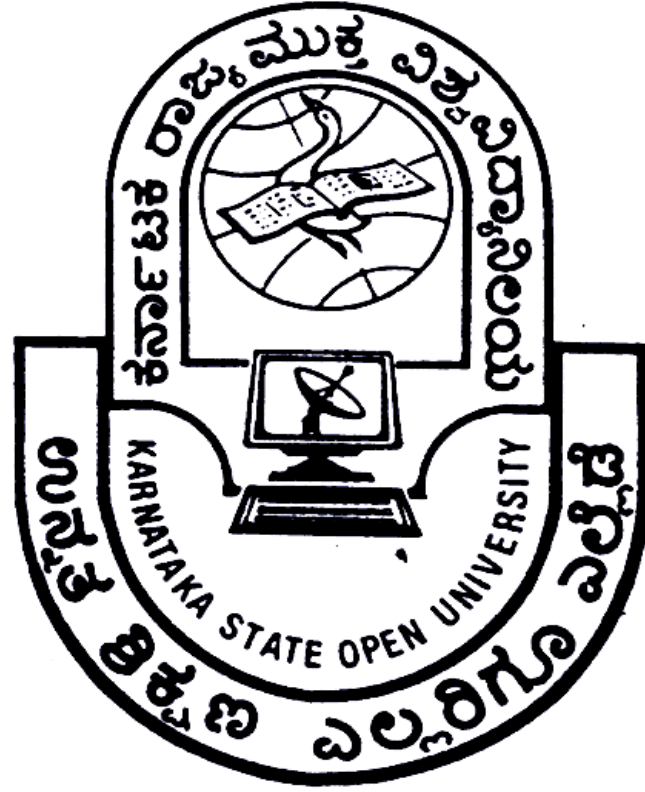


KARNATAKA STATE OPEN UNIVERSITY

PROGRAMME GUIDE

M.Sc in Computer Science



**DEPARTMENT OF POST GRADUATE STUDIES
AND RESEARCH IN COMPUTER SCIENCE**

Mukthagangothri, Mysore – 570 006

VICE CHANCELLOR'S MESSAGE

Dear Learner,

The family of KSOU welcomes you to pursue the academic programmes you have chosen to achieve not only academic excellence but also to fulfill the desire of your career. The University, established by the Act of State Legislature has created wonderful academic ambience. The programmes offered by the University have been recognized by University Grants Commission. Therefore, the degrees are valid for employment opportunities across the country. The 'core values' of the University are derived from its vision 'Higher Education to Everyone, Everywhere'. The ultimate touchstone of quality higher education is the motto of the University. Today, higher education stands at the crossroads of keeping pace with the emerging needs of the country.

The University has adopted a school concept in its functioning. The school of science headed by a Director offers academic programmes in basic and applied sciences. It combines an inter disciplinary and professional approach to pedagogy and research. The University believes that rigors of the contemporary world require competent quality human resources to create knowledge based society. The academic activities of B.Sc. programmes are initiated through well-established department/s led by the Chairperson/s. Well-qualified teaching faculty with equally dedicated non-academic team is an asset to the University, which is always, committed for the welfare of the students.

The University functions in a 3-tier system of student support service, namely Headquarters, Regional Centres and Learners Support Centres spread all over Karnataka. The learners can undergo teaching-learning process in the notified Regional Centres/Learner Support Centres. The University has adopted a mechanism to deliver Self Learning Material by print, limited audio visual and Counseling/Personal Contact Programme. As a learner, you will have greater opportunity to gain knowledge and skill through those mechanisms. The academic counselors will play a strategic role and supports you from the enrollment of the programme till you accomplish the goal. A proper blending of the knowledge and skill will be imparted so that you will be transformed as a good citizen to contribute to the development of society and the country.

The UGC in its Public Notice dated: 23.02.2018 stated that the Degree/Diploma/Certificate Programme awarded through distance mode are at par with corresponding Degree/ Diploma/ Certificate Programme obtained through conventional universities. The degrees acquired through distance education are recognized for the purpose of employment in State/Central Government, MNCs, Private Sector etc. and also for pursuing higher education in other educational institutes. Therefore, you have greater opportunity of pursuing Higher Education without any kind of fear about your career.

I am sure you will enjoy good experience with services rendered by the university through its Regional centres and Learner Support Centres, besides Headquarters. I wish you all the best in your academic endeavors.

Prof. Vidyashankar S

MESSAGE FROM DEAN (ACADEMIC)

Dear learner,

As you know education imparts knowledge and skills which empowers all to build civilized society. Higher education policy which was once a priority sector is no longer maintaining the same, due to General Agreements and Trade in Services (GATS). The education policy of the government provides a greater opportunity to accelerate Gross Enrolment Ratio (GER).

Higher education is imparted both by conventional system and ODL system. The former education has inbuilt rigidity where ODL enjoy flexibility. Presently the GER in higher education around is 27%, thanks to the role played by ODL system. The ODL system operates under access, flexibility and success.

