



**Dr.M.G.R.**  
**Educational and Research Institute**  
**UNIVERSITY**  
(Decl. U/S 3 of the UGC Act 1956)  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**BCA Data Analytics (Full Time)**  
**Curriculum & Syllabus**  
**2018 Regulations**

<b>I SEMESTER</b>							
<b>S.NO</b>	<b>Sub.Code</b>	<b>Title of the Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
1.	HBTA18001 HBHI18001 HBFR18001	Tamil/Hindi/French – I	3	0	0	3	
2.	HBEN18001	English – I	3	0	0	3	
3.	HBMA18A01	Allied Paper Mathematics I	3	1	0	4	
4.	HBCA18B01	Fundamentals of Computers	3	1	0	4	
5.	HBCA18B02	DOS and Office Automation	3	1	0	4	
6.	HBCA18BL01	DOS and Office Automation Laboratory	0	0	2	2	
<b>(Additionally 2 Workshops)</b>			<b>Total</b>	<b>15</b>	<b>3</b>	<b>2</b>	<b>20</b>

<b>II SEMESTER</b>							
<b>S.NO</b>	<b>Sub.Code</b>	<b>Title of the Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
1.	HBTA18002 HBHI18002 HBFR18002	Tamil/Hindi/French – II	3	0	0	3	
2.	HBEN18002	English – II	3	0	0	3	
3.	HBMA18A02	Allied Paper Mathematics II	3	1	0	4	
4.	HBCA18B03	Programming for Analytics	3	1	0	4	
5.	HBCA18B04	Programming in C	3	1	0	4	
6.	HBCA18BL02	Programming for Analytics Laboratory	0	0	2	2	
			<b>Total</b>	<b>15</b>	<b>3</b>	<b>2</b>	<b>20</b>



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III SEMESTER						
S.NO	Sub.Code	Title of the Subject	L	T	P	C
1.	HBCA18A01	Allied Paper Introduction to Digital Fundamentals	3	1	0	4
2.	HBCA18B05	Business Statistics with R	3	1	0	4
3.	HBCA18B06	Web Page Designing	3	1	0	4
4.	HBCA18B07	Software Engineering	3	1	0	4
5.	HBMG18BL01	Soft Skills I	2	0	0	2
6.	HBCA18BL03	Mini Project Work	0	0	2	2
7.	HBCA18BL04	Web Page Designing Laboratory	0	0	2	2
<b>Total</b>			<b>14</b>	<b>4</b>	<b>4</b>	<b>22</b>

IV SEMESTER						
S.NO	Sub.Code	Title of the Subject	L	T	P	C
1.	HBCA18A02	Allied Paper Computer Organization and Microprocessor Design	3	1	0	4
2.	HBCA18B08	Object Oriented Paradigm and Programming in C++	3	1	0	4
3.	HBCA18B09	Introduction to RDBMS	3	1	0	4
4.	HBCA18B10	Multivariate Data Analysis	3	1	0	4
5.	HBMG18BL02	Soft Skills II	2	0	0	2
6.	HBCA18BL05	Programming in C++ Laboratory	0	0	2	2
7.	HBCA18BL06	RDBMS Laboratory	0	0	2	2
<b>Total</b>			<b>14</b>	<b>4</b>	<b>4</b>	<b>22</b>



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V SEMESTER						
S.NO	Sub.Code	Title of the Subject	L	T	P	C
1.	HBMG18001	Environment Studies	3	0	0	3
2.	HBCA18B11	Programming in Java	3	1	0	4
3.	HBCA18BE01	Elective 1- Data Mining with R	3	1	0	4
4.	HBCA18B12	Visual Programming	3	1	0	4
5.	HBCA18B13	Computer Graphics and Multimedia Systems	3	1	0	4
6.	HBCA18BL07	Programming in Java Laboratory	0	0	2	2
7.	HBCA18BL08	Visual Programming Laboratory	0	0	2	2
<b>Total</b>			<b>15</b>	<b>4</b>	<b>4</b>	<b>23</b>

VI SEMESTER						
S.NO	Sub.Code	Title of the Subject	L	T	P	C
1.	HBMG18B01	Entrepreneurial Development	3	0	0	3
2.	HBCA18B14	Linux Operating System	3	1	0	4
3.	HBCA18BE02	Elective II – Open source Programming	3	1	0	4
4.	HBCA18BL09	Linux Laboratory	0	0	2	2
5.	HBCA18BL10	PROJECT WORK	0	0	10	10
<b>Total</b>			<b>9</b>	<b>2</b>	<b>12</b>	<b>23</b>

**Summary of Credits**

**1<sup>st</sup> Semester – 20**

**2<sup>nd</sup> Semester – 20**

**3<sup>rd</sup> Semester – 22**

**4<sup>th</sup> Semester – 22**

**5<sup>th</sup> Semester – 23**

**6<sup>th</sup> Semester – 23**

**Total - 130**



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**Elective List**

<b>Electives</b>						
<b>S.NO</b>	<b>Sub.Code</b>	<b>Title of the Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1.	HBCA18BE01	Data Mining with R	3	1	0	4
2.	HBCA18BE02	Open Source Programming	3	1	0	4
3.	HBCA18BE03	Information Security	3	1	0	4
4.	HBCA18BE04	Professional Ethics	3	1	0	4
5.	HBCA18BE05	Software Project Management	3	1	0	4
6.	HBCA18BE06	Management Information System	3	1	0	4
7.	HBCA18BE07	Mobile Computing	3	1	0	4
8.	HBCA18BE08	Image Processing	3	1	0	4
9.	HBCA18BE09	Introduction to Cloud Computing	3	1	0	4
10.	HBCA18BE10	Software Testing	3	1	0	4



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**HBTA18001**

**TAMIL**

**3 0 0 3**

**நோக்கம்:**

- வாய்மொழி இலக்கியத்தையும் செய்யுள் இலக்கியத்தையும் அறிந்துகொள்ளல்.
- சிறுகதை மரபினைப் புரிந்துகொள்ளல்.
- பிழையின்றித் தமிழ் எழுதுவதற்கு அடிப்படை இலக்கணத்தைப் பயிற்றுவித்தல்.
- கவிதை மரபினையும் சிறுகதை மரபினையும் வரலாற்று நிலையிலிருந்து விளக்குதல்.

**முதல் பருவம் – தமிழ்த்தாள் 1**

**அலகு – 1**

செய்யுள் திரட்டு வாய்மொழி இலக்கியம்: **நாட்டுப்புறப்பாடல்கள்**

1. தாலாட்டு
2. காதல்
3. ஒப்பாரி
4. காணிநிலம் வேண்டும் – பாரதியார்
5. நல்லதோர் வீணை – பாரதியார்
6. தமிழ்க்காதல் – பாரதிதாசன்
7. தமிழ் வளர்ச்சி – பாரதிதாசன்
8. எந்நாளோ? – பாரதிதாசன்
9. ஆறுதன் வரலாறு கூறுதல் – கவிமணி தேசிக விநாயகம்பிள்ளை

**அலகு – 2**

1. வழித்துணை – ந. பிச்சமூர்த்தி
2. குருடர்களின் யானை – அப்துல் ரகுமான்
3. முள் முள் முள் – சிற்பி

**அலகு – 3 (புதுமைப்பித்தன் கதைகள்)**

1. கடவுளும் கந்தசாமிப்பிள்ளையும்
2. செல்லம்மாள்
3. துன்பக்கேணி
4. ஆற்றங்கரைப் பிள்ளையார்
5. ஒருநாள் கழிந்தது

**அலகு – 4**

1. பெயர், வினை, இடை, உரிச்சொற்களின் பொது இலக்கணம், வலிமிகும் இடங்கள், வலிமிகா இடங்கள்

**அலகு – 5**

1. தமிழ்க்கவிதையின் தோற்றமும் வளர்ச்சியும் (மரபுக்கவிதை, புதுக்கவிதை)
2. தமிழ்ச்சிறுகதையின் தோற்றமும் வளர்ச்சியும்
3. மரபுத்தொடர்கள், பொருந்திய சொல் தருதல், கலைச்சொற்கள், நேர்காணல்

**மேற்பார்வை நூல்கள்:**

1. சென்னைப்பல்கலைக் கழக வெளியீடு – 2013
2. பொது இலக்கணம்

Total No of Hrs : 45



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**HINDI – I**

**3 0 0 3**

**OBJECTIVES:**

- Special emphasis on creative writing with phrases and quotes.
- Essays of eminent authors have been selected
- Administrative terms prescribed by official language department is taught

Prose, Administrative Hindi and Grammer.

**UNIT I**

**9 Hrs**

1. Sabhyatakarahasya – lesson and annotations ,Questions & answers,
2. Administrative terms ( Prayojanmulak Hindi)

**UNIT II**

**9 Hrs**

1. Mitrathakarahasya - lesson and annotations questions and answers
2. Patralekhan, definitions, correspondence in hindi

**UNIT III**

**9 Hrs**

1. Paramanuoorjaevam and kadhyasanrakshan (lesson ) annotations and answers,
2. Technical terms and words, letter writing

**UNIT IV**

**9 Hrs**

1. Yuvavon se (lesson), annotations, essay and questions and answers
2. Types of official correspondence, technical terms
3. Grammer(Change of voice, correcting the sentences)

**UNIT V**

**9 Hrs**

1. Yogyataaurvyavasaykachunav (Lesson) essay, questions and answers
2. Letter writing
3. grammer& technical terms

**Total no of Hrs: 45**

**TEXT BOOK:**

1. Dr. Syed Rahmatullah&PoornimaPrakashan, Hindi gadhyamaala

**REFERENCES:**

1. Dr. Syed Rahmatullah&PoornimaPrakashan, *Prayojanmulak Hindi*
2. Dakshin Bharat Hindi Prachara Sabha, T.Nagar,*Saral Hindi Vyakaran-2*



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<b>HBFR18001</b>	<b>FRENCH – I</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNITÉ 1</b>					<b>9 Hrs</b>
<b>Découvrir le langue française</b>					
<b>UNITÉ 2</b>					<b>9 Hrs</b>
<b>Faire connaissance</b>					
<b>UNITÉ 3</b>					<b>9 Hrs</b>
<b>Organizer son temps</b>					
<b>UNITÉ 4</b>					<b>9 Hrs</b>
<b>Découvrir son environnement</b>					
<b>UNITÉ 5</b>					<b>9 Hrs</b>
<b>S’informer, Se faire plaisir</b>					
					<b>Total no. of Hrs: 45</b>

**TEXT BOOK:**

Authors: Jacky Girardet, Jacques Pécheur

Available at :Goyal Publishers Pvt Ltd 86, University

Block JawaharNagar ,New Delhi – 110007. Tel : 011 – 23858362 / 23858983



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**ENGLISH - I**

**3 0 0 3**

**COURSE OBJECTIVES:**

- To prepare students for attaining a comprehensive knowledge of the communication skills.
- To make them understand the nuances of the language and use its vocabulary in appropriate contexts.
- To develop in students a knowledge of the various techniques in language use.
- To develop in them analytical and interpretative skills.
- To train learners in organized academic and business writing.

