| 11 | Implement an application that stores big data in HBase / MongoDB / Pig using Hadoop / R |
| | **Total Hours : 75** |

**Tools for Assessment (30 Marks)**

| Laboratory Performance | | | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| Application of Logics | Program Creativity | Code Debugging | | | | |
| 5 | 5 | 5 | 6 | 6 | 3 | 30 |

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTE501 | Discipline Specific<br>Elective Paper I: Soft Computing | | |
| Semester: V | Credits: 4 | CIA:50 Marks | ESE:50 Marks |

**Course Objective:**

To enable the students to learn the concepts of neural network theory and fuzzy logic theory.

**Course Outcomes (CO):**

| | |
|---|---|
| **CO1** | Classify the Neural networks and hybrid systems. |
| **CO2** | Build the basic models of Artificial Neural Networks. |
| **CO3** | Analyse the basic concept of fuzzy logic. |
| **CO4** | Compare the basic technologies of Genetic Algorithm. |
| **CO5** | Construct the applications of soft computing. |

**Offered by:** Computer Science

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction: Neural Networks**: Artificial Neural Network: Definition, Advantages ofNeural Networks, Application Scope of Neural Networks, Fuzzy Logic, Genetic Algorithm. | 1 | 1 |
| | **Hybrid Systems**: Neuro Fuzzy Hybrid Systems, Neuro Genetic Hybrid Systems , Fuzzy Genetic Hybrid Systems, Soft Computing | 1 | 1 |
| | **Instructional Hours** | | **18** |
| II | **Artificial Neural Network:** An Introduction, Fundamental Concept, Evolution of Neural Networks<br>**Basic Models of Artificial Neural Network**:Important Terminologies of ANNs, Linear Separability,Hebb Network, | 1 | 2 |
| | **Instructional Hours** | | **18** |
| III | **Introduction to Fuzzy Logic**: Classical Sets and Fuzzy Sets: Introduction to Fuzzy Logic, Classical Sets (Crisp Sets): Operations on Classical Sets, Properties of Classical Sets, Function Mapping of Classical Sets. | 1 | 7 |
| | **Fuzzy Sets:** Fuzzy Set Operations : Union , Intersection, Complement , More operations on Fuzzy Sets, Properties of Fuzzy Sets. | 1 | 7 |
| | **Instructional Hours** | | **18** |
| IV | **Genetic Algorithm: Introduction**: Biological Background, Traditional Optimization and Search Techniques, Genetic Algorithm and Search Space. | 1 | 15 |
| | **Basic Terminologies in Genetic Algorithm:** General Genetic Algorithm, Operators in Generic Algorithm, topping Condition for Generic Algorithm Flow, Problem Solving Using Genetic Algorithm. | 1 | 15 |
| | **Instructional Hours** | | **18** |
| V | **Applications of Soft Computing:** Introduction, Optimization of Traveling Salesman Problem using Genetic Algorithm Approach, Genetic Algorithm-Based Internet Search Technique, Soft Computing Based Hybrid Fuzzy Controllers, Soft Computing Based Rocket Engine Control | 1 | 17 |
| | **Instructional Hours** | | **18** |
| | **Total Hours** | | **90** |

**Text Book(s):**

1. Wiley, **Principles of Soft Computing**, PHI/Pearson Education, 2nd edition, 2014.
   **Unit I**: Chapter 1 Section: 1.1 to 1.6
   **Unit II**: Chapter 2 Section:2.1 to 2.7
   **Unit III**: Chapter 7 Section 7.1 to 7.3
   **Unit IV**:Chapter 15 Sections:15.1 to 15.6,15.9, 15.10, 15.12
   **Unit V**: Chapter 17 Sections:17.1, 17.4 to 17.6

**Reference Book(s ):**

1. .JangJ.S.R.,Sun C.T and Mizutami E ,**Neuro Fuzzy and Soft computing,** Prentice hall New Jersey,1998
2. Timothy J.Ross, **Fuzzy Logic Engineering Applications,**.McGraw Hill,NewYork,1997.
3. LaureneFauseett, **Fundamentals of Neural Networks**.prentice Hall India,New Delhi,1994.

**Web Reference:**

1. **http://cse.iitkgp.ac.in/~dsamanta/courses/sca/index.html**
2. **https://sites.google.com/site/softcomputingcse/about-me**

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTE502 | Discipline Specific<br>Elective Paper I: Digital Image Processing | | |
| Semester: V | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:**

To introduce the fundamentals and to impart knowledge on various Digital Image Processing Techniques and their Applications.

**Course Outcomes (CO):**

| | |
|---|---|
| **CO1** | Learn the fundamentals of Digital Images and representing them for processing. |
| **CO2** | Analyze different image enhancement techniques. |
| **CO3** | Restore the lost details of the image and to reconstruct. |
| **CO4** | Identifying sources of redundancy and using it to compress the images. |
| **CO5** | Comprehend the images and analyzing. |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Digital image processing:** Introduction – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. | 1 | 1 |
| | **Digital Image Fundamentals**: Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Basic relationship between Pixels | 1 | 2 |
| | Color Models | 1 | 6 |
| | **Instructional Hours** | | **18** |
| II | **Image Enhancement:** Intensity Transformations and Spatial Filtering: Background – Basic intensity Transformation functions – Histogram Processing-Fundamentals of spatial filtering – Smoothing spatial filters – Sharpening spatial filters | 1 | 3 |
| | **Filtering in the Frequency Domain**: Image Smoothing Using Frequency Domain Filters-Image Sharpening Using Frequency Domain Filters | 1 | 4 |
| | **Instructional Hours** | | **18** |
| III | **Restoration and Reconstruction:** Model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter - Image Reconstruction from Projections | 1 | 5 |
| | **Instructional Hours** | | **18** |
| IV | **Image Compression:**Fundamentals: Coding Redundancy - Spatial and Temporal Redundancy- Irrelevant Information - Measuring Image Information - Fidelity Criteria - Image Compression Models - Compression Methods :Huffman Coding- Golomb Coding - Arithmetic Coding -LZW Coding- Run-Length Coding- Symbol-Based Coding - Bit-Plane Coding- Digital Image Watermarking | 1 | 8 |
| | **Instructional Hours** | | **18** |
| V | **Image Segmentation**: Morphological Image Processing: Preliminaries - Erosion and Dilation | 1 | 9 |