The Karnataka State Open University, which came up in 1996 under the Act of state legislation 1992 play a stupendous role in imparting quality education. As one of the premier institution in ODL system of the country, the university strive hard to empower various disadvantaged sections of the society like, house wives, economically and culturally backward, tribal, senior citizens, working groups, differently abled, professionals, technocrat, jail inmates etc., The University cater to the needs of students ranging from the age of 18 years to 80 years.

The programmes offered by KSOU are strictly in conformity with quality and standards set by regulatory bodies UGC/AICTE etc., The Karnataka State Open University was established on 1st June 1996 vide Government Notification No. EDI/ UOV/ 95 dated 12th February 1996- KSOU Act 1992, keeping in view the educational needs of our country, in general, and the state in particular. The University has a long and rich experience in the field of Distance Education as the erstwhile Institute of Correspondence Course and Continuing Education. University Grants Commission (UGC) New-Delhi vide order No: F.No 14-5/2018 (DEB-I) Dated : 14th August 2018 for the period from 2018-19 to 2022-23. The KSOU operates on dictum quality first and students foremost. Further the university is highly committed to provide need based education to the door steps of the students.

The KSOU has students' support services which work in 3 tiers - head office; regional centres and study centres within the jurisdiction of state. The admissions, counseling and the examinations are conducted in different places, hence, education at the door steps.

The dedicated staffs in various department and state of the art student support services create a conducive environment for teaching learning. The university put in places all possible efforts to keep the learners happy from the stage of enrolment till they get employed. I am confident that, as a learner in the university, you will enjoy good experience in the system.

I wish you all the best in your academic endeavors.

Truly yours,

Dean (Academic)

Department of Studies and Research in Computer Science

Dear Student

In the current trend of automation of many day to day processes by computers, through knowledge on design and development of computer programs has almost become essential. In view of this, education in Computer Science play a vital role in reaching the current demands in automation. Though a number of engineering or MCA graduates are coming up every year, still there is a lot more requirements in most of the industries / academic institutions / research and development organizations, which, perhaps, can be addressed by MSc in Computer Science.

The Karnataka State Open University (KSOU) has taken an initiative step to start a Masters Program i.e. M.Sc. in Computer Science to meet the demand. After interacting with experts in the domain, and after a thorough discussion among the experts in the form of a workshop, the Board of Studies in Computer Science of KSOU has prepared a good curriculum content to maintain the quality of M.Sc. in Computer Science program on par with that of other universities.

With this background, the Department of Studies and Research in Computer Science considers it to be its privilege to initiate the program by welcoming you all. I feel that it is also your privilege to be the student of our department.

The program has 4 semesters with totally 82 credits. The first and second semesters together cover 40 credits. There are two theory Courses each with 4 credits and two practicals with 2 credits each. Meanwhile CS and Non CS students can opt two subjects their own choice with 6 credits along with elective subject 2 credits. The third semester is for 21 credits. There are 2 theory courses and two practical classes with 2 credits each. Meanwhile CS and Non CS students can opt two subjects their own choice with 6 credits along with elective subject 3 credits. In the fourth semester, there is a compulsory 2 theory course for 4 credits each and an elective course for 6 credits and a project work for 4 credits totaling 21 credits along with elective subject 3 credits.

Learning Material:

The syllabus prescribed by the University will be taught through self-instructional material which is print media. The University brings out qualitative study material by involving academicians and industrialist working in reputed institutions across the country. Each course has four blocks of syllabi and each block will have 4 units. Every effort is made by the Department to provide you adequate study material with proper illustrations and the cases. Nevertheless, to acquire mastery over the subject, you are required to refer the latest books, journals, periodicals, magazines and newspapers. In additions to printed material, the Department would also upload the Softcopy of study material through website. Hence we will provide video lecture through our own customized channel.

Contact Programme:

The Department will conduct Compulsory Contact Programme in every semester. The PCP will be held at Mysore in offline as well as online for 15 days days in the month of April / May and Nov/Dec and the detailed Time Table will be sent in due course and will be hosted in the website www.ksoumysuru.ac.in Assignment Questions will also be hosted in the website.

Truly Yours

Prof. Kamble Ashok

FACULTY DETAILS

a. Department of Computer Science

Sl. No.	Name of the Faculty	Designation	Qualification	Specialization	Experience in Years	Mobile Number
1	Smt. Suneetha	Assistant Professor & Chairperson	M.Sc.	Pattern recognition & Image Processing	16	9480326709
2	Dr. Sumati Ramakrishna Gowda	Assistant Professor	M.Sc.IT, MPhil Ph.D.	Mobile Adhoc Networks	21	572
3	Dr. D.M. Mahesha	Assistant Professor	M.C.A., Ph.D.	Text Recognition	11	580
4	Smt. D.N.Bhavya	Assistant Professor	M.Tech.	Bio Matrics	11	-
5	Dr. Naveen Kumar C.G	Assistant Professor (Contract Basis)				

ACADEMIC REGULATIONS FOR MSc COMPUTER SCIENCE COURSE

1. TITLE AND DURATION OF THE COURSE

- 1.1 The post-graduate course in Computer Science will be called as the **Master of Science in Computer Science**
- 1.2 The MSc Computer Science programme will be of two academic year's duration and conducted in four semesters with each semester having an academic duration of 14 to 16 weeks.