**Unit I-PROSE- For Detailed Study**

- |                               |                 |
|-------------------------------|-----------------|
| 1. On Running After One's Hat | G.K. Chesterton |
| 2. The Unexpected             | Robert Lynd     |
| 3. How to be a Doctor         | Stephen Leacock |

**Unit II- POETRY- For Detailed Study**

- |                                    |                     |
|------------------------------------|---------------------|
| 1. Ulysses                         | Lord Tennyson       |
| 2. If                              | Rudyard Kipling     |
| 3. Leave this Chanting and Singing | Rabindranath Tagore |

**Unit III- SHORT STORY**

- |                            |              |
|----------------------------|--------------|
| 1. A Retrieved Reformation | O'Henry      |
| 2. Engine Trouble          | R.K. Narayan |

**Unit IV – GLIMPSES FROM GREAT MINDS**

- |                        |                     |
|------------------------|---------------------|
| 1. I lived with words  | R.L. Stevenson      |
| 2. My Vision for India | Dr. APJ Abdul Kalam |

**Unit V - FUNCTIONAL ENGLISH**

Enhancing LSRW Skills through Tasks

**Note: Each lesson to be followed by text-based Vocabulary, Grammar, and Usage Exercises**

Synonyms, Antonyms- Affixes ( prefixes & Suffixes)-Noun- Adjectives, Verb, Tense, Adverb, Preposition, 'if' clause, Articles, discourse markers, Reported and Direct speech- Voice, Degrees of comparison, Interrogatives  
Comprehension, Précis writing

**Text Books, Reference Books and Web Resources**

1. Quest: A Textbook of Communication Skills, Orient Blackswan,
2. Pushkala R, P.A.Sarada, El Dorado: A Textbook of Communication Skills, Orient Blackswan, 2014
3. Padmasani Kannan.S., Pushkala.R. : Functional English
4. <https://learnenglish.britishcouncil.org>
5. [www.englishpage.com](http://www.englishpage.com)
6. [www.writingcentre.uottawa.ca/hypergrammar/preposit.html](http://www.writingcentre.uottawa.ca/hypergrammar/preposit.html)

**Total No of Hrs : 45**





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**HBMA18A01**

**MATHEMATICS I**

**3 1 0 4**

**OBJECTIVES:**

- Engage students in sound mathematical thinking and reasoning.
- Analyze the structure of real world problems and plan solution strategies.
- Solve the Problems using appropriate tools.

**UNIT I**

**12 Hrs**

ALGEBRA: Binomial, Exponential, Logarithmic Series (without proof of theorems) –Problemson Summation, Approximation and Coefficients.

**UNIT II**

**12 Hrs**

MATRICES: Characteristic equation –Eigen values and Eigen vectors of a real matrix–Properties of Eigen values–Cayley-Hamilton theorem (withoutproof)–Orthogonal reduction of asymmetric matrix to Diagonal form.

**UNIT III**

**12 Hrs**

TRIGONOMETRY: Expansion of  $\sin n\theta$ ,  $\cos n\theta$  in powers of  $\sin\theta$  and  $\cos\theta$ –Expansion of  $\tan n\theta$ –Expansion of  $\sin^n \theta$  and  $\cos^n \theta$  in terms of Sines and Conines of multiples of  $\theta$ –Hyperbolic functions–Separation into real and imaginary parts.

**UNIT IV**

**12 Hrs**

DIFFERENTIATION: Basicconcepts of Differentiation–Elementary differentiation methods –Parametric functions–Implicitfunction –Leibnitz theorem(without proof)–Maxima and Minima– Points of inflection.

**UNIT V**

**12 Hrs**

FUNCTIONSOF SEVERAL VARIABLES : Partial derivatives– Total differential–Differentiation of implicitfunctions–Taylor'sexpansion–Maxima and Minima by Lagrange'sMethod of undeterminedmultipliers– Jacobians.

**Total No of Hrs:60**

**TEXT BOOK:**

1. Kreyszig,E(2001)*AdvancedEngineeringMathematics*(8<sup>th</sup>ed.),JohnWileyandSons(Asia)Pvt.Ltd., Singapore.

**REFERENCES:**

- 1.Grewal,B.S(2000) *Higher Engineering Mathematics*(3<sup>5</sup>thed.), Khanna Publishers, Delhi,
- 2.JohnBird(2010) *BasicEngineeringMathematics*(5<sup>th</sup>ed.),ElsevierLtd.
- 3.Veerarajan(2002) *EngineeringMathematicsforIYr*.TataMcGrawHillPublishingCo.,NewDelhi.
- 4.Kandasamy, P&Thilagavathy,K&Gunavathy, K(2000) *Engineering Mathematics*(4<sup>th</sup>Revised ed.),S.Chand& Co., Publishers, New Delhi.



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**HBCA18B01**

**FUNDAMENTALS OF COMPUTERS**

**3 1 0 4**

**OBJECTIVES:**

- ✓ To give you a general understanding of how a computer works
- ✓ Introduce you to assembly-level programming
- ✓ To prepare you for future courses
- ✓ Introduction To Programming Environment
- ✓ Input/ Output Devices and Memory units

**UNIT I**

**12 Hrs**

**Computer Basics:** Algorithms – simple model of computer- Characteristics of computer-Problem solving using computers-**Data Representation:** Characers-integers-fractions-Hexadecimal representation of numbers-Decimal to binary conversion.

**UNIT II**

**12 Hrs**

**Input/ Output Devices and Memory: Input Devices:** Keyboard –Display unit-Computer mouse-Touch pad-Touch Screen – MICR – OMR-Flatbed Scanner- OCR-BarCode- **Output Devices** – Flat panel Display Technology – E-ink Display –Printers- Inkjet printers- Laser printers – Dot Matrix printers – Line printers- Plotters - **Memory** : Cell-Memory Organization-ROM-Serial access memory- Magnetic hard disc- CDRom-Magnetic Tap driver-Memory hierarchy.

**UNIT III**

**12Hrs**

**Programming Lanuguages:** Introduction To Programming Languages – Assembly languages –high level programming languages-Computer generations and Classification: First,Second,Third,Fourth and Fifth generation-Classification of computers.

**UNIT IV**

**12 Hrs**

**Microcomputers:** Ideal microcomputer - Actual microcomputer - Memory system for microcomputers- microcomputer configuration- Evolution of microcomputers – Introduction to OS-Types of Operating System: Batch Operating system – Multiprogramming – Time sharing – On-line system- Real time systems – Personal computer operating system.

**UNIT V**

**12 Hrs**

**Computer Networks** : Introduction, Networking devices - NIC, Modem, Repeater, Bridge, Hub, Switch, Router,Types of Networks, Network Architecture-Client/Server,Peer-to-Peer, Network Topologies,Network Communication Technology-Intranet,Extranet,Internet

**Total No of Hrs: 60**

**TEXT BOOK:**

1. Rajaraman, V and Neeharika adabala (2010), “Fundamentals Of Computers(6<sup>th</sup> ed.),PHI Learning

**REFERENCES:**

1. Sinha, P, K(2004), “*Computer Fundamentals(6<sup>th</sup> ed.)*”, BPB Publications.
2. Reema Thareja(2014), “*Fundamentals of Computers*”, Oxford
3. Anita Goel(2010), “*Computer Fundamentals*”, Pearson Education India.



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**HBCA18B02**

**DOS AND OFFICE AUTOMATION**

**3 1 0 4**

**OBJECTIVES:**

- To discuss the Disk Operating System
- Features of MS-WINDOWS
- To improve quality of output in terms of presentation and reduction in processing time
- Discussing Microsoft Word documents and working with tables and columns
- Introduction to Ms-Excel & Powerpoint

**UNIT I**

**12Hrs**

**Disk Operating System :** Introduction - History & Version of Dos. Dos basics-Physical structure of disk, drive name, FAT, file & directory structure and naming rules. Booting process. DOS system files. Dos Commands - Internal : DIR, MD, CD, RD, COPY, DEL, REN, VOL, DATE, TIME, CLS, PATH, TYPE. External : CHKDSK, XCOPY, PRINT, DISKCOPY, DISCOMP, DOSKEY, TREE, MOVE, LABEL, APPEND, FORMAT, SORT, FDISK, BACKUP, EDIT, MODE, ATTRIB HELP, SYS.

**UNIT II**

**12Hrs**

**Windows Operating System:** Hardware requirements of Windows, Windows concepts, features, windows structure, Desktop, Taskbar, Start Menu, My Computer, Recycle bin - Windows Accessories: Calculator, Notepad, Paint, Wordpad, Character map, Windows Explorer: Creating folders and other explorer facilities. Entertainment, CD Player, DVD Player, Media Player, Sound Recorder, Volume Control.