| | | | |
|---|---|---|---|
| | **Segmentation :** Fundamentals - Point, Line, and Edge Detection: Background - Detection of Isolated Points- Line Detection- Edge Models – Thresholding- Foundation-Basic Global Thresholding- Region-Based Segmentation - Region Growing- Region Splitting and Merging– The use of motion in segmentation. | 1 | 10 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book(s):**

1. Rafael C. Gonzalez, Richard E. Woods, **Digital Image Processing**, Third Edition, PHI/Pearson Education.

**Unit I:** Chapter 1: Section 1.1, 1.3-1.5, Chapter 2: Section 2.2-2.5, Chapter 6: Section 6.1-6.2
**Unit II:** Chapter 3: Section 3.1-3.6, Chapter 4: Section 4.1, 4.8,4.9
**Unit III:** Chapter 5: Section 5.1-5.11 **Unit IV:** Chapter 8: Section 8.1.1-8.1.6,8.2.1- 8.2.7, 8.3
**Unit V:** Chapter 9: Section 9.1, 9.2 Chapter10: Section 10.1, 10.2.1 -10.2.4, 10.3.1, 10.3.2, 10.4, 10.6

**Reference Books:**

1. B. Chanda, D. Dutta Majumder, **Digital Image Processing and Analysis**, PHI, 2003.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, **Digital Image Processing using MATLAB**, Pearson Education, Inc., 2004.
3. William K. Pratt, **Digital Image Processing**, John Wiley, New York, 2002.
4. S. Annadurai, R. Shanmugalakshmi, **Fundamentals of Digital Image Processing**, Pearson Education India, 2008
5. Madhuri A. Josh, **Digital Image Processing: An Algorithm Approach** , PHI, 2007
6. Milan Sonka et al, **Image Processing, Analysis and Machine vision**, Brookes/Cole, Vikas Publishing House, 2nd edition, 2007.
7. Rohit M. Thanki, Ashish M. Kothari , **Digital Image Processing using SCILAB**

**Web Reference:**

1. https://nptel.ac.in/courses/117105079/
2. https://books.google.co.in/books?id=VydaDwAAQBAJ&printsec=frontcover&dq=digital+image+processing+with+scilab&hl=en&sa=X&ved=0ahUKEwjOtfvSuuLeAhUPTo8KHQQgA5kQ6AEIKTAA

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CJE503 | Discipline Specific<br>Elective Paper I: Healthcare Analytics | | |
| Semester: V | Credits:4 | CIA: 50 Marks | ESE: 50 Marks |

**(Common to B. Sc. AIML / DS)**

**Course Objective:**

To apply mining, modeling and analytics techniques to health and healthcare data. Students will understand the use of healthcare data to make decisions and transform healthcare delivery and the health of individuals and populations.

**Course Outcomes :**

| | |
|---|---|
| **CO1** | To Demonstrate the use of business intelligence or health data analytics tool, application or approach. |
| **CO2** | Articulate the value of big volumes of data to health and healthcare, and future trends. |
| **CO3** | Construct the concept of health data visualization principles and techniques for supporting decision making. |
| **CO4** | To provide comprehensive knowledge of data analytics, business intelligence, and data governing practices and opportunities in health and healthcare. |
| **CO5** | Utilize critical thinking to construct how with business intelligence processes and tools health and healthcare data. |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| **I** | **An Introduction to Healthcare Data Analytics:** Introduction. **Healthcare Data Sources and Basic Analytics:** Electronic Health Records - Components of HER - Benefits of HER. **Mining of Sensor Data in Healthcare:** Mining Sensor Data in Medical Informatics - Challenges in Healthcare Data Analysis - Sensor Data Mining Applications. | 1 | 1,2 |
| | **Instructional Hours** | | **18** |
| **II** | **Biomedical Signal Analysis:** Types of Biomedical Signals - ECG Signal Analysis - Denoising of Signals - Recent Trends in Biomedical Signal Analysis. **Genomic Data Analysis for Personalized Medicine:** Genomic Data Generation - Methods and Standards for Genomic Data Analysis - Types of Computational Genomics Studies towards Personalized Medicine | 1 | 5,6 |
| | **Instructional Hours** | | **18** |
| **III** | **Natural Language Processing and Data Mining for Clinical Text:** Natural Language Processing - Mining Information from Clinical Text. **Social Media Analytics for Healthcare:** Social Media Analysis for Detection and Tracking of Infectious Disease Outbreaks - Social Media Analysis for Public Health Research - Analysis of Social Media Use in Healthcare | 1 | 7, 9 |
| | **Instructional Hours** | | **18** |

| | | | |
|---|---|---|---|
| IV | **Advanced Data Analytics for Healthcare:** A Review of Clinical Prediction Models - Basic Statistical Prediction Models - Alternative Clinical Prediction Models. **Information Retrieval for Healthcare -** Knowledge-Based Information in Healthcare and Biomedicine – Retrieval – Evaluation. **Privacy-Preserving Data Publishing Methods in Healthcare -** Privacy-Preserving Publishing Methods | 1 | 10, 14,15 |
| | | **Instructional Hours** | **18** |
| V | **Applications and Practical Systems for Healthcare:** Data Analytics for Pervasive Health - Supporting Infrastructure and Technology - Basic Analytic Techniques - Advanced Analytic Techniques – Applications. **Fraud Detection in Healthcare:** Understanding Fraud in the Healthcare System - Knowledge Discovery-Based Solutions for Identifying Fraud | 1 | 16, 17 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book(s):**