2. GENERAL ENTRY SCHEME FOR MSc COMPUTER SCIENCE COURSE

3. Eligibility Criteria B.Tech/AMIE/B.E (Electrical and Electronics) / B.E in Electronics / IT / IS/ CS / Electronics and Communication / Telecommunication / Medical Electronics / Mechatronics, OR B.Sc. (Electronics / Computer Science / Electrical / Medical Technology / Multimedia / Telecommunication / IT / Information Science) / BCA OR B.Sc. with one year / 2 Semesters PG Diploma in Computer Science / Computer Application / Add-on Course in Computer Science equivalent to six papers in Computer Science OR Graduates in B.Sc. with Mathematics as one of the major.

3. MAXIMUM DURATION FOR COMPLETING MSc COMPUTER SCIENCE COURSE

A candidate who is admitted to the MSc Computer Science Programme has to complete the degree within twice the duration of the course i.e., 4 years, from the date of his/her admission.

4. AWARD OF DEGREES

Students will be eligible to get their degree certificates of MSc Computer Science after successful completion of their academic programme. They will have to apply to the Registrar (Evaluation) along with the prescribed fee at the time of convocation to get their degree certificates. However, they may be issued a provisional degree certificate, on application, soon after the announcement of the final results.

5. PROGRAMME STRUCTURE- M.Sc. Computer Science-First Semester

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
I	MCSDSC-1.1	Advanced Data Structures with Algorithms	4	12	20	80	100	08	32	3
	MCSDSC-1.2	OOPs with Java	4	12	20	80	100	08	32	3
	MCSDSC-1.3	Data Structure & Algorithms Lab	2	60	10	40	50	04	16	3
	MCSDSC-1.4	OOPs with Java Lab	2	60	10	40	50	04	16	3
	MCSDSE-1.5	Computer Architecture	3	09	20	80	100	08	32	3
	MCSDSE-1.6	Advanced C programming								
	MCSDSE-1.7	Computer Graphics	3	09	20	80	100	08	32	3
	MCSDSE-1.8	Operating System								
	ELMCS-01	Interdisciplinary Elective -1	2	06	10	40	50	04	16	1 ^{1/2}
Total			20	168	110	44	550	44	176	-

Non-CS Students are recommended to opt MCSDSE-1.6 and MCSDSE-1.8
 CS Students are recommended to opt
 MCSDSE-1.5 and MCSDSE-1.7

Second Semester

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
II	MCSDSC-2.1	Linear Algebra & Statistics	4	12	20	80	100	08	32	3
	MCSDSC-2.2	Relational Database Management System	4	12	20	80	100	08	32	3
	MCSDSC-2.3	Statistics Lab	2	60	10	40	50	04	16	3
	MCSDSC-2.4	RDBMS Lab	2	60	10	40	50	04	16	3
	MCSDSE-2.5	Web Programming	3	09	20	80	100	08	32	3
	MCSDSE-2.6	Object Oriented Analysis and Design								
	MCSDSE-2.7	Computer Networks	3	09	20	80	100	08	32	3
	MCSDSE-2.8	Ad hoc Networks								
	ELMCS-02	Interdisciplinary Elective -2	2	06	10	40	50	04	16	1 ^{1/2}
Total			20	168	110	44	550	44	176	-

Note: Non- CS Students are recommended to opt MCSDSE-2.5 and MCSDSE-2.7CS students are recommended to opt MCSDSE-2.6 and MCSDSE-2.8

Third Semester

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
III	MCSDSC-3.1	Data Science with Python	4	12	20	80	100	08	32	3
	MCSDSC-3.2	Machine Learning	4	12	20	80	100	08	32	3
	MCSDSC-3.3	Python Programming Lab	2	60	10	40	50	04	16	3
	MCSDSC-3.4	Machine Learning Lab	2	60	10	40	50	04	16	3
	MCSDSE-3.5	Business Analytics	3	09	20	80	100	08	32	3
	MCSDSE-3.6	Software Engineering								
	MCSDSE-3.7	Cryptography & Network Security	3	09	20	80	100	08	32	3
	MCSDSE-3.8	Cloud Computing								
	MCSSEC-1	Big-Data Analytics-1	2	06	10	40	50	04	16	1 ^{1/2}
Total			20	168	110	44	550	44	176	-

Note: Students are recommended to opt any one from MCSDSE-3.5/ MCSDSE-3.6 and MCSDSE-3.7/MCSDSE-3.8

Fourth Semester

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
IV	MCSDSC-4.1	Artificial Intelligence	4	12	20	80	100	08	32	3
	MCSDSC-4.2	Introduction to IOT	4	12	20	80	100	08	32	3
	MCSDSE-4.3	Dissertation/Project work	8	240	30	120	150	12	48	3
	MCSDSE-4.4	Introduction to Block Chain	3	09	20	80	100	08	32	3
	MCSDSE-4.5	Nature Inspired Computing Methods								
	MCSSEC-2	Big-Data Analytics-2	2	06	10	40	50	04	16	1 ^{1/2}
	Total			21	279	100	400	500	40	160

Note: Students are recommended to opt any one from MCSDSE-4.4/
MCSDSE-4.