**UNIT III**

**12 Hrs**

**Introduction to MS Word:** Starting Word-Typing and saving your Masterpiece- Toolbars - The Ruler-Insertion point - Scroll Bars - The Menu bar - The status bar - Dialog Boxes - Command buttons - check boxes - drop-down lists -tabs - radio buttons - Increment buttons -Wizards and Templates - Basic Text Editing: Moving around in a document, Adding Text, Cut, Copy, Paste, Undo, Redo, Delete .

**UNIT IV**

**12 Hrs**

**Formatting & Working with tables & columns :** Character and paragraph Formatting, - font dialog box - Keeping text together- Adding borders and shading - setting page margins - numbering pages-Proof reading Tools: Find and replace, Checking Grammar, Using the Thesaurus - Creating a table-Using table tools changing columns widths with Auto fit: Gridlines, Merging Cells, Formatting Sorting tables, copying tables, deleting tables - Mail merge.

**UNIT V**

**12 Hrs**

**Introduction to Ms-Excel and Powerpoint :** Overview - Excel highlight - starting excel - creating spreadsheet excel menu -Working with Formulas and Functions, advance formulas - Formatting:Types of formatting Using borders, color and patterns- Creating , Formatting and Exploring charts - Creating a Presentation- Modifying a Presentation - Inserting Objects into a Presentation - Working with Advanced Tools and Masters - Enhancing Charts Inserting Objects and Media Clips

**Total No of Hrs: 60**

**TEXT BOOK:**

1. Corey Sandler , Tam Badgett& Jan Weingarten, *Teach Yourself Office 97/2000 For Windows* , BPB Publications,
2. Russell A Stultz *Dos 6.22*, BPB Publication .

**REFERENCES:**

1. Stephen L. Nelson(1999) , *Office 2000: The Complete Reference* , McGraw-Hill.
2. Paul McFedries (2003), *Teach Yourself VISUALLY Windows 8.1*, Wiley Publisher.



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**HBCA18BL01**

**DOS AND OFFICE AUTOMATION LABORATORY**

**0 0 2 2**

**OBJECTIVES:**

- Students will learn various internal and external DOS commands
- Students should know how to operate Windows OS
- Students will be learning and knowing to operate MS WORD
- Students will have knowledge on MS EXCEL worksheets and POWERPOINT

**DOS AND WINDOWS**

1. Study of various internal and external commands of DOS.
2. Study of various batch file commands and creation of batch file
3. Study of redirection and piping concept.
4. Study of Windows OS and Accessories of windows

**MSWORD**

5. Text Manipulations & Formatting
6. Usage of Numbering, Bullets, Footer and Headers.
7. Usage of Spell check, and Find & Replace.
8. Creation templates.
9. Mail Merge Concepts.
10. Copying Text & Pictures from Excel.

**MS - EXCEL**

11. Cell Editing.
12. Usage of Formulae and Built-in Functions.
13. File Manipulations.
14. Data Sorting (both number and alphabets)& usage of auto formatting
15. Drawing Graphs.

**POWER POINT**

16. Inserting Clip arts and Pictures AND Frame movements
17. Preparation of Organisation Charts.
18. Presentation using Wizards.

**Total Hrs needed to complete the lab: 30**



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**HBCA18B03**

**PROGRAMMING FOR ANALYTICS**

**3 1 0 4**

**OBJECTIVES:**

- Introduction to DBMS.
- SQL commands and operations
- Introduction to SAS
- Basics of Python
- R Programming Basics

**UNIT I**

**12Hrs**

**Introduction: Database Management Systems** – Definition, Characteristics of DBMS, Architecture & Security, Types of Data Models, Concepts and constraints of RDBMS, Introduction to Structured Query Language, MySql Installer, Download sample Database, Loading Sample Database.

**UNIT II**

**12Hrs**

**Data definition and Manipulation:** SQL Process, SQL Commands – DDL, DML, DCL, DQL, SQL Constraints, Data Integrity, Data Types, SQL Operators, Expressions, Querying Database, Retrieving result sets, Sub Queries, Syntax for various Clauses of SQL, Functions and Joins, Indexes, Views, Transactions.

**UNIT III**

**12Hrs**

**Basics of SAS:** Introduction to SAS, Installation of SAS university Edition, prerequisites for data analysis using SAS, SAS Architecture, Data Types, Formats and Informats, SAS coding- Data step and proc step, Libraries, Importing external data, Reading and Manipulating Data, Functions, Data Transformations, Conditional Statements.

**UNIT IV**

**12Hrs**

**Python:** Basics of Python – various tools, Installation of Anaconda Navigator, Data types – string, tuples, set, lists, dictionary, Arrays. Spyder, Importing and Exporting Files, Data Manipulation, Descriptive Statistics and Documentation with Jupyter.

**UNIT V**

**12Hrs**

**R Programming:** Basics of R, Installation of R studio, Vectors, Matrices, Data types, Importing files, Writing files, Merging Files, Data Manipulation, Creation and Deletion of New Variables, Sorting of Data, Functions, Graphical Presentation and Descriptive Statistics.

**Total No of Hrs: 60**

**REFERENCES:**

1. Dyer. (2008). MYSQL in a nutshell. O’ Reilly
2. DuBois. (2014). MySQL cookbook. O’ Reilly
3. Delwiche& Slaughter. (2012). SAS: The little SAS Book. SAS Institute
4. Hemedinger&McDaniel. (2010). SAS for dummies. Wiley
5. Grolemond. (2014). R : Hands-on Programming; Garrett, O’ Reilly
6. Paul. (2011). R: R Cookbook. O’ Reilly
7. Madhavan. (2015). Mastering Python for Data Science. Packt
8. McKinney. (2018). Python for Data Analysis. O’ Reilly



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HBCA18B04

PROGRAMMING IN C

3 1 0 4

**UNIT I**

**12 Hrs**

**C fundamentals:** Character set - keywords and Identifiers - constants - Variables – Declarations of variables –Data types – Expressions - Operators: Arithmetic-Relational-logical- Assignment- Increment and Decrement- Conditional – Bitwise - Special operators - Mathematical functions.

**UNIT II**

**12 Hrs**

**Decision making, Looping and Arrays:** Decision making : Simple if- if...else- nested if..else- switch case - goto statement - Looping: while, do- while, for loop. One dimensional array-two dimensional array - Character arrays – Strings - String handling functions.

**UNIT III**

**12 Hrs**

**Functions:** Definition –function declaration- function call - Passing arguments – Recursion - Storage Classes: Automatic, External, Static and Register Variables.

**UNIT IV**

**12 Hrs**

**Structures and Pointers :** Defining and declaration of structures - Accessing structure members – Unions - Pointers - Declarations – Accessing a variable through its pointer-Pointer and Arrays

**UNIT V**

**12 Hrs**

**Files:** Types of files - Opening and closing a file - Input/ Output operations on files.

**Total No of Hrs: 60**

**TEXT BOOK:**

1. Balaguruswamy, E(2012), *Programming in C(6th ed.)*, Tata McGraw-Hill Publishing Company Limited.

**REFERENCES:**

1. Byron Gottfried & Jitender Chhabra(2010), *Programming with C* (Schaum's Outlines Series), McGraw Hill Education.
2. K N King(2008), *C Programming(2<sup>nd</sup> ed.)*, W. Norton & Company



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**HBCA18BL02**

**PROGRAMMING FOR ANALYTICS**

**0 0 2 2**

**OBJECTIVES:**

- Students will learn various commands of R, SAS and Python.
  - Students should know how to create and query a database.
1. Creation of Database.
  2. Run various SQL queries on the database.
  3. Study of various steps, functions and statements of SAS programming.
  4. Study of Anaconda Navigator and various tools of Python.
  5. Study of various Python commands to explore data information.
  6. Study of R Studio.
  7. Study of various data types, functions and other commands in R.

**Total Hrs needed to complete the lab: 30**



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**HBCA18A01 ALLIED PAPER INTRODUCTION TO DIGITAL FUNDAMENTALS    3   1   0   4**

**OBJECTIVES :**

- Student will learn the concepts of computer organization for several engineering applications.
- Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.

**UNIT I**

**12 Hrs**

**Binary Systems** : Digital Computers and Digital Systems – Binary Numbers – Number Based Conversions – Octal and Hexadecimal Numbers - Complements - Binary codes - Binary logic

**UNIT II**

**12 Hrs**

**Logic Gates and Simplification of Boolean Functions** : Digital Logic Gates - Truth tables. K- map method (upto 5 Variables) – Product of Sums Simplifications – Don't Care Conditions - Mc-Clausky Tabulation method.

**UNIT III**

**12 Hrs**

**Combinational Logic** : Adders - Subtractors - Decoders - Encoders - Multiplexer - Demultiplexer - Design of Circuits using decoders/Multiplexers - ROM - PLA (Programmable Logic Array)– PAL(Programmable Array Logic).

**UNIT IV**

**12 Hrs**

**Sequential logic** : Flip flops : RS, JK, Master-Slave flipflop, D and T Flip flops - Registers – Shift Registers – Types of shift registers : SIPO, SISO, PISO, PIPO.

**UNIT V**

**12 Hrs**

**Counters and Memory** : Counters - Ripple Counters - Synchronous Counter-asynchronous counter, Up/down synchronous counters, Cascaded counters –Basics of Memory- RAM-ROM-PROM-EPROM

**Total No of Hrs: 60**

**TEXT BOOKS:**

1. Morris Mano, M(1984), *Digital Logic and Computer Design*(2<sup>nd</sup> ed.), Prentice Hall of India
2. Thomas L. Floyd & R.P. Jain, (2009), *Digital Fundamentals*(8<sup>th</sup> ed.), Pearson Education

**REFERENCE :**

1. Barte, T, C(1991) *Computer Architecture and logical Design* McGraw Hill,.





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**DEPARTMENT OF COMPUTER APPLICATIONS**

**HBCA18B05**

**BUSINESS STATISTICS WITH R**

**3 1 0 4**

**OBJECTIVES :**

- To make students exercise the fundamentals of statistical analysis in R environment. They would be able to analysis data for the purpose of exploration using descriptive and inferential statistics.
- Students will understand Probability and Sampling Distribution and learn creative application of Linear Regression in Multivariate context for predictive purpose.