1. Chandan K. Reddy and Charu C. Aggarwal, **"Healthcare Data Analytics"** CRC Press, 2015

**Reference Book(s):**

1. Trevor L. Strome **"Healthcare Analytics for Quality and Performance Improvement",** John Wiley & Sons, Inc. 2013.

**Tools for Assessment (50 Marks)**

| CIA - I | CIA - II | CIA - III | Assignment | Seminar | Quiz | 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 | 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 HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U3DTE504 | **Discipline Specific**<br>**Elective Paper I: Distributed System Concepts and Design** | |
| **Semester: V** | **Credits:4** | **CIA: 50 Marks ESE: 50 Marks** |

**Course Objective:**

To provide basic foundation with the mechanisms of distributed computing, the inter process communication and remote communication and emerging trends in distributed computing.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Elucidate the foundations and issues of distributed systems |
| **CO2** | Understand Distributed Computing techniques, Synchronous and Processes |
| **CO3** | Analyse distributed object-oriented architecture |
| **CO4** | Design a distributed system that fulfills requirements with regards to key distributed systems |
| **CO5** | Apply Distributed web-based system. |

**Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| **I** | INTRODUCTION: Definition of a Distributed System - Goals - Making Resources Accessible-Distribution Transparency - Openness - Scalability – Pitfalls-Types of Distributed Systems - Distributed Computing Systems -Distributed Information Systems - Distributed Pervasive Systems- ARCHITECTURES: Architectural Styles- System Architectures - Centralized Architectures- Decentralized Architectures- Hybrid Architectures | 1 | 1,2 |
| | | **Instructional Hours** | **18** |
| **II** | COMMUNICATION- FUNDAMENTALS- Layered Protocols- Types Of Communication - REMOTE PROCEDURE CALL - Basic RPC Operation - Parameter Passing - Asynchronous RPC- Example: DCE RPC - MESSAGE-ORIENTED COMMUNICATION- Message-Oriented Transient Communication - Message-Oriented Persistent Communication - Example: Ffim's Web sphere Message-Queuing System-STREAM-ORIENTED COMMUNICATION -Support For Continuous Media - Streams And Quality Of Service- Stream Synchronization - MULTICAST COMMUNICATION - Application-Level Multicasting - Gossip-Based Data Dissemination | 1 | 4 |
| | | **Instructional Hours** | **18** |
| **III** | DISTRIBUTED OBJECT-BASED SYSTEMS :ARCHITECTURE-Distributed Objects - Example: Enterprise Java Beans- Example: Globe Distributed Shared Objects-PROCESSES - Object Servers - Example: The Ice Runtime System COMMUNICATION - Binding a Client to an Object - Static versus Dynamic Remote Method Invocations - Parameter Passing - Example: Java RMI- Object-Based Messaging - NAMING - CORBA Object References - Globe Object References- SYNCHRONIZATION - CONSISTENCY AND REPLICATION - Entry Consistency - Replicated Invocations-FAULT TOLERANCE-Example: Fault-Tolerant CORBA - Example: Fault-Tolerant Java -SECURITY - Example: Globe - Security for Remote Objects | 1 | 10 |
| | | **Instructional Hours** | **18** |

| | | | |
|---|---|---|---|
| **IV** | DISTRIBUTED FILE SYSTEMS: ARCHITECTURE - Client-Server Architectures - Cluster-Based Distributed File Systems - Symmetric Architectures 9 PROCESSES - COMMUNICATION - RPCs in NFS - The RPC Subsystem - File-Oriented Communication in Plan- NAMING - Naming in NFS- Constructing a Global Name Space - SYNCHRONIZATION - Semantics of File Sharing - File Locking -Sharing Files in Coda- CONSISTENCY AND REPLICATION - Client-Side Caching-Server-Side Replication- Replication in Peer-to-Peer File Systems - File Replication in Grid Systems-FAULT TOLERANCE - Handling Byzantine Failures-High Availability in Peer-to-Peer Systems- SECURITY- Security in NFS - Decentralized Authentication -Secure Peer-to-Peer File-Sharing Systems | 1 | 11 |
| | | **Instructional Hours** | **18** |
| **V** | DISTRIBUTED WEB-BASED SYSTEMS- ARCHITECTURE - Traditional Web-Based Systems - Web Services - PROCESSES - Clients - The Apache Web Server - Web Server Clusters – COMMUNICATION- Hypertext Transfer Protocol - Simple Object Access Protocol - NAMING SYNCHRONIZATION - CONSISTENCY AND REPLICATION - Web Proxy Caching - Replication for Web Hosting Systems - Replication of Web Applications - FAULT TOLERANCE -SECURITY | 1 | 12 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book(s):**

1.Tanenbaum A.S., Van Steen M., **"Distributed Systems: Principles and Paradigms"**, Pearson Education, Second Edition.