Interdisciplinary Electives

SL No	Department	Sub Code	I Semester	Sub Code	II Semester
1	KANNADA	ELK-01	ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ	ELK-02	ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ
2	ENGLISH	ELE-01	Indian Literature -I	ELE-02	Indian Literature -II
3	HINDI	ELH-01	Vyavaharik Hindi Vyakaran	ELH-02	Hindi Cinema
4	TELUGU	ELT-01	Tilak	ELT-02	Telugu Samskruthi – Samaajam
5	HISTORY	ELHS-01	Ancient World Civilisations (Egypt, Mesopotamia, Greek, Roman, Inca, Chinese)	ELHS-02	Social Reform Movement in India
6	ECONOMICS	ELEC-01	Economic Policies of India Since 1991	ELEC-02	Institutions for International Development
7	POLITICAL SCIENCE	ELP-01	Local Government in India.	ELP-02	Indian Constitution
8	PUBLIC ADMINISTRATION	ELPA-01	Indian Polity-1	ELPA-02	Indian Polity-2
9	SOCIOLOGY	ELS-01	Invitation to Sociology	ELS-02	Study of Indian Society
10	JOURNALISM AND	ELJ-01	Aspects of	ELJ-02	Aspects of Journalism

	MASS COMMUNICATION		Journalism and Mass Communication - I		and Mass Communication - II
11	ANCIENT HISTORY AND ARCHEOLOGY	ELA-01	World heritage sites of India	ELA-02	Cultural History of Hoysalas
12	EDUCATION	ELED-01	Foundations of Education	ELED-02	Higher Education
13	COMMERCE	ELC –01	Personal Financial Planning	ELC –02	Entrepreneurship Development
14	MANAGEMENT	ELM –01	Disaster Management	ELM –02	E-Commerce
15	BIOCHEMISTRY	ELMBC –01	Basics of Bioinorganic and Biophysical chemistry for Biology graduates.	ELMBC –02	Basic Bioorganic chemistry for Biology graduates.
16	BIOTECHNOLOGY	ELMBT –01	Biotechnology Principles and applications	ELMBT –02	Fundamentals of Biotechnology
17	CHEMISTRY	ELMC –01	Open Elective I	ELMC –02	Open Elective II
18	CLINICAL NUTRITION AND DIETETICS	ELMCND –01	Healthy lifestyles and nutrition	ELMCND–02	Nutraceuticals and health foods
19	COMPUTER SCIENCE	ELMCS –01	Mobile App Development	ELMCS –02	E-Commerce
20	ENVIRONMENTAL SCIENCE	ELMES –01	Basics of Environmental Science	ELMES –02	Advances in Environmental Science
21	GEOGRAPHY	ELMG –01	Introduction to Physical Geography	ELMG –02	Geography of Karnataka
22	MATHEMATICS	ELMM –01	Fundamentals of Mathematics	ELMM –02	Combinatorics and Graph Theory
23	MICROBIOLOGY	ELMMB –01	Microbial World and Microbial Diversity	ELMMB –02	Microbes in Sustainable Agriculture and Development
24	PHYSICS	ELMP –01	Mechanics	ELMP –02	Waves and Optics
25	PSYCHOLOGY	ELMPSY –01	Introduction to Psychology	ELMPSY –02	Psychology in Everyday Life
26	INFORMATION TECHNOLOGY	ELMIT –01	Green Computing	ELMIT –02	E-Commerce
27	BOTANY (NEW)	ELMBOT –01	Plant-Microbe Interactions	ELMBOT –02	Plant Diversity and Human Welfare
28	ZOOLOGY (NEW)	ELMZ –01	Parasites Vectors & communicable diseases	ELMZ–02	Essential of Reproductive Health

29	FOOD AND NUTRITION SCIENCES	ELMFNS –01	Food Psychology	ELMFNS –02	Nutritional Management in Disaster Conditions
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Note:

- A. I and II Semester Open elective (Interdisciplinary Electives) syllabus are attached in Annexure – I and Annexure - II respectively.
- B. The Students may contact respective department chairperson in case of any queries regarding open elective course. The contact details available in the university website.