**UNIT I**

**12 Hrs**

**Introduction to R Programming:** R and R Studio, Logical Arguments, Missing Values, Characters, Factors and Numeric, Help in R, Vector to Matrix, Matrix Access, Data Frames, Data Frame Access, Basic Data Manipulation Techniques, Usage of various apply functions – apply, lapply, sapply and tapply, Outliers treatment.

**UNIT II**

**12 Hrs**

**Descriptive Statistics** - Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median, Bar Chart, Pie Chart and Box Plot, Measures of Variability, Range, Inter-Quartile-Range, Standard Deviation, Skewness and Kurtosis, Histogram, Stem and Leaf Diagram, Standard Error of Mean and Confidence Intervals.

**UNIT III**

**12 Hrs**

**Probability and Sampling Distribution:** Experiment, Sample Space and Events, Classical Probability, General Rules Of Addition, Conditional Probability, General Rules For Multiplication, Independent Events, Bayes' Theorem, Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal Distribution & t-distribution, Sampling Distribution and Central Limit Theorem.

**UNIT IV**

**12 Hrs**

**Statistical Inference and Hypothesis Testing:** Population and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t Test, Confidence Intervals, One Sample Proportion Test, Paired Sample t Test, Independent Samples t Test, Two Sample Proportion Tests, One Way Analysis of Variance and Chi Square Test.

**UNIT V**

**12 Hrs**

**Correlation and Regression:** Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Correlation Matrix, Scatter Plots, Simple Linear Regression, R Square, Adjusted R Square, Testing of Slope, Standard Error of Estimate, Overall Model Fitness, Assumptions of Linear Regression, Multiple Regression, Coefficients of Partial Determination, Durbin Watson Statistics, Variance Inflation Factor.

**Total No of Hrs : 60**

**REFERENCES:**

1. Ken Black (2013). *Business Statistics*, New Delhi, Wiley.
2. Anderson, David R., Thomas A. Williams and Dennis J. Sweeney. (2012). *Statistics for Business and Economics*. New Delhi: South Western.
3. Levin, Richard I. and David S. Rubin (1994). *Statistics for Management*. New Delhi: Prentice Hall.
4. Waller, Derek. (2008). *Statistics for Business*. London: BH Publications.
5. Lee, Cheng. et al. (2013). *Statistics for Business and Financial Economics*. New York: Heidelberg Dordrecht.



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**HBCA18B06**

**WEB PAGE DESIGNING**

**3 1 0 4**

**OBJECTIVES:**

- Understand the importance of the web as a medium of communication.
- Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Learn the language of the web: HTML and CSS.

**UNIT I**

**12 Hrs**

**Web Publishing:** Web browser – WWW - Web design process: Implementation, Maintenance Phases of Website - Web Publishing - HTML Documents: Overview, rules guidelines, structure of HTML documents, document types.

**UNIT II**

**12 Hrs**

**HTML Tags:** <HTML> - <HEAD> - <TITLE> , <BODY>,<Marquee> - Paragraphs - Lists - Text Formatting, <Font>, Text Styles - Adding Graphics to HTML Documents- Linking Documents

**UNIT III**

**12Hrs**

**Tables, Frame and Forms:** Table tag and its Attributes - Frame: Overview of frame, Frameset - Simple frame, Frame targeting - Forms: Form objects and Methods.

**UNIT IV**

**12 Hrs**

**DHTML:** Introduction to Dynamic HTML – CSS – Addition Style to a Document : Linking to a Style Sheet - Embedding and Importing Style Sheet

**UNIT V**

**12 Hrs**

**Introduction to PHP :** Including PHP in a page - Data types - Arrays -Regular expressions - Functions- Managing Cookies - Maintaining Sessions

**Total No of Hrs: 60**

**TEXT BOOK:**

1.Thomas A. Powell(1999), *HTML: The Complete Reference*(2nd. ed.), Bpb Publication.

**REFERENCES:**

1. Ed. Wilson (2006), *Microsoft VBScript: Step by Step*, Microsoft Press
2. Sterling Hughes(2001) *PHP:Developers's Cook book*,BPB publications
3. Ivan N Bayross(2000), *Web Enabled Commercial Applications Development Using, HTML, DHTML, Java Script, Perl CGI*(2<sup>nd</sup> ed.), BPB Publications



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**HBCA17B10**

**SOFTWARE ENGINEERING**

**3 1 0 4**

**OBJECTIVE:**

To inculcate knowledge on Software engineering concepts in turn gives a roadmap to design a new software project.

**UNIT I**

**12Hrs**

**Introduction to Software Engineering:** Planning a Software Project: Planning the Development Process – Planning an Organizational Structure. Definitions – Size Factors – Quality and Productivity Factors. Software cost Factors – Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Estimation Costs.

**UNIT II**

**12Hrs**

**Design Notations & Techniques:** Software Requirements Definition: The Software Requirements specification – Formal Specification Techniques. Software Design: Fundamental Design Concepts – Modules and Modularization Criteria. Implementation Issues: Structured Coding Techniques – Coding Style – Standards and Guidelines – Documentation Guidelines.

**UNIT III**

**12Hrs**

**Testiing Environment And Test Processes:** Overview of Software Testing Process - Organizing for Testing : Requirement Specifications – Static & Dynamic Testing : Verification & Validation - Analyzing and Reporting Test Results – Post Implementation Analysis. Software Testing Life Cycle: SDLC & STLC , Stages - Test case Templates– Traceability Matrix - Defect Tracking Templates – Postmortem Report.

**UNIT IV**

**12Hrs**

**Types, Techniques And Levels Of Testing:** Developing the Test Plan - Using White Box Approach –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables – State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing - Functionality Testing - Performance Testing - Compatibility Testing - Case study

**UNIT V**

**12Hrs**

**Quality Assurance:** Walkthroughs and Inspections - Static Analysis - Symbolic Execution - Unit Testing and Debugging - System Testing - Formal Verification: Enhancing Maintainability during Development - Managerial Aspects of Software Maintenance - Source Code Metrics

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Pressman,R,S(1997) *Software Engineering*(4<sup>th</sup> ed.) , McGraw Hill.

**REFERENCES:**

1. Fairley,R(1997) *Software Engineering Concepts*, Tata McGraw-Hill.
- 2., Jeff Tian, *Software Quality Engineering*, Student Edition, 2006, Wiley India



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**HBMG18BL01**

**SOFT SKILL-I**

**0 1 1 2**

**OBJECTIVES:**

- To diagnose the strength and weakness of the student in Functional English.
- To develop the functional grammar.
- To prepare them to use Functional English through LSRW.
- To make them learn through practice and activity.
- To use English Language as a life skill.

**Prelude**

Diagnostic Test- Articles, Forms of 'be' verbs, Tense, Preposition, Gerund & Infinitives, Reported Speech, Active & Passive Voice, Letter Writing.

**UNIT-I**

**6 hours**

Job and Career-three types-Govt., pvt and public sector-Bank, govt.offices, navy, defense, govt.institutions-IT and, BPO and corporate-semi govt like ISRO etc- requirements-advt-skills needed(download the details)  
Delivery Audio and Video cassettes.

**UNIT-II**

**6 hours**

Technical skill-Communication skill especially in English-strengthening communicative English-Listening, Reading, Speaking and Writing-Listening-sounds of vowels and consonants and writing them-functional English-difference between functional and theoretical English.

**UNIT-III**

**6 hours**

Listening and Writing  
Activity based exercise on articles, modals, preposition and infinitives.  
The above topics are chosen as we don't find equivalents' in L1.

**UNIT-IV**

**6 hours**

Reading and Writing  
Vocabulary-synonyms, antonyms,collocations, confused words, homonym, odd man out , words with correct spelling, avoid redundancy-Inferential comprehension (based on BEC and Blog on Soft Skills BY me)

**UNIT-V**

**6 hours**

Speaking  
Introducing yourself (giving questions)-collecting information in pairs and presenting it for 2 minute-story telling through picture- interpretation of psychometric pictures through question and answer- PPT preparation and presentation- developing the story in pairs as game.

**Total:**

**30 Periods**

**Text Book**

1. Soft Skill for Everyone-Jeff Butterfield,Part-1; Unit-D&E
2. EFA (English For All)- Dr. PadmasanniKannan, Libin Roy Thomas
3. English for Competitive Exam- R.P. Bhatnagar,RajulBhargava

**Reference Books:**

1. Soft Skill Blog
2. Jobsearch.about.com
3. www.exsearch.in/interview.html



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**HBCA18BL03**

**MINI PROJECT WORK**

**0 0 2 2**

**OBJECTIVES:**

Students will be implementing mini project where they cover the concepts that they learnt in the above subjects. They will be provided with simple the data set over which they need to do the analysis and prepare the report.

**Total No of Hrs needed to complete the Lab : 30**



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**HBCA18BL04**

**WEB PAGE DESIGNING LABORATORY**

**0 0 2 2**

**List of Experiments :**

1. Program to illustrate Text Formatting tags
2. Create a web page using ordered list and unordered list
3. A program to illustrate Hyperlink tag(Anchor tag)
4. Create a webpage which contains table with its Attributes
5. Create a Web Page using frame tag with its attributes
6. Create a webpage using img tag.
7. Create a web page using form tag
8. Use Cascading Style Sheet to create web page
9. Write a PHP program for Login Validation
10. Finding page hit count and setting page expiry using PHP

**Total No of Hrs needed to complete the Lab : 30**



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**HBCA18A02 ALLIED PAPER COMPUTER ORGANIZATION AND MICROPROCESSOR DESIGN**

**3 1 0 4**

**OBJECTIVES :**

- Student will learn the concepts of computer organization for several engineering applications.
- Will learn building blocks of Computer Systems.
- To be understand memory management.
- Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.