**Reference Book(s):**

1. George Coulouris, Jean Dollimore and Tim Kindberg, **"Distributed Systems Concepts and Design"**, Fifth Edition, Pearson Education, 2012.

**Tools for Assessment (50 Marks)**

| CIA - I | CIA - II | CIA - III | Assignment | Seminar | Quiz | 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 | 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 HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3DTE605 | Discipline Specific<br>Elective Paper II: Computer Networks | | |
| Semester: VI | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**Course Objective:** To inculcate knowledge on Networking concepts and technologies like wireless, Broadband and Bluetooth**.**

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Understand about network hardware, software and uses of computer networks |
| **CO2** | Understand Guided Transmission Media, Wireless Transmission, and Communication Satellites |
| **CO3** | Understand error detection and correction, elementary data link protocol and Routing algorithms |
| **CO4** | Understand and identify the applications of application layer and network security |
| **CO5** | Apply Networking technologies in the real-time system. |

**Course Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Uses of computer networks**: Business Applications- Home Applications - Mobile Users - and 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 Versus Connectionless Service - 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** | | **18** |
| II | **Physical Layer - Guided Transmission Media**: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. **Wireless Transmission**: Electromagnetic Spectrum –Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. **Communication Satellites**: Geostationary - Medium-Earth Orbit - Low Earth-orbit Satellites – Satellites versus Fiber. | 1 | 2 |
| | **Instructional Hours** | | **18** |
| III | **Data link Layer:** 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**: A Utopian Simplex Protocol- A Simplex Stop-and-Wait Protocol for an Error-Free Channel- A Simplex Stop-and-Wait Protocol for a Noisy Channel. **Sliding Window Protocols:** One-Bit sliding window protocol – A protocol using Go-Back-N – A Protocol using Selective Repeat. | 1 | 3 |
| | **Instructional Hours** | | **18** |

| | | | |
|---|---|---|---|
| **IV** | **Network layer: Routing algorithm**-The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing,Anycast Routing, Routing for Mobile Hosts, Routing in Ad Hoc Networks, **Transport layer: Elements of transport protocols**-Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing, Crash Recovery **The Internet Transport Protocols UDP**: Introduction to UDP. TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment,TCP Connection Release, TCP Connection Management Modeling, TCP Sliding Window,TCP Timer Management, TCP Congestion Control. | 1 | 5,6 |
| | | **Instructional Hours** | **18** |
| **V** | **Application layer:** DNS—The Domain Name System, The DNS Name Space, Domain 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** | **18** |
| | | **Total Hours** | **90** |

**Text Book(s):**

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 ed., PHI

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21U3DTE606 | Discipline Specific<br>Elective Paper II: Social and Web Media Analytics | |
| Semester: VI | Credits:4 | CIA: 50 Marks ESE: 50 Marks |

**Course Objective:**
To understand how big data principles implemented in social media & Web

**Course Outcomes:**

| | |
|---|---|
| **CO1** | To recognize the fundamental concepts of social media. |
| **CO2** | To recognize the fundamental concepts of Web. |
| **CO3** | To analyze data obtained from social media. |
| **CO4** | To explain the experimental methods in web data analytics. |
| **CO5** | To recognize the types of data for social media & Web analytics. |

**Course Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction:** History of Social media- Basics of Social Media and Business Models- Basics of Web Search Engines and Digital Advertising. Web& social media (websites, web apps , mobile apps & social media) | 1 | |
| | **Instructional Hours** | | 18 |
| II | **Web analytics:** Web analytics 2.0 framework (clickstream, multiple outcomes analysis, experimentation and testing, voice of customer, competitive intelligence, Insights) - Experimental methods in web data analytics - Air France Internet Marketing Case Study - Econometric modeling of search engine ads | 1 | |
| | **Instructional Hours** | | 18 |
| III | **Structured data Vs unstructured data**: Data (Structured data, unstructured data, metadata, Big Data and Linked Data) -Lab testing and experiment design (selecting participants, within-subjects or between subjects study, counterbalancing, independent and dependent variable; A/B testing, multivariate testing, controlled experiments | 2 | |
| | **Instructional Hours** | | 18 |
| IV | **Web metrics and web analytic**: Web metrics and web analytics - PULSE metrics (Page views, Uptime, Latency, Seven-day active users) on business and technical issues; -HEART metrics (Happiness, Engagement, Adoption, Retention, and Task success) on user behaviour issues; -On-site web analytics, off-site web analytics, the goal-signal-metric process | 1 | |
| | **Instructional Hours** | | 18 |

| | | | |
|---|---|---|---|
| **V** | **Social media analytics:** Social media analytics - Social media analytics (what and why) - Social media KPIs (reach and engagement) - Performing social media analytics (business goal, KPIs, data gathering, analysis, measure and feedback) 6. Data analysis language and tools Cases and examples - User experience measurement cases - Web analytics cases 8. Group work and hands on practice - Usability study planning and testing; and data analysis using software tools (Google Analytics, Google Sites, R and Deducer) | 2 | |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book(s):**

1. 1. Brian Clifton, Advanced Web Metrics with Google Analytics, John Wiley & Sons; edition (30 Mar 2012)
2. Jim Sterne, Social Media Metrics: How to Measure and Optimize Your Marketing. Investment, John Wiley & Sons (16 April 2010) Presenting Usability Metrics, Morgan Kaufmann; 1 edition (28 April 2008).