6. ACADEMIC REGULATIONS FOR MSc COMPUTER SCIENCE COURSE

6.1 General Regulations

- a) A student is permitted to register for the next higher semester after completion of a semester course, irrespective of the results in his previous semester papers.
- b) The candidate can continue to register for higher semesters in a similar way along with his/her registration in failed subjects of earlier semesters.
- c) A student has to complete the degree programme within twice the duration of the academic programme that in 4 years.

6.2 Academic Assessment Procedure

- a) The academic assessment in each subject is based on the Internal Assessment and Term-end examinations conducted by the University.
- b) The distribution of marks for evaluation in each subject will be as follows.

i) For Theory Subjects

Internal Assessment	20 marks
Term-end University Examination	80 marks
Total	100 marks

ii) For Practicals

Internal Assessment	10 marks
Term-end University Practical Examination	40 marks
Total	50 marks

iv) Project work

Internal Assessment	30 marks
Term-end University Project Examination	120marks
Total	150 marks

- c) The Internal Assessment Marks obtained by a candidate cannot be changed or improved upon unless he/she Re-registers for the same semester once again.
- d) A candidate can register for Improvement Examination in his/her term-end University Examination for any subject, (theory or practical), of his/her earlier semesters.

The better performance of his/her attempt will be taken into consideration.

Detailed Syllabus for MSc Computer science I semester CBCS pattern

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
I	MCSDSC-1.1	Advanced Data Structures with Algorithms	4	12	20	80	100	08	32	3
	MCSDSC-1.2	OOPs with Java	4	12	20	80	100	08	32	3
	MCSDSC-1.3	Data Structure & Algorithms Lab	2	60	10	40	50	04	16	3
	MCSDSC-1.4	OOPs with Java Lab	2	60	10	40	50	04	16	3
	MCSDSE-1.5	Computer Architecture	3	09	20	80	100	08	32	3
	MCSDSE-1.6	Advanced C programming								
	MCSDSE-1.7	Computer Graphics	3	09	20	80	100	08	32	3
	MCSDSE-1.8	Operating System								
	ELMCS-01	Interdisciplinary Elective -1	2	06	10	40	50	04	16	1 ^{1/2}
Total			20	168	110	44	550	44	176	-

Non-CS Students are recommended to opt MCSDSE-1.6 and MCSDSE-1.8 CS Students are

recommended to opt MCSDSE-1.5 and MCSDSE-1.7

Eligibility Criteria B.Tech/AMIE/B.E (Electrical and Electronics) / B.E in Electronics / IT / IS/ CS / Electronics and Communication / Telecommunication / Medical Electronics / Mechatronics, OR B.Sc. (Electronics / Computer Science / Electrical / Medical Technology / Multimedia / Telecommunication / IT / Information Science) / BCA OR B.Sc. with one year / 2 Semesters PG Diploma in Computer Science / Computer Application / Add-on Course in Computer Science equivalent to six papers in Computer Science OR Graduates in B.Sc. with Mathematics as one of the major.

Duration of the Programme: 2 years (4 Semesters)

HC 1.1 Advanced Data Structures with Algorithms: Credit 4:

BLOCK- I ROLE OF ALGORITHMS IN COMPUTING

Unit-1 Algorithms – Algorithms as a Technology- Insertion Sort

Unit-2 Analyzing Algorithms – Designing Algorithms- Growth of Functions:

Unit-3 Asymptotic Notation – Standard Notations and Common Functions

Unit-4 Recurrences: The Substitution Method The Recursion-Tree Method

BLOCK -II HIERARCHICAL DATA STRUCTURES

Unit-5 Binary Search Trees: Basics – Querying a Binary search tree – Insertion and Deletion-Red-Black

trees: Properties of Red-Black Trees.

Unit-6 Rotations – Insertion – Deletion -B-Trees: Definition of Btrees – Basic operations on B-Trees –

Deleting a key from a B-Tree-

Unit-7: Fibonacci Heaps: structure – Mergeable-heap operations-

Unit-8: Decreasing a key and deleting a node-Bounding the maximum degree.

BLOCK- III GRAPHS

Unit-9: Elementary Graph Algorithms: Representations of Graphs – Breadth-First Search – Depth-First

Search.

Unit-10: Topological Sort – Strongly Connected Components- Minimum Spanning Trees: Growing a

Minimum Spanning Tree –

Unit-11: Kruskal and Prim- Single-Source Shortest Paths: The Bellman-Ford algorithm Single-Source

Shortest paths in Directed Acyclic Graphs –

Unit-12: Dijkstra's Algorithm; All-Pairs Shortest Paths: Shortest Paths and Matrix Multiplication – The

Floyd Warshall Algorithm;

BLOCK- IV ALGORITHM DESIGN TECHNIQUES

Unit-13: Dynamic Programming: Matrix-Chain Multiplication – Elements of Dynamic Programming – Longest Common Subsequence

Unit-14: Greedy Algorithms: An Activity-Selection Problem – Elements of the Greedy Strategy-

Unit-15: Huffman Codes. Np Complete and NP Hard NP-Completeness:

Unit-16: Polynomial Time – Polynomial-Time Verification – NP- Completeness and Reducibility – NP-Completeness Proofs –NP-Complete Problems

Text Books:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition, Universities Press, Hyderabad, 2008.

2. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, Prentice Hall of India, New Delhi, 2007
- 3.S.Sridhar,|Design and Analysis of Algorithms|, First Edition, Oxford University Press. 2014

REFERENCES:

1. Introduction to Algorithms – T.H. Corman, C.E. Leiserson., R.L. Rivest, C. Stein.
2. Fundamentals to Computer Algorithms – E. Horowitz, S. Sahni, S. Rajasekaran.
3. Combinatorial Optimization Algorithms and Complexity – C.H. Papadimitriou, E. Steiglitz.
- 4.Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, —Data Structures and Algorithms|, Pearson Education, Reprint 2006.
- 5.Robert Sedgewick and Kevin Wayne, —ALGORITHMS|, Fourth Edition, Pearson Education.

HC 1.2 OOPS with JAVA: credit 4

Block 1: Introduction to Java:

Unit-1: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping,

Unit-2: Java methods, Overloading, Math class, Arrays in java. Objects and Classes Basics of objects and classes in java,

Unit-3: Constructors, Finalizer, Visibility modifiers, Methods and objects,

Unit-4: Inbuilt classes like String, Character, String Buffer, File, this reference.

Block 2: Inheritance and Polymorphism:

Unit-5: Inheritance in java, Super and sub class,

Unit-6: Overriding, Object class, Polymorphism,

Unit-7: Dynamic binding, Generic programming, Casting objects, Instance of operator,

Unit-8: Abstract class, interface in java, Package in java, UTIL package.

Block 3: Event and GUI programming:

Unit-9: Event handling in java, Event types, Mouse and key events, GUI Basics,

Unit-10: Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout,

Unit-11: GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text

Areas, Combo

Unit-12: Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle,

Introduction to swing.

Block 4: I/O programming:

Unit-13: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

Unit-14: Multithreading in java: Thread life cycle and methods, Runnable interface,

Unit-15: Thread synchronization, Exception handling with try-catch-finally,

Unit-16: Collections in java, Introduction to JavaBeans and Network Programming.

Text book

1. Daniel.Y. Lilang., “Introduction to Java programming”, 7th edition, Pearson publication, 2009.

Reference book

1. Balagurussamy.E., “Programming with java”, 3 editions, The McGraw-Hill, 2008.

HC 1.3 Data Structure & Algorithms LAB

1. Write a program for implementation of stack using array
2. Write a program Fibonacci series up to a range.
3. Write a program Fibonacci series using recursive function.
4. Write a program Implementation of stack using array.
5. Write a program in to construct binary tree and binary tree traversal
6. Implementing recursive algorithms and study its theoretical time vs empirical time –
7. Implement and analyze selection problem
8. Implement and analyze: Minimum spanning tree problem
9. Implement and analyze Traveling salesperson problem.
10. Implement and analyze: Sum of subsets.

HC 1.4 OOPs with Java LAB

List of experiments:

OOPs with java LAB

- 1 Program to define a structure of a basic JAVA program
- 2 Program to define the data types, variable, operators, arrays and control structures.
- 3 Program to define class and constructors. Demonstrate constructors.
- 4 Program to define class, methods and objects. Demonstrate method overloading.
- 5 Program to define inheritance and show method overriding.
- 6 Program to demonstrate Packages.
- 7 Program to demonstrate Exception Handling.
- 8 Program to demonstrate Multithreading.
- 9 Program to demonstrate I/O operations.
- 10 Program to demonstrate Network Programming.
- 11 Program to demonstrate Applet structure and event handling.
- 12 Program to demonstrate Layout managers.

1.5 Computer Architecture: Credit 3:

Block -I

Unit-1: Overview of von Neumann architecture: Instruction set architecture; The Arithmetic and Logic

Unit, The Control Unit,

Unit-2: Memory and I/O devices and their interfacing to the CPU; Measuring and reporting performance; CISC and RISC processors. Pipelining:

Unit-3: Basic concepts of pipelining, data hazards, control hazards, and structural hazards;

Unit-4: Techniques for overcoming or reducing the effects of various hazards. Hierarchical Memory

Technology:

Block -II

Unit-5: Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for

reducing cache misses;

Unit-6: Virtual memory organization, mapping and management techniques, memory replacement

policies.

Unit-7: Instruction-level parallelism: Concepts of instruction-level parallelism (ILP), Techniques for

increasing ILP;

Unit-8: Superscalar, super-pipelined and VLIW processor architectures; Vector and Array Processors

Block -1II

Unit-9: Principles: Instruction types, Compound, Vector loops, Chaining, Array processor structure and

algorithms, Case studies of contemporary microprocessors.