**UNIT I**

**12 Hrs**

**Building blocks of computer system:** Basic building blocks – I/O, Memory, ALU and its components, Control Unit and its functions - Instruction –word, Instruction and Execution cycle - branch, skip, jump and shift instruction - Operation of control registers- Controlling of arithmetic operations

**UNIT II**

**12 Hrs**

**Addressing techniques and registers:** Addressing techniques – Direct, Indirect, Immediate, Relative, Indexed addressing and paging. Registers – Indexed, General purpose, Special purpose, overflow, carry, shift, scratch, Memory Buffer register, accumulators , stack pointers , floating point, status information and buffer registers.

**UNIT III**

**12 Hrs**

**Memory:** Main memory: RAM, static and dynamic, ROM, EPROM, EEPROM, EAROM, Cache and Virtual memory.

**UNIT IV**

**12 Hrs**

**Interconnecting System components:** Buses: Interfacing buses, Bus formats – address, data and control, Interfacing keyboard, display, auxiliary storage devices and printers - I/O cards in personal computers.

**UNIT V**

**12 Hrs**

**Introduction to Microprocessors and Microcontrollers:** introduction to 8085 micropocesor - examples of few instructions to understand addressing techniques - Difference between microprocessor and microcontrollers.

**Total No of Hrs: 60**

**TEXT BOOK:**

1. Andrew S. Tanenbaum(2005), “*Structured Computer Organization(5<sup>th</sup> ed.)*”,Printice Hall

**REFERENCES :**

1. William Stallings(2003), “*Computer Organization and Architecture(6<sup>th</sup> ed.)*”, Pearson.
2. Bartee,T,C(1991), “*Computer Architecture and logical Design*”, McGraw Hill,.
- 3.David A. Patterson & John L. Hennessy(2011), “*Computer Organization and Design: The Hardware/Software Interface(4<sup>th</sup> ed.)*”, Morgan Kaufmann Publishers Inc.







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**HBCA18B09**

**INTRODUCTION TO RDBMS**

**3 1 0 4**

**OBJECTIVES :**

- To Understand basic database concepts, including the structure and operation of the relational data model.
- To Construct simple and moderately advanced database queries using Structured Query Language (SQL).

**UNIT I**

**12 Hrs**

**Introduction and Basic Concepts:** Structure of DBMS - Advantages and Disadvantages of DBMS - Relational Database: attributes & domains, tuples, relations and their schemes - Integrity rules - Relational Algebra: basic operations.

**UNIT II**

**12 Hrs**

**SQL Language Basics :** Oracle & Client-Server Technology - types of SQL Declarations – DDL - DML - SELECT command - data types - Expressions and Operators- Types of Operators - Precedence of Operators-

**UNIT III**

**12 Hrs**

**More on SQL:** Data Integrity : types of integrity , integrity constraints , NOT NULL, UNIQUE, Primary KEY, CHECK Constraints - Oracle Dual Table - Oracle Built in Function - Union, Intersect, Minus,

**UNIT IV**

**12 Hrs**

**SQL Performance Tuning:** Indexes : creating indexes, changing an index, eliminating an Index –Views : properties and privileges of view, creating view, deleting a view – Sequences : creating, changing, deleting sequence, synonyms : creating, renaming, removing a synonyms

**UNIT V**

**12 Hrs**

**Introduction to PL/SQL:**Introduction -The Generic PL/SQL Block - How PL/SQL works-control structures, Stored Procedures and Functions - Database Triggers- types of triggers - creating, modifying and deleting a trigger - Introduction to Cursor

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Jose A Ramalho(2000), *Oracle 8i*, BPB Publications

**REFERENCES:**

1. Bipin C. Desai (1997), *An Introduction To Database Systems*, West Publishing Company.
2. Ivan Bayross Sql, *Pl/Sql The Programming Language Of Oracle*(2<sup>nd</sup> ed.) , Bpb Publications



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**HBCA18B10**

**MULTIVARIATE DATA ANALYSIS**

**3 1 0 4**

**OBJECTIVES:**

- To exercise Multivariate Techniques in R environment in different Business Cases
- Different techniques covered under the scope of Multivariate Analysis
- Apply and build select Predictive Models in the context of Binary Classification and Time Series.

**UNIT I**

**12 Hrs**

Overview of Multivariate Statistics: Nature of Multivariate Analysis, Validity and Reliability, Types of Multivariate Techniques, PCA and Factor Analysis, Multiple Regression, Logistic Regression, Canonical Correlation, Conjoint Analysis, Cluster Analysis, Multi-Dimensional Scaling, Correspondence Analysis, Structural Equation Modeling, Multivariate Model Building.

**UNIT II**

**12 Hrs**

Data Cleaning and Multivariate Techniques: Graphical Examination of Data, Convert Un-Tidy Data into Tidy Data. Missing Data, Imputation of Missing Data by Central Tendency and kNN Method. Outliers, Winsorization of Outliers, Testing the Assumptions of Multivariate Analysis, Incorporating Nonmetric Data with Dummy Variables, Managerial Overview of the Results.

**UNIT III**

**12 Hrs**

Logistic Regression: Binary Classification versus Point Estimation, Odds versus Probability, Logit Function, Classification Matrix, Individual Group Classification Efficiency, Overall Classification Efficiency, Nagelkerke R Square, Receiver Operating Characteristic Curve, Sensitivity, Specificity, Area Under ROC Curve, Cut-Offs, True Positive Rate and False Positive Rate.

**UNIT IV**

**12 Hrs**

Introduction to Time Series: Nature of Time Series, Components of Time Series, Secular Trend, Seasonal Variations, Cyclical Variations, Irregular Variations, Time Series Decomposition, Smoothing Techniques, Moving Average, Weighted Moving Average, Exponential Smoothing, Double Exponential Smoothing, Regression Trend Analysis, Autocorrelation and Autoregression.

**UNIT V**

**12 Hrs**

Univariate Time Series Models: Tests for Stationarity, Graphical Method, Unit Root Test, Augmented Dickey Fuller Test, Phillips–Perron Test, Schmidt–Phillips Test, KPSS Test, Identification Of ARMA Models & Parameter Estimation, Testing Significance with Forecasting, Stationary Restriction for ARMA Models, ARIMA Models, Model Parameter Estimation, Testing Parameter Significance.

**Total No of Hrs : 60**

**REFERENCES:**

1. Hair, J. F. et al. (2015). *Multivariate Data Analysis*, 6th edition. NJ: Prentice Hall.
2. Aiken, L. S., & West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage.
3. Hamilton, J. D. (1994). *Time Series Analysis*. Princeton University Press.
4. Enders, W. (2010). *Applied Econometric Time Series*. Hoboken, NJ: John Wiley & Sons.
5. Menard, S. (2002). *Applied Logistic Regression Analysis*. Thousand Oaks, CA: Sage.
6. Tabachnick, B. and Fidell, L. (2007). *Using Multivariate Statistics*, New York: Allyn & Bacon.



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**DEPARTMENT OF COMPUTER APPLICATIONS**

**HBMG18L02**

**SOFT SKILL-II**

**0 1 1 2**

**OBJECTIVES:**

- To strengthen the students with the needed vocabulary.
- To infer information from the given passage through reasoning.
- To train them in attending group discussion.
- To face the technical and hr interview of the corporate.
- To raise communication proficiency to global standards

**UNIT-I**

**6 hours**

Preparation of resume- functional resume with objective according to different advts- how to have interview file- how to send it by email- concept of writing email- practise through BEC method (questions and answer)

**UNIT-II**

**6 hours**

Writing secretarial letters like intra-mail and inter-mail, agenda, memo and business reports- introducing GD through video-conduct of GD on a topic and also case studies

**UNIT-III**

**6 hours**

Body language-grooming- Interview skill- Dos and Donts- mock interview- exchange of interviewee practical session

**UNIT-IV (Department of Mathematics)**

**6 hours**

Number system- H.C.F & L.C.M- Problems on ages – Percentage- Profit & Loss- Ratio &Proportion- Partnership.

**UNIT-V**

**6 hours**

Time& work-Time& Distance- Clocks – Permutation &Combibnations- Heights &Distancea- Odd man out and Series.

**Total:**

**30 Periods**

**Text Book**

1. Soft Skill for Everyone-Jeff Butterfield,Part-1; Unit-D&E
2. EFA (English For All)- Dr. PadmasanniKannan, Libin Roy Thomas
3. English for Competitive Exam- R.P. Bhatnagar,RajulBhargava
4. Placement Interview- S.Anandamurugan,Chapter-2&3
5. Alex K, Soft Skills; S. Chand& Company Pvt Ltd,2009
- 6.Rizvi Ashraf M, Effective Technical Communication; Tata McGraw-Hill; 2005
7. Thorpe, Edgar, Course in Mental Ability and Quantitative Aptitude Tata McGraw- Hill,2003
- 8.Agarwal, R.S, A Modern Approach to Verbal and Non-Verbal Reasoning, S. Chand& Co;2004
9. R.S.Agarwal, Quantitative Aptitude for Competitive Examinations,S. Chand& Co., (2017)

**Reference Books:**

1. Jobsearch.about.com
2. www.exsearch.in/interview.html



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**PROGRAMMING IN C++ LABORATORY**

**0 0 2 2**

**List of Experiments :**

1. To find GCD of two numbers using recursion
2. To implement matrix multiplication
3. To implement Class
4. To implement Constructor
5. Using Friend Function
6. To demonstrate Inheritance
7. To implement Virtual Function
8. To Prepare bio data using file Operations
9. To overload << Operator
10. To add two complex numbers using Operator Overloading

**Total no. of Hrs needed to complete the Lab: 30**



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**RDBMS LABORATORY**

**0 0 2 2**

**List of Experiments :**

- I. SQL BASICS :
  1. DDL – Create,Alter,Drop
  2. DML-Update ,Insert,Delete
  3. DRL-Select
- II. VIEWS
- III. INTEGRITY CONSTRAINTS- Naming Constraints
- IV. SUB QUERIES- Nested, Complex
- V. SQL FUNCTIONS-Built in functions
- VI. SET OPERATIONS
- VII. PL/SQL-Factorial ,Fibonacci Series

**Total no. of Hrs needed to complete the Lab : 30**



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**HBMG17001**

**ENVIRONMENTAL STUDIES**

**3 0 0 3**

**OBJECTIVES:**

- To gain a variety of experiences and acquire a basic understanding and knowledge.
- To develop a world in which persons are aware of and concerned about environment.
- To acquire an attitude of concern for the environment.
- To acquire the skills for identifying and solving environmental problems.
- To participate in improvement and protection of environment.
- To develop the ability to evaluate measures for the improvement and protection of environment.