**Reference Book(s):**

1. **Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability and Science of** Customer Centricity, John Wiley & Sons.
2. Tom Tullis, Bill Albert, Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics, Morgan Kaufmann; 1 edition (28 April 2008).
3. Avinash Kaushik, Web Analytics: An Hour a Day, John Wiley & Sons, 2007

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKE607 | Discipline Specific<br>Elective Paper II: Cloud Computing | | |
| Semester: VI | Credits: 4 | CIA: 50 Marks | ESE:50 Marks |

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

**Course Objectives:**

- To make the students to understand the Cloud Computing and types, cloud architecture, identify the applications of cloud computing abstraction & virtualization in real-time.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Understand the basics of Cloud Computing |
| **CO2** | Understand the architecture and services of cloud |
| **CO3** | Identify the importance of abstraction and virtualization |
| **CO4** | Apply the cloud computing for personal and business usage |
| **CO5** | Gain knowledge in cloud security |

**Offered by:** Information Technology

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| 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. | 1 | 1 |
| | **Assessing the Value Proposition:** Measuring the Cloud's Value: The laws of cloudonomics - Cloud computing obstacles - Behavioral factors relating to cloud adoption. | | 2 |
| | **Instructional Hours** | | **18** |
| II | **Understanding Cloud Architecture:** Exploring the Cloud Computing Stack - Connecting to the Cloud. | 1 | 3 |
| | **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). | | 4 |
| | **Instructional Hours** | | **18** |
| III | **Understanding Abstraction and Virtualization:** Using Virtualization Technologies - Load Balancing and Virtualization - Understanding Hypervisors - Understanding Machine Imaging - Porting Applications. | 1 | 5 |
| | **Exploring Platform as a Service:** Defining Services - Using PaaS Application Frameworks. | | 7 |
| | **Instructional Hours** | | **18** |
| IV | **Using Google Web Services:** Exploring Google Applications - Surveying the Google Application Portfolio - Exploring the Google Toolkit - Working with the Google App Engine. | 1 | 8 |
| | **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. | | 9 |
| | **Instructional Hours** | | **18** |

| | | | |
|---|---|---|---|
| V | **Using Microsoft:** Cloud Services - Exploring Microsoft Cloud Services - Defining the Windows Azure Platform - Using Windows Live. | 1 | 10 |
| | **Understanding Cloud:** Security - Securing the Cloud - Securing Data - Establishing Identity and Presence**.** | | 12 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book:**

1. Barrie Sosinsky, **"Cloud Computing Bible"**, Wiley Publishing ,Inc., 2011.

**Reference Book(s):**

1. Ray J Rafaels, **"Cloud Computing : From Beginning to End"**, 2015.
2. Arshdeep, Bahga and Vijai Madisetti, **"Cloud Computing: A Hands-on Approach"**, 2014.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Class Participation | Seminar | Assignment | 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 | 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 HOD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKE608 | Discipline Specific<br>Elective Paper II: Cyber Security | | |
| Semester: VI | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

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

**Course Objectives:**

To make the students to understand Cryptography, Cyber crime and its significance in current scenario of IT and information security.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Remember the information and various representation |
| **CO2** | Understand the concept of computer networks and overview of internet |
| **CO3** | Understand the information storage, data communication and data modulation techniques |
| **CO4** | Understand the knowledge about the Cryptography, Cyber Crime and Information Security |
| **CO5** | Understand the importance of Information Security Framework |

**Offered by:** Artificial Intelligence and Machine Learning

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| 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** |
| 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** |
| III | **Information storage and communication:** Information storage - purpose of storage - Types of storage Devices - File organization - Internal file structure - External file structure and file extension - Data communication - an overview - what is data communication - signals - Basic - Data Communication Model - Modulation Techniques. | 1 | 3 |
| | | **Instructional Hours** | **18** |
| 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** |

| | | | |
|---|---|---|---|
| **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** |
| | | **Total Hours** | **90** |

**Text Book:**

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

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Case Study Presentation | Seminar | Assignment | 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 | 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 HoD | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKE609 | Discipline Specific<br>Elective Paper III: Software Engineering | | |
| Semester: VI | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**(Common to B. Sc. AIML / DS)**

**Course Objective:**

To gain knowledge about basic concepts of Software Engineering and Testing.

**Course Outcomes:**

| | |
|---|---|
| CO1 | Able to understand the nature of the software and different types of process models |
| CO2 | Gains knowledge about the requirements stage development of the software |
| CO3 | Analyse the different types of architectural designs of the software |
| CO4 | Setting the context on Software Development and Evaluates different testing strategies of the software |
| CO5 | Understand the testing types and test automation |

**Offered by: Computer Applications**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction to Software Engineering:** Evolving role of software- Software- The changing nature of Software- Software Myths. A Generic view of Process- A Layered Technology | 1 | 1 |
| | **Software Process Models:** Prescriptive models- The Waterfall Model - Incremental Process Models- Evolutionary Process Models. | 1 | 3 |
| | | **Instructional Hours** | **18** |
| II | **Requirements Engineering:** Requirements Engineering Tasks- Initiating the Requirements Engineering Process- Eliciting Requirements- Building the Analysis Model. | 1 | 7 |
| | **Building the Analysis Model:** Scenario-Based Modelling- Flow Oriented Modelling. | 1 | 6 |
| | | **Instructional Hours** | **18** |
| III | **Design Engineering:** Design Concepts -The design model. | 1 | 9 |
| | **Creating an Architectural Design:** Representing the System in Context- Defining Archetypes- Refining the Architecture into Components- Describing Instantiations of the System. | 1 | 10 |
| | **Modelling Component-Level Design:** What is a Component – Designing Class-Based Components. | 1 | 11 |
| | **User Interface Design:** User Interface Analysis and Design-Interface Design steps. | 1 | 12 |
| | | **Instructional Hours** | **18** |
| IV | **Software Development Life Cycle models:** Phases of Software project – Quality, Quality Assurance, Quality control – Testing, Verification and Validation<br>**White-Box Testing-** Static Testing – Structural Testing<br>**Black-Box Testing**- How to do Black-Box Testing? | 2 | 2,3,4 |
| | | **Instructional Hours** | **18** |