Unit-10: Multiprocessor Architecture: Centralized shared-memory architecture,

Unit-11: synchronization, memory consistency, interconnection networks;

Unit-12: Distributed shared-memory architecture, Cluster computers.

References:

1. John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan

Kaufmann.

2. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-

Hill.

3. M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing

House.

1.6 Advanced C programming: Credit 2

Block 1:

Unit-1: Functions: User Defined Functions-Introduction, Elements of UDF, Categories of UDF-,

Unit-2: No argument no return value, Arguments but no return value, No argument but returns a

value, Arguments with return value, Recursion, Nesting Function, Storage Classes

Unit-3: Structures, Unions & Pointers -Defining a structure, Accessing a structure variable, operations

on structure members,

Unit-4: Unions, Pointer-Definition and Concept, advantage of using pointer, Pointer arithmetic

Block-2:

Unit-5: Dynamic Memory Allocation-Memory Allocation Function- malloc(), calloc(), realloc(), free()

Link List Concepts Advantages

Unit-6: Overview of types of Link List Operations on Singly Link List (create, display, insert at first,

insert at last, delete at first, delete at last) o Application of Link list.

Unit-7: Files and Preprocessors • Files Concepts of File Management Files functions – fopen(),

fclose(), fprintf(), fscanf(), fseek(), ftell(), rewind(), putc(), getc(), putw(), getw()

Error handling

functions Command line argument.

Unit-8: Preprocessors o Types of Preprocessors o Macro substitution directives o File inclusion

directives o Compiler control directives

Textbook:

1. Programming in C (Second Edition) Publication: Pearson Education by Ashok N. Kamthane

Reference Book:

1. Simplifying C (First Edition 2010) Publication: Dreamtech by Harshal Arolkar and Sonal Jain
2. Programming in ANSI C (Fifth Edition 2011) Publication: Mc Graw Hill by Balagurusamy
3. Programming in C (First Edition 2011) Publication: Oxford Higher Education by Reema Thareja

Advanced C Programming Lab Credit 1

Using Functions:

1. Write a program to calculate average temperature of five days. Create temp() function.
2. Write a program that uses recursive function fibo() that generates a Fibonacci series containing N elements.
3. Write a program that uses a recursive function fact() that finds the factorial of a given number N.
4. Program to find if the given no. is prime or not. The function should accept the number as argument and return if the no. is prime or not.
5. Write a function which accepts a character array as argument from the user. The function should print the ASCII equivalent of all the characters in the string.
6. Write a function which accepts a character array as argument from the user. The function should convert all the lowercase characters into uppercase case
7. Write a user-defined function to perform
 - a) Square of a number
 - b) Area of a square
 - c) Reverse the number
8. Write a program that uses a function to check whether an entered three digit number is palindrome or not.

Using Structures:

1. Write a program to define structure with tag state with fields state name, number of districts and total population. Read and display the data.
2. Write a program to create a list of books details. The details of a book include title, author, publisher, publishing year, number of pages, and price.
3. Define a structure called Item with members: Item code, Item name, Price. Create an array of five Items. Create a function which accepts the Item array and modifies each element with an increase of 10% in the price.
4. Define a structure to represent a date. Use your structures that accept two different dates in the format mm dd of the same year. Write a C program to display the month names of both dates.

1.7 Computer Graphics: Credit 2

Block 1:

Unit-1: Brief discussion on historical perspective; graphics primitives such as points, lines, polygons,

etc.; representation of pictures using primitives; storage & retrieval of pictures;

Unit-2: introduction to graphics display devices; calligraphic/ vector graphics versus raster graphics; bit

plane; colour look-up table;

Unit-3: Introduction to graphic input devices – track ball, mouse, digitizing tablet, light pen etc.

Unit-4: Rasterization techniques: Line – DDA; Bresenham's generalized integer version; Mid-point

rasterization. Circle.

Unit-5: Bresenham's algorithm; Mid-Point algorithm. Ellipse – Mid-Point algorithm **2D Scan**

conversion & polygon filling: Active-Edge-List (y-bucket) scan conversion of lines

Unit-6: polygons; Edge –fill, Fence –fill, & Edge –flag polygon filling algorithms; simple Seed –fill &

Scan –lineseed –fill algorithms.

Unit-7: 2D Geometric transformations: Introduction to position vector; representation of 2D objects as

matrices; transformation matrices for scaling, shear, rotation, reflection homogeneous coordinates;

Unit-8: representing translation as a transformation matrix; composite transformation matrix for arbitrary

transformation; invariance of origin under transformation; 2D view-port & viewing window.