**UNIT-I ENVIRONMENT AND ECOSYSTEMS**

**9 Hours**

Definition, scope and importance of environment – need for public awareness – concept, structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem. Biodiversity at National and local level – India.

**UNIT-II ENVIRONMENTAL POLLUTION**

**9 Hours**

Definition – causes, effects and control measures of: (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Nuclear hazards (g) E-Wastes and causes, effects and control measures.

**UNIT-III NATURAL RESOURCES**

**9 Hours**

Forest resources: Use and over-exploitation, deforestation. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems.

**UNIT-IV SOCIAL ISSUES AND THE ENVIRONMENT**

**9 Hours**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, central and state pollution control boards – Public awareness.

**UNIT-V HUMAN POPULATION AND THE ENVIRONMENT**

**9 Hours**

Population growth, variation among nations – population explosion, environment and human health – human rights – value education – HIV/AIDS – women and child welfare – role of information technology in environment and human health.

**Total No of Hrs : 45**

**TEXT BOOKS**

1. Gilbert McMasters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).



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**PROGRAMMING IN JAVA**

**3 1 0 4**

**OBJECTIVES:**

- To understand the concepts of object-oriented, event driven, and concurrent programming paradigms and develop skills in using these paradigms using Java.
- Be exposed to Java specific, Web services Architecture

**UNIT I**

**12 Hrs**

**Introduction to Java :** Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements.

**UNIT II**

**12 Hrs**

**Classes & Objects :**Class – Objects-Methods- Constructors - Overloading methods - Access Control- Understanding Static - String Class – Objects – String Buffer - Char Array- Inheritance - Overriding methods - Using super- Abstract class - Java Utilities.

**UNIT III**

**12 Hrs**

**Packages & Interfaces :** Access Protection - Importing Packages - interfaces - Exception Handling - Multithreading -Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication – Deadlock - Suspending, Resuming and stopping threads.

**UNIT IV**

**12 Hrs**

**I/O Streams :** File Streams - Applets - Working with windows using AWT Classes - AWT Controls - Layout Managers and Menus.

**UNIT V**

**12 Hrs**

**Network Basics :** Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL - Datagrams

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Naughton, P & Schildt, H(1999) *Java2 The Complete Reference* (3<sup>rd</sup> ed.),TMH.

**REFERENCES:**

1. Cay S.Horstmann, Gary Cornell (2000) *Core Java 2 Volume I Fundamentals* (5<sup>th</sup> ed.), PHI.
2. Arnold, K & Gosling, J(1996) *The Java Programming Language*(2<sup>nd</sup> ed.), Addison Wesley.



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**VISUAL PROGRAMMING**

**3 1 0 4**

**OBJECTIVES:**

- Identify the differences between the procedural languages and event driven languages
- Define and modify the properties and methods associated with an object
- Define and implement form objects, including data arrays, control arrays, text boxes, message boxes, dialog boxes, labels, pull down menus, and combo boxes.
- Design of application using visual data manager

**UNIT I**

**12 Hrs**

**Customizing a Form :** Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers.

**UNIT II**

**12 Hrs**

**Loops and Functions:** Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures .

**UNIT III**

**12 Hrs**

**Arrays:** Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms - Do Events and Sub Main - Error Trapping.

**UNIT IV**

**12 Hrs**

**VB Objects:** Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization - Working with Graphics.

**UNIT V**

**12 Hrs**

**Database programming with VB:** Record set – Data control-Using the visual data manager – Entering data – Validating data – Accessing fields and record sets – using SQL statements - ADO objects.

**Total No of Hrs : 60**

**TEXT BOOKS:**

1. Gary Cornell(1999) *Visual Basic 6 from the Ground up* , Tata McGraw Hill.(I – IV Units)
2. Gary Bronson, Introduction to programming Using Visual Basic 6, Dreamtech publications, II Edition(V<sup>th</sup> Unit)

**REFERENCES:**

1. Noel Jerke (1999) *Visual Basic 6 The Complete Reference* Tata McGraw Hill .







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**PROGRAMMING IN JAVA LABORATORY**

**0 0 2 2**

**List of Experiments :**

1. Write a Java program to calculate Area and perimeter of a circle
2. Write a Java Program to Check if the given number is Prime or not
3. Write a simple Java program to Display Month of year using Calendar class
4. Write a java program to sort a given set of numbers.
5. Write a java program for handling string Functions a) Reverse b) Replace c) Concat d) Compare
6. Create New Thread Using Runnable interface in java.
7. Read File Using Java BufferedInputStream class
8. Draw Oval, Circle, Rectangle & Square using Applets
9. Write an applet Program for flowlayout
10. Create AWT controls for button,combobox,checkbox,Textfield using java applet

**Total no. of Hrs needed to complete the Lab : 30**



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**VISUAL PROGRAMMING LABORATORY**

**0 0 2 2**

**List of Experiments :**

1. Building simple application using form object.
2. Working with intrinsic controls.
3. Application with menus.
4. Application with MDI.
5. Create a simple Calculator using windows common controls.
6. PL/SQL Block for function
7. Pay -roll system
8. Inventory Processing System
9. Railway / Airway Reservation System.
10. Library Management System.

**Total no. of Hrs. needed to complete the Lab : 30**



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**HBMG17G01**

**ENTREPRENEURSHIP DEVELOPMENT**

**3 0 0 3**

**OBJECTIVES:**

- To motivate a person for entrepreneurial career.
- To make him capable of perceiving and exploiting successfully opportunities for enterprises.
- To enable the participants internalize the concept and process of entrepreneurial motivation training.
- To adapt to varying audience and situation.
- To internalize the concept of achievement syndrome and its application with performance.

**UNIT-I Concept of Entrepreneurship**

**9 Hours**

Entrepreneurship – Meaning – Types – Qualities of an Entrepreneur – Classification of Entrepreneur – Factors influencing Entrepreneurship – Functions of Entrepreneurships.

**UNIT-II Entrepreneurial Developments Agencies**

**9 Hours**

Commercial Banks – District Industries Centre – National Small Industries Corporation – Small Industries Development Organization – Small Industries Service Institute, All India Financial Institutions – IDBI – IFCI – ICICI – IRDBI.

**UNIT-III Project Management**

**9 Hours**

Business idea generation techniques – Identification of Business Opportunities – Feasibility study – Marketing, Finance, Technology and Legal Formalities – Preparation of project report – Tools of Appraisal.

**UNIT – IV Entrepreneurial Development Programmes**

**9 Hours**

Entrepreneurial Development Programmes (EDP) – Role, relevance and achievements – Role of Government in organized EDPs – Critical Evaluation.

**UNIT-V Economic Development and Entrepreneurial Growth**

**9 Hours**

Role of Entrepreneurs in Economic Growth – Strategic approaches in the changing Economic scenario for small scale Entrepreneurs – Networking. Niche plat, Geographic Concentration. Franchising/Dealership – Development of Women Entrepreneurship.

**Total No of Hrs : 45**

**TEXT BOOKS**

1. Dr.V.balu – ENTREPRENEURIAL DEVELOPMENT
2. Dr. P.T.Vijayashree & Dr.M.Alagammal – ENTREPRENEURIAL DEVELOPMENT



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**LINUX OPERATING SYSTEM**

**3 1 0 4**

**OBJECTIVES:**

- To be aware of the evolution of the Operating System
- To have an exposure to Linux
- To enable the students to install and use Linux distribution
- To train the students in the Linux environment, administration and configuration
- To train shell programming in Linux

**UNIT I**

**12 Hrs**

**Linux Introduction: Introduction to OS:** What is Linux OS-Comparison of various operating systems- Pros and Cons of Linux-Flavours of Linux-Linux Loader-Linux kernel-Linux Installation notes - File System :File System concept-Types of File Systems. File System Related Commands: mount, umount, mkfs, fsck, fdisk, dd, du, df, fsconf. Files: What is a File - Sorts of Files.

**UNIT II**

**12 Hrs**

**Linux commands and Utilities:** alias, at, atrm. File Manipulation commands: Files-Creating, Moving, Copying and Deleting Files -Viewing File and its properties. Directory related commands: cd, mkdir, rm, rmdir,ls, pwd, mv, tree. Filters: cat, grep, cut, wc, sort, more, pipe examples. Tools and utilites: find, locate, date, cal, gzip, gunzip, zcat, man, tar. Vi editor: Using Vim Editor-Basic Commands.

**UNIT III**

**12 Hrs**

**System Administration:** Security: File Security. Communication commands :- write, wall, talk, mesg, motd,Pre-login Message. Managing software with RPM:- Installing, Uninstalling, Upgrading. Managing users and Groups: Adding users, changing password, removing users, Adding groups, changing user group , removing groups. Administrative Commands: who, whoami, su, fdformat, login, logout, chmod, chown, chroot, hostname, ifconfig, netstat, ping.

**UNIT IV**

**12 Hrs**

**Managing Processes and Scheduling:** Processes: What is a Process-Process types-Commands for controlling processes-Process Attributes-Display Process Information – Life Cycle of Process. Managing Processes: Performance – Load - Process Scheduling. Backup and Restore: Backup Strategies and Operations-Restoring files.