| | | | |
|---|---|---|---|
| V | **Integration Testing**: Integration Testing as Type of Testing – Integration Testing as a Phase f Testing – Scenario Testing – Defect Bash. **System and Acceptance Testing**: system Testing Overview – Why System testing is done? – Functional versus Non-functional Testing - Functional testing - Non-functional Testing – Acceptance Testing. **Performance Testing**: Methodology of Performance Testing – tools for Performance Testing. **Regression Testing**: What is Regression Testing? – Types of Regression Testing, What is Test Automation? | 2 | 5,6,7, 8,16 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book(s):**

1. Roger S Pressman, **Software Engineering a Practitioner's Approach**, Sixth Edition, McGraw Hill, International Edition, 2013
2. Srinivasan Desikan, Gopalaswamy Ramesh, **Software Testing Principles and Practices**, Pearson, 2006.

**Reference Books(s):**

1. Richard Fairley, **Software Engineering Concepts**, Tata McGraw-Hill Publishing Company Limited, 2010.
2. Waman S. Jawadekar, **Software Engineering – Principles and Practice**, Tata McGraw Hill Publishing Company Limited, 2011.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKE610 | Discipline Specific<br>Elective Paper III: Pattern Recognition | | |
| Semester: VI | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**(Common to B. Sc. AIML / DS)**

**Course Objective:**

To introduce the students about fundamentals of image formation, the major ideas, methods, and techniques of computer vision and pattern recognition.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Understand the fundamentals of image formation. |
| **CO2** | Comprehend the major ideas, methods and techniques of image processing and computer vision. |
| **CO3** | Understand typical pattern recognition techniques for object recognition. |
| **CO4** | Implement the basic image processing and computer vision techniques. |
| **CO5** | Develop simple object recognition systems and pattern classifiers. |

**Department offered:** Artificiel Intelligence & Machine Learning

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Classifiers Based on Bayes Decision Theory:** Is Pattern Recognition Important? - Features, Feature Vectors, and Classifiers - Supervised, Unsupervised, and Semi-Supervised Learning - MATLAB Programs. | 1 | 1 |
| | **Instructional Hours** | **18** | |
| II | **Classifiers Based on Cost Function Optimization –** Introduction - Bayes Decision Theory - Discriminant Functions and Decision Surfaces - Bayesian Classification for Normal Distributions - Estimation of Unknown Probability Density Functions - The Nearest Neighbor Rule - Bayesian Networks | 1 | 2 |
| | **Instructional Hours** | **18** | |
| III | **Data Transformation: Feature Generation and Dimensionality Reduction -** Introduction - Linear Discriminant Functions and Decision Hyperplane- The Perceptron Algorithm - Least Squares Methods - Mean Square Estimation Revisited - Logistic Discrimination -Support Vector Machines | 1 | 3 |
| | **Instructional Hours** | **18** | |
| IV | **Nonlinear Classifiers –** Introduction - The XOR Problem - The Two-Layer Perceptron - Three-Layer Perceptron's -. Algorithms Based on Exact Classification of the Training Set -The Backpropagation Algorithm - Pruning Techniques -Constructive Techniques - Support Vector Machines: The Nonlinear Case - Beyond the SVM Paradigm - Decision Trees- Combining Classifiers | 1 | 4 |
| | **Instructional Hours** | **18** | |

| | | | |
|---|---|---|---|
| V | **Context-Dependent Classification –** Introduction - The Bayes Classifier - Markov Chain Models - The Viterbi Algorithm - Channel Equalization - Hidden Markov Models - HMM with State Duration Modeling -Training Markov Models via Neural Networks - A Discussion of Markov Random Fields | 1 | 9 |
| | **Instructional Hours** | **18** | |
| | **Total Hours** | **90** | |

**Text Book(s):**

1. S Theodoridis and K Koutroumbas ,"Pattern Recognition", 4th Edition, Academic Press, 2009.

**Reference Book(s):**

1. Theodoridis & Koutroumbas, **"**Pattern Recognition**",** Academic Press, 4th Edition,2014
2. C Bishop ," Pattern Recognition and Machine Learning" ,Springer , 2006.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKE611 | Discipline Specific<br>Elective Paper III: Software Testing | | |
| Semester: VI | Credits: 4 | CIA: 50 Marks | ESE:50 Marks |

**(Common to B. Sc. AIML / DS)**

**Course Objective:**

To develop the fundamentals of Software Testing, mechanisms of Software Testing and implement simple Software Testing mechanisms.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | List the different types of Software testing, Quality and Verification |
| **CO2** | Understand various testing techniques including domain, usage and model-based |
| **CO3** | Develop and implement testing terminology throughout the testing process |
| **CO4** | Implement various test process for quality improvement. |
| **CO5** | Examine program and test evaluations. |

**Course Offered by: Data Science**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction:** Phases of Software Project- Quality- Quality Assurance and Quality Control- Testing, Verification and Validation- Process model to represent Different Phases- Life Cycle Models | 1 | 1,2 |
| | **Instructional Hours** | | **18** |
| II | **White Box Testing:** What is White Box Testing- Static Testing- Structural Testing- Challenges in White Box Testing. **Black Box Testing:** What is Black Box Testing- Why Black Box Testing- When to do Black Box Testing- How to do Black Box Testing | 1 | 3,4 |
| | **Instructional Hours** | | **18** |
| III | **Integration Testing:** What is Integration Testing- Integration Testing as a type of testing- Scenario Testing- Defect Bash. **System and Acceptance Testing:** System Testing Overview- Functional Vs Non-Functional- Functional Testing- Non Functional Testing- Acceptance Testing | 1 | 5,6 |
| | **Instructional Hours** | | **18** |
| IV | **Performance Testing:** Introduction- Factors governing performance testing- Methodology for Performance Testing- Tools for Performance Testing- Process for Performance Testing- Challenges. **Regression Testing:** What is Regression Testing- Types- When to do Regression Testing- How to do Regression Testing | 1 | 7,8 |
| | **Instructional Hours** | | **18** |
| V | **Test Planning, Management, Execution, and Reporting:** Introduction- Test Planning- Test Management- Test Process- Test Reporting. **Test Metrices and Measurements:** What are Test Metrices and Measurements- Why Metrices in Testing- Types- Project Metrices- Progress Metrices | 1 | 15,17 |
| | **Instructional Hours** | | **18** |
| | **Total Hours** | | **90** |

**Text Book(s):**

1. Srinivasan Desikan and Gopalaswamy Ramesh, "**Software Testing Principles and Practices"** Pearson Education Inc., Second Edition 2006.
   Unit I: Section 2.1 to 2.5 (Chapter 1)
   Unit II: Section 3.1 to 3.4, 4.1 to 4.4 (Chapter 3 and 4)
   Unit III: Section 5.1 to5.5, 6.1 to 6.6 (Chapter 5 and 6)
   Unit IV: Section 7.1 to 7.5, 8.1 to 8.4 (Chapter 7 and 8)
   Unit V: Section 15.1 to 15.5, 17.1 to 17.5 (Chapter 15 and 17)

**Reference Book(s):**

1. William Stallings, **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

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKE612 | Discipline Specific<br>Elective Paper: III Software Project Management | | |
| Semester: VI | Credits: 4 | CIA:50 Marks | ESE:50 Marks |

**(Common to B. Sc. AIML / DS)**

**Course Objective:**

To understand and develop projects and also solve problems in software project management, project planning for the software process and learn the cost estimation techniques during the project analysis.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | Remember the importance of Software Project Management |
| **CO2** | Understand the Software approaches, Estimation and Software Quality |
| **CO3** | Apply activity planning, resource allocation and managing peoples |
| **CO4** | Analyze, Interpret, Contrast and compare Software Quality |
| **CO5** | Construct the applications of software |

**Offered by: Computer Applications**

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

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | **Introduction to Software Project Management:** Introduction – why is software project management importance – Project – s/w projects versus other types of project – Activities covered by s/w project management – Some ways of categorizing s/w projects – Management – Problems with s/w projects – Overview of Project Planning. **Project Evaluation:** Evaluation of individual projects – Technical assessment – Cost benefit evaluation techniques – Risk evaluation. | 1 | 1,2 |
| | **Instructional Hours** | | **18** |
| II | **Selection Approach:** Introduction – Choosing technologies – Structure versus speed of delivery – Waterfall model – V-process model – Spiral model. **Software Estimation:** Basis for s/w estimating – s/w effort estimation techniques – Albrecht function point analysis – COCOMO model. **Risk Management**: Risk – Categories of risk – Framework – Risk identification – Risk assessment – Risk planning – Risk management – Evaluating risk – Applying PERT technique. | 1 | 4, 5 & 7 |
| | **Instructional Hours** | | **18** |
| III | **Activity Planning:** Introduction – Objectives – Project Schedules – Project and Activities – Sequencing and Scheduling activities – Network planning models – Formulating a network model – Forward pass – Backward pass – Identifying critical activities. **Resource Allocation:** Nature of resources – Identifying resource requirements – Scheduling resources – publishing resource schedule – Cost schedules – Scheduling Sequence. | 1 | 6 & 8 |
| | **Instructional Hours** | | **18** |

| | | | |
|---|---|---|---|
| IV | **Monitoring and Control:** Creating Framework – Collecting data – Visualizing progress – Cost monitoring – Prioritizing monitoring – Change control. **Managing People:** Organizational behavior – Selecting right person for the job – Motivation – Oldham-Hackman job characteristics model – Decision Making – Leadership – Organizational structures. | 1 | 9,11 |
| | | **Instructional Hours** | **18** |
| V | **Software Quality:** Introduction – Importance – Definition – ISO 9126 – Practical s/w quality measures Product versus process quality management – Techniques – Quality plans. | 1 | 13 |
| | | **Instructional Hours** | **18** |
| | | **Total Hours** | **90** |

**Text Book:**

1. Bob Hughes, Mike Cotterell, Rajib Mall **"Software Project Management",** Tata McGraw Hill Education, Fifth Edition, 2011.

**Reference Book(s):**

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.