**UNIT V**

**12 Hrs**

**Shell Programming and Linux configuration:** Shell Programming: Introduction to Shell Programming- Basics-Variables – Special Characters – Comparison of Expressions – Iteration Statements - Control Statements – Functions - Linux Configuration: Network configuration, DHCP configuration for Linux.

**Total No of Hrs : 60**

**TEXT BOOKS:**

1. Machtelt Garrels, Introduction to Linux,A Beginner's Guide, 3rd Edition, Linux Docuention Library, [www.linbrary.com](http://www.linbrary.com)
2. David Pitts, et al., Red Hat Linux 5.2 Unleashed, 2nd Edition, SAM Publishing

**REFERENCES:**

1. Christopher Negus, Linux Bible 8th Edition, John Wiley & Sons, Inc.
2. Peter Norton, Complete guide to Linux, Techmedia Publications
3. Redhat, Official Red Hat Linux User's guide ,Wiley Dreamte
4. Yeswant Kanethkar,UNIX Shell Programming , BPB



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**LINUX LABORATORY**

**0 0 2 2**

**List of Experiments :**

1. Prime test.
2. Palindrome test.
3. Fibonacci series generation.
4. Armstrong No test.
5. Solving Quadratic Equation.
6. Sorting: Ascending & Descending - Menu Driven Shell Script
7. Usage of Case Structures.
8. Process Scheduling: FCFS
9. Process Scheduling: Round Robin
10. Using Pipes to calculate nCr.

**Total no. of Hrs. needed to complete the Lab : 30**



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**HBCA18BL10**

**PROJECT WORK**

**0 0 10 10**

**OBJECTIVES:**

- Students will be implementing project where they cover the concepts that they learnt in the above subjects. They will be provided with the data set over which they need to do the analysis and come up with an efficient solution.



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**HBCA18BE01**

**DATA MINING WITH R**

**3 1 0 4**

**OBJECTIVES:**

- Understanding about major Data Mining procedures like Decision Tree, Cluster Analysis, Neural Networks, Support Vector Machine, Bayesian Networks and Machine Learning fundamentals.
- Students will be able to apply and practice this gained knowledge in variety of Business Scenarios.

**UNIT I**

**12 Hrs**

Classification and Regression Tree: Classification & Regression, Working of a Decision Tree, Attribute Selection Measures, Information Gain, Gain Ratio, Gini Index, Building Decision Trees, CART, C5.0, and CHAID Trees, Prediction by Decision Tree, Advantages and Disadvantages of Decision Trees, Model Overfitting, Building Decision Trees in R.

**UNIT II**

**12 Hrs**

Clustering: Cluster Analysis versus Factor Analysis, Overview of Basic Clustering Methods, Agglomerative Hierarchical Clustering, Within-Group Linkage, Nearest Neighbour or Single Linkage, Furthest Neighbour or Complete Linkage, Centroid Clustering, Ward's Method, K-Means Algorithm, Dendrogram, Profiling of Cluster, Cluster Evaluation.

**UNIT III**

**12 Hrs**

Artificial Neural Networks: Structure of a Neural Network, Input Layer, Hidden Layer, Output Layer, Nodes, Synaptic Weights, Analogy with Biological Neural Network, Scaling of Data, Activation Functions, Hyperbolic Tangent, Sigmoid, Identity, Softmax, Optimization Algorithms, Scaled Conjugate Gradient, Gradient Descent, Model Accuracy.

**UNIT IV**

**12 Hrs**

SVM and Bayesian Statistics: Decision Boundaries for Support Vector Machine, Maximum Margin Hyperplanes, Structural Risk Minimization, Linear SVM-Separable Case, Linear SVM-Non-Separable Case, Kernel Function, Kernel Trick, Kernel Hilbert Space, Characteristics of Bayesian Networks, Conditional Probability Table, Model Evaluation.

**UNIT V**

**12 Hrs**

Machine Learning: Understanding Machine Learning Technology, Applications of Machine Learning, Types of Machine Learning, Machine Learning Approaches, Bagging, Random Forest, Boosting, Gradient Boosting, XG Boosting.

**Total No of Hrs : 60**

**REFERENCES:**

1. Han, Jiawei and Kamber, Micheline. (2012). *Data Mining: Concepts and Techniques*. Morgan Kaufman Publishers.
2. Tang, P.N., Steinback, M. and Kumar, V. (2014). *Introduction to Data Mining*. Pearson.
3. Myatt, Glenn and Johnson, Wayne. (2009). *Making Sense of Data II*. Wiley.
4. AnandRajaraman. (2011). *Mining of Massive Datasets*. Cambridge University Press.
5. Mitchell (2013). *Machine Learning*. McGraw Hill.





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**HBCA18BE02**

**OPEN SOURCE PROGRAMMING**

**3 1 0 4**

**Objectives:**

- Understand concepts, strategies, and methodologies related to open source software development.
- Understand the business, economy, societal and intellectual property issues of open source software.
- Be familiar with open source software products and development tools currently available on the market.

**UNIT I**

**12 Hrs**

**Introduction to Open Source:** Definition, Open Source History, Initiatives , Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. History : BSD, The Free Software Foundation and Open Source GNU Project.

**UNIT II**

**12 Hrs**

**Principle and methodologies :** Philosophy : Software Freedom, Open Source Development Model Licences and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copylefts, Patents Economics of FOSS : Zero Marginal Cost, Income-generation opportunities

**UNIT III**

**12 Hrs**

**Case Studies :** Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office. Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open source Teaching. and Open source media.

**UNIT IV**

**12 Hrs**

**IoT :** Definitions - overview, applications, potential & challenges, and architecture. IoT examples: Case studies, e.g. sensor body-area-network and control of a smart home.

**UNIT V**

**12 Hrs**

**INTRODUCTION TO BIG DATA:** Distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

**Total No of Hrs : 60**

**TEXT BOOK:**

1. [https://tavaana.org/sites/default/files/introduction\\_to\\_opensource.pdf](https://tavaana.org/sites/default/files/introduction_to_opensource.pdf)
2. Chris Eaton, Dirk deRoos et al.(2012) , “*Understanding Big data* ”, McGraw Hill.

**REFERENCES:**

1. Greg Elmer, Ganaele Langlois , Dr. Joanna Redden(2015), “ *Compromised Data: From Social Media to Big Data*”, Bloomsbury Academic Publishing.



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**HBCA18BE03**

**INFORMATION SECURITY**

**3 1 0 4**

**UNIT I**

**12 Hrs**

**Introduction:** History, What is Information Security? Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing the Components - Balancing Security and Access - The SDLC - The Security SDLC

**UNIT II**

**12 Hrs**

**Security Investigation:** Need for Security - Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

**UNIT III**

**12 Hrs**

**Security Analysis :** Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

**UNIT IV**

**12 Hrs**

**Logical Design:** Blueprint for Security - Information Security Policy - Standards and Practices - ISO 18799/BS 7799 - NIST Models - VISA International Security Model - Design of Security Architecture - Planning for Continuity

**UNIT V**

**12 Hrs**

**Physical Design :** Security Technology – IDS - Scanning and Analysis Tools – Cryptography - Access Control Devices - Physical Security - Security and Personnel

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Michael E Whitman and Herbert J Mattord(2003) , “*Principles of Information Security*”, Vikas Publishing House, New Delhi.

**REFERENCES:**

1. Micki Krause, Harold F. Tipton(2004), “ *Handbook of Information Security Management*”, Vol 1-3 CRC Press LLC.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz(2003), “*Hacking Exposed*”, Tata McGraw-Hill.
3. Matt Bishop(2002), “ *Computer Security Art and Science*”, Pearson/PHI.



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**HBCA18BE04**

**PROFESSIONAL ETHICS**

**3 1 0 4**

**UNIT I**

**12 Hrs**

**ENGINEERING ETHICS** : Senses of 'engineering ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – Kohlberg's theory – Gilligan's theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self-interest – customs and religion – uses of ethical theories.

**UNIT II**

**12 Hrs**

**ENGINEERING AS SOCIAL EXPERIMENTATION**: Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the Challenger case study.

**UNIT III**

**12 Hrs**

**ENGINEER'S RESPONSIBILITY FOR SAFETY**: Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk – the Three Mile Island and Chernobyl case studies.

**UNIT IV**

**12 Hrs**

**RESPONSIBILITIES AND RIGHTS** : Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights (IPR) – discrimination

**UNIT V**

**12 Hrs**

**GLOBAL ISSUES** : Multinational corporations – environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Mike Martin and Roland Schinzinger(1996), "*Ethics in Engineering*", McGraw Hill, New York.

**REFERENCES:**

1. Charles D Fleddermann(1999), "*Engineering Ethics*", Prentice Hall, New Mexico.
2. Laura Schlesinger(1996), "*How Could You Do That: The Abdication of Character, Courage, and Conscience*", Harper Collins, New York.
3. Stephen Carter(1996), "*Integrity*", Basic Books, New York.
4. Tom Rusk(1993), "*The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life*", Viking, New York.



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**HBCA18BE05                      SOFTWARE PROJECT MANAGEMENT                      3 1 0 4**

**OBJECTIVES:**

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software

**UNIT I**

**12 Hrs**

**Introduction to Software Projects :** An Overview of Project Planning – Project Management and Evaluation .

**UNIT II**

**12 Hrs**

**Selection of an appropriate Project approach :** Software effort Estimation -Activity Planning :- Project Schedules – Sequencing and Scheduling Projects – Network Planning Model – forward and backward pass- Identifying the Critical path-Activity float-Shortening Project Duration – Identifying Critical Activities- precedence networks.

**UNIT III**

**12 Hrs**

**Software quality assurance plan & Risk Management :** Resource Allocation – Monitoring and Control, Reviews and Audits – Management.

**UNIT IV**

**12 Hrs**

**Models :** ISO 9000 model, CMM model – Comparisons - ISO 9000 weaknesses - Managing People and Organizing Teams – Software Quality -Planning for Small Projects.