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | 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 | 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U4CK3ED1 | 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 Outcomes**

| | |
|---|---|
| **CO1** | Remember the graphics concepts |
| **CO2** | Understand the multimedia tools and techniques |
| **CO3** | Apply the graphical designs and functions using Photoshop, CorelDraw and Flash |
| **CO4** | Create Professional design & animation |
| **CO5** | Create Animated Objects |

**Offered by: Computer Applications**

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

| S. No | 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. |
| | **Total Hours 30** |

## 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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | | |
|---|---|---|---|
| 21U4CK3ED2 | 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 Outcomes:**

| | |
|---|---|
| **CO1** | Remember about WebPages and Web sites. |
| **CO2** | Understand about different HTML Tags |
| **CO3** | Apply the tags which they understood to design web pages and web applications |
| **CO4** | Analyze the usage of Web tags |
| **CO5** | Evaluate website on real world problems according to dynamic content |

**Offered by: Computer Applications**

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

| Prog. No. | List of Programs |
|---|---|
| 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. |
| | **Total Hours 30** |

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21UDTSS01 | Self-Study Paper: Libre Office | |
| Semester: II - V | Credits: 1 | ESE: 50 Marks |

**Course Objective:** Introduces the basic features of Libre Office, Writer, Calc, Impress.

**Course Outcome:**

| | |
|---|---|
| **CO1** | Recognize when to use each of the Microsoft Office programs to create professional business documents. |
| **CO2** | Use Microsoft Office programs to create personal and/or business documents following current professional and/or industry standards. |
| **CO3** | Pursue future courses specializing in one or more of the programs. |
| **CO4** | Apply the basic concept of Libre and Recognize the elements analyse data. |
| **CO5** | Gain knowledge in 3D objects and advance draw techniques. |

**Offered by:** Data Science

**Course Content**

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| **I** | Introducing Libre Office – What is Libre Office – Advantages – Minimum Requirement – How to get and Install the Software – Extensions and Add-Ons – How to get Help – Starting LibreOffice – Parts of Main Window – Starting a New Document – Opening - Saving – Renaming and Deleting – Navigator – Undoing and Redoing – Closing a Document and LibreOffice - | 1 | 1 |
| **II** | Getting Started with Writer – Introducing – Setting Up – Working – Formatting – Introduction to Styles – Working with Graphics – Working with Tables – Working with Templates in Writer – Using Mail Merge – Creating Tables – Working with Master Documents – Working with Fields – Using Forms in Writer – Customizing Writer | 1 | 4 |
| **III** | Getting Started with Calc – Introducing – Entering, Editing, Formatting – Using Charts and Graphs – Using Styles and Templates – Using Graphics in Calc – Printing, Exporting and E-mailing – Formulas and Functions – Using the Data pilot – Data Analysis – Linking Calc Data – Sharing and Reviewing – Calc Marcos – Calc as a simple Database | 1 | 5 |
| **IV** | Getting Started with Impress – Introducing – Using Slide Masters – Adding and Formatting text – Pictures – Managing and Formatting Graphic Objects – Including Spread Sheets, Charts and Other Objects – Adding and Formatting Slides, Notes, and Handouts – Slideshows – Printing, E-mailing, Exporting and Saving Slide Shows | 1 | 6 |
| **V** | Getting Started with Draw – Introducing Draw – Drawing Basic Shapes – Working with Objects and Object Points – Changing Object Attributes – Combining Multiple Objects – Editing Pictures – Working with 3D Objects – Tips and Tricks - Organization Charts – Flow Diagrams – Advanced Draw Technique | 1 | 7 |

**Text Book :**

1. Libre Office – Getting Started Guide, 2017

**Reference Books:**

1. http://www.open-of-course.org/courses/course/view.php?id=86.

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |

| Course Code | Title | |
|---|---|---|
| 21UDTSS02 | Self-Study Paper: Quantitative Aptitude | |
| Semester: II - V | Credits: 1 | ESE: 50 Marks |

**(Common to B. Sc. IT / DCFS / DS)**

**Course Objective:**

To enable the students to know the Integration of Business Information, Learn the core activities in the systems development process.

**Course Outcomes:**

| | |
|---|---|
| **CO1** | To understand and gain knowledge about L.C.M & H.C.F. |
| **CO2** | To analyze Profit and Loss & Ratio and Proportion. |
| **CO3** | To enhance the skill of understanding problems on Ages and Calendar. |
| **CO4** | To evaluate the Problems on Train and Boats and Streams. |
| **CO5** | To gain knowledge in solving Time, Work, Pipes & Cistern. |

**Department Offered: Information Technology**

**Course Content**

| Unit | Description | Text Book | Chapter |
|---|---|---|---|
| I | Numbers | 1 | 1 |
| | L.C.M. & H.C.F. | 1 | 2 |
| | Average | 1 | 6 |
| | | | |
| II | Percentage | 1 | 10 |
| | Profit and Loss | | 11 |
| | Ratio and Proportion | | 12 |
| | | | |
| III | Simple Interest | 1 | 21 |
| | Compound Interest | | 22 |
| | Problems on Ages | 1 | 8 |
| | Problems on Calendar | 1 | 27 |
| | Problems on Clocks | 1 | 28 |
| | | | |
| IV | Time and distance | 1 | 17 |
| | Problems on Trains | 1 | 18 |
| | Boats and Streams | 1 | 19 |
| | | | |
| V | Time and Work | 1 | 15 |
| | Pipes and Cisterns | 1 | 16 |

**Text Books:**

1. Dr. R. S. Aggarwal , **Quantitative Aptitude** , S. Chand, 7th Edition, 2008

**Reference Book**:

1. Dr. R. S. Aggarwal , **A Modern approach to verbal and non-verbal reasoning**, S. Chand, 7th Edition, 2008 .

**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 | Checked by | Approved by |
|---|---|---|---|
| | | | |
| | | | |