**UNIT V**

**12 Hrs**

Case Study – PRINCE Project Management, BS 6079:1996

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Mike Cotterell, Bob Hughes , “Software Project Management”, Inclination/Thomas Computer Press, 4th Edition, 2004. Chapters : 1-13

**REFERENCES:**

1. Darrel Ince, H.Sharp and M.Woodman,” Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 1995.
2. Philip.B.Crosby, Quality is Free: The Art of Making Quality Certain, Mass Market, 1992.



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**HBCA18BE06**

**MANAGEMENT INFORMATION SYSTEM**

**3 1 0 4**

**OBJECTIVES:**

- To know about basics of information system and MIS
- To understand about database storage
- To design the system for problem identifying and solving
- To understand the conceptual and detailed system design.

**UNIT I**

**12 Hrs**

**Foundation of Information System :** Introduction to Information System and MIS – Decision support and decision making systems - systems approach - the systems view of business - MIS organization within company - Management information and the systems approach

**UNIT II**

**12 Hrs**

**Information Technology :** A manager's overview - managerial overviews - computer hardware and software - DBMS - RDBMS - Telecommunication

**UNIT III**

**12 Hrs**

**Conceptual system design:** Define the problems - set systems objective - establish system – constraints - determine information needs determine information sources - develop alternative conceptual design and select one document the system concept - prepare the conceptual design report

**UNIT IV**

**12 Hrs**

**Detailed system design :** Inform and involve the organization - aim of detailed design - project management of MIS detailed design - identify dominant and trade of criteria - define the sub systems - sketch the detailed operating sub systems and information flow - determine the degree of automation of each operation - inform and involve the organization again - inputs outputs and processing - early system testing – software - hardware and tools propose an organization to operate the system - document the detailed design - revisit the manager user

**UNIT V**

**12 Hrs**

**Implementation evaluation and maintenance of the MIS :** Plan the implementation - acquire floor space and plan space layouts - organize for implementation - develop procedures for implementation - train the operating personnel - computer related acquisitions - develop forms for data collection and information dissemination - develop the files test the system - cut-over - document the system - evaluate the MIS control and maintain the system - Pitfalls in MIS development

**Total no. of Hrs : 60**

**TEXT BOOK:**

1. W. S. Jawadekar(2002), *Management Information System*, Tata McGraw Hill.

**REFERENCES:**

2. Robert G. Murdick, Loel E. Ross & James R. Claggett, *Information System for Modern Management* (3<sup>rd</sup> Ed), PHI.
3. Brian,O, *Management Information System*, TMH.
4. Davis Olson, *Management Information System*, McGraw Hill.



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**DEPARTMENT OF COMPUTER APPLICATIONS**

**HBCA18BE07**

**MOBILE COMPUTING**

**3 1 0 4**

**OBJECTIVES:**

- Understand and identify requirements issue limitation parameters and components in computing
- To understand the rationale for the solution adopted in existing or emerging systems
- To participate in the development and proposal of future systems

**UNIT I**

**12 Hrs**

**Fundamentals of Wireless Transmission:** Wireless-Wireless networks in comparison to fixed networks-Mobile communication: Development – Principles of mobile communication – Overview of mobility and portability-Issues for portability- Effects of device portability – Applications-Reference model

**UNIT II**

**12 Hrs**

Radio Transmission: Frequency – Signals – antennas –Signal propagation- Multiplexing – Modulation-Spread Spectrum(DSSS,FHSS).

**UNIT III**

**12 Hrs**

**Medium access control:**Motivation for specialized MAC,SDMA,FDMA,TDMA,CDMA, Comparison of the Medium access mechanism-Telecommunication Networks –GSM, Satellite communication.

**UNIT IV**

**12 Hrs**

**Wireless LAN:**Advantages of Wireless LAN-Design goals-Wireless transmission technology-Settings for wireless LAN-IEEE 802.11: System architecture-Bluetooth

**UNIT V**

**12 Hrs**

**Mobile Network Layer and Transport Layer :**Mobile IP-DHCP-Traditional TCP-Congestion control – mechanism to alter the transmission - Classical TCP Improvements

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Jochen Schiller (2014) *Mobile Communications*(2<sup>nd</sup> ed.), Pearson Education
2. Nithyanandam .S,Ambika.M,Gayathri K.S., “Mobile Computing”, Dhanpat Rai &co.(P)Ltd

**REFERENCE:**

1. William C.Y.Lee(1995) *Mobile Cellular Telecommunications*(2<sup>nd</sup> ed.), Mc-Graw- Hill.



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**DEPARTMENT OF COMPUTER APPLICATIONS**

**HBCA18BE08**

**IMAGE PROCESSING**

**3 1 0 4**

**Objectives :**

- To gain knowledge about the fundamentals of digital image processing
- To understand the techniques in digital image processing
- To know the methods of image restoration techniques, Image compression and Segmentation

**UNIT I**

**12 Hrs**

**DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS:** Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT

**UNIT II**

**12 Hrs**

**IMAGE ENHANCEMENT TECHNIQUES:** Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters.

**UNIT III**

**12 Hrs**

**IMAGE RESTORATION:** Model of Image Degradation/restoration process – Noise models – Inverse filtering - Least mean square filtering – Constrained least mean square filtering – Blind image restoration –

**UNIT IV**

**12 Hrs**

**IMAGE COMPRESSION:** Lossless compression: Variable length coding – LZW coding – Bit plane coding predictive coding-DPCM. Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards

**UNIT V**

**12 Hrs**

**IMAGE SEGMENTATION AND REPRESENTATION:** Edge detection – Thresholding - Region Based segmentation – Boundary representation: chain codes- Polygonal approximation –Boundary segments –boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Rafael C Gonzalez, Richard E Woods(2003), “*Digital Image Processing*”(2<sup>nd</sup>. ed.), Pearson Education.

**REFERENCES:**

1. William K Pratt(2001), “*Digital Image Processing*”, John Willey (2001) .



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**DEPARTMENT OF COMPUTER APPLICATIONS**

**HBCA18BE09**

**INTRODUCTION TO CLOUD COMPUTING**

**3 1 0 4**

**Objectives:**

- Recognize terminology and concepts related to cloud computing
- Understand cloud computing security measures
- Differentiate cloud storage options, cloud compute services, and cloud networking options
- Describe cloud resource management services and cloud based database services
- Identify virtual resource deployment and management options

**UNIT 1**

**12 Hrs**

**Introduction and Concepts:** Defining cloud computing – Cloud models- Characteristics of Cloud Computing – Cloud based services and Applications- Cloud services and platforms: Compute Services, Storage Services, Database services, Application Services, Content Delivery Services

**UNIT II**

**12 Hrs**

**Cloud Application Design:** Introduction- Scalability- Reliability – Reference Architectures for Cloud Applications- Cloud Application Design Methodologies : Service Oriented Architecture, Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications- Data Storage Approaches

**UNIT III**

**12 Hrs**

**Python Basics :** Introduction – Installing Python – Python Data types and Data Structures- control flow – functions – modules- Python for Cloud : Python for Amazon Web Services , Python for Google Cloud Platform – Python for windows Azure

**UNIT IV**

**12 Hrs**

**Cloud Application Development in Python :** Python Packages of Interest – Python Web Application Framework (Django) – Designing RESTful API - Design Approaches – Image Processing App

**UNIT V**

**12 Hrs**

**Advanced Topics :** Multimedia Cloud - Using the Mobile Cloud – Cloud Application Benchmarking and Tuning – Cloud Security – Cloud for Industry, Healthcare and Education

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Arshdeep Bahga & Vijay Madiseti(2016), “*Cloud Computing A Hands – on Approach*”, Universities Press

**REFERENCES:**

1. Kris Jamsa(2013), “*Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More*”, Jones & Bartlett Learning , Publisher.
2. Barrie Sosinsky(2011), “*Cloud Computing Bible*“, Wiley Publishing.





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**DEPARTMENT OF COMPUTER APPLICATIONS**

**HBCA18BE10**

**SOFTWARE TESTING**

**3 1 0 4**

- To discuss the distinctions between validation testing and defect testing
- To describe the principles of system and component testing
- To describe strategies for generating system test cases
- To understand the essential characteristics of tool used for test automation

**UNIT I**

**12 Hrs**

**Testiing Environment And Test Processes:** Introduction – World Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing : Requirement Specifications ( Software, User, market, Business) – Static & Dynamic Testing : Verification & Validation - Analyzing and Reporting Test Results – Post Implementation Analysis

**UNIT II**

**12 Hrs**

**Developing the Test Plan :** Using White Box Approach to Test design – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing : Functionality Testing - Performance Testing - Unit Testing - Integration Testing - System Testing – User Acceptance Testing - Compatibility Testing

**UNIT III**

**12 Hrs**

**Software Testing Life Cycle :** Software Testing Life Cycle: SDLC & STLC , Stages – System Study – Test case design, Review, Approval, Execution - Test case Templates: Header - Body & Footer Templates – Traceability Matrix - Defect Tracking Templates – Postmortem Report (Achievements & Comments) – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Web Applications – Web based system – Web Technology Evolution – Testing a Data base

**UNIT IV**

**12 Hrs**

**TEST AUTOMATION : Introduction :** Software Testing Tools (Win Runner, Load Runner) - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug

**UNIT V**

**12 Hrs**

**Quality Assurance & Quality Control :** Complexity Metrics and Models – Quality Management Metrics - Defect Removal Effectiveness Quality Function Deployment – Taguchi Quality Loss Function.

**Total No of Hrs : 60**

**TEXT BOOK:**

1. Srinivasan Desikan and Gopalswamy Ramesh(2007) “Software Testing – Principles and Practices”,Pearson Education.

**REFERENCES:**

1. William Perry(2007), “*Effective Methods of Software Testing*”, Third Edition,Wiley Publishing 2007
2. Naresh Chauhan(2010) , “*Software Testing Principles and Practices* ” Oxford University Press , New Delhi , 2010.