Suggested Readings:

1. Procedural Elements for Computer Graphics by David F. Rogers, TMH publication.
2. Mathematical Elements for Computer Graphics by David F. Rogers and J. A. Adams, TMH publication.
3. Computer Graphics, principles & practices by J.D. Foley, A. van Dam, S.K. Feiner and J.F. Huges, Addison Wesley.
4. Computer Graphics, C version, by D. Hearn and M.P. Baker, Pearson Education.
5. Computer Graphics, a programming approach, by S. Harrington, TMH publication.
6. Computer Graphics by A.N. Sinha and A.D. Udai, TMH publication

Computer Graphics Lab programs: Credit-1

USING C / OPENGL / JAVA

1. Implementation of Algorithms for drawing 2D Primitives –
Line (DDA, Bresenham) – all slopes
Circle (Midpoint)
2. 2D Geometric transformations –
Translation
Rotation
Scaling
Reflection
Shear
Window-Viewport
3. Composite 2D Transformations

1.8 Operating system: Credit 2

Block 1:

Unit-1: Introduction to Operating system, Operating system functions, evaluation of O.S.,

Unit-2: Concept of batch-processing, multi-programming, time sharing, real time, distributed,

Unit-3: Parallel Process Management: Concept of process, state diagram, process control block;

Unit-4: scheduling of processes – criteria, types of scheduling, non-pre-emptive and pre-emptive scheduling algorithms.

Block 2:

Unit-5: FCFS, Shortest Job First/Next (SJF/N), Shortest Remaining Time Next (SRTN), Round Robin (RR),

Unit-6: Highest Response Ratio Next (HRN), Priority based scheduling, different Multilevel queue scheduling etc.

Unit-7: Threads – concept, process vs thread, kernel and user threads, multithreading models,

Unit-8: Inter-process Communication (IPC) Memory management: Address space and address Translation

Block 3:

Unit-9: static partitioning, dynamic partitioning, different types of fragmentation,

Unit-10: paging, segmentation, swapping, virtual memory,

Unit-11: demand paging, page size, page table, page replacement algorithms

Unit-12: FIFO, LRU, Optimal page replacement, Variants of LRU, etc; thrashing, working set strategy

References:

1. Operating Systems Concepts – A. Silberschatz, P. Galvin and G. Gagne. Wiley India
2. Operating Systems Concepts - Gary Nutt, N. Chaki and S. Neogy, Pearson Education
3. Operating Systems – W. Stallings, Pearson Education
4. Operating Systems: A Concept-based Approach – D. M. Dhamdhere, TataMcGraw-Hill

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
II	MCSDSC-2.1	Linear Algebra & Statistics	4	12	20	80	100	08	32	3
	MCSDSC-2.2	Relational Database Management System	4	12	20	80	100	08	32	3
	MCSDSC-2.3	Statistics Lab	2	60	10	40	50	04	16	3
	MCSDSC-2.4	RDBMS Lab	2	60	10	40	50	04	16	3
	MCSDSE-2.5	Web Programming	3	09	20	80	100	08	32	3
	MCSDSE-2.6	Object Oriented Analysis and Design								
	MCSDSE-2.7	Computer Networks	3	09	20	80	100	08	32	3
	MCSDSE-2.8	Ad hoc Networks								
	ELMCS-02	Interdisciplinary Elective -2	2	06	10	40	50	04	16	1 ^{1/2}

Correlation,

UNIT-15: Measure of Correlation, Least Square Regression lines. Curve fitting: Method of least square, least square line, least squares Parabola. chi-square test: definition of chi-square; signification test: contingency test, coefficient of contingency.

UNIT-16: Basic of sampling theory: Sample mean and variance, students t-test, test of Hypotheses and significance, degree of freedom, Z-test, small and large sampling, Introduction to Monte Carlo method.

References

1. S. Friedberg. A. Insel, and L. Spence – *Linear Algebra*, Fourth Edition, PHI, 2009.
2. P. R. Halmos – *Finite Dimensional Vector Space*, D. Van Nostrand, 1958.
3. Hoffman and Kunze – *Linear Algebra*, Prentice – Hall of India, 1978, 2nd Ed.,
4. Jimmie Gilbert and Linda Gilbert – *Linear Algebra and Matrix Theory*, Academic Press, An imprint of Elsevier 2010
5. Advanced Engineering Mathematics: H.K. Dass; S. Chand & Co., 9 Revised Edition, 2001.
6. Discrete Mathematics: S.K. Sarkar; S. Chand & Co., 2000.
7. Numerical Analysis: S.S. Sastry; Prentice Hall of India, 1998.
8. Mathematical Statistics: J.N. Kapoor and H.C. Saxena.
9. Mathematical Statistics: M. Ray and H. Sharma

MCSDSC 2.2 Relational Database Management System credit-4

BLOCK-I

UNIT-1: Introduction: Characteristics of database approach, data models, DBMS architecture and data independence.

UNIT-2: E-R Modeling: Entity types, Entity set, attribute and key, Relationships, Relation types, Roles and Structural constraints, Weak entities, Enhanced ER Model.

UNIT-3: Database Languages: DDL, DML, Database Access for applications Programs, Database Users And Administrator,

UNIT-4: Transaction Management, Database system Structure, Storage Manager, Query Processor.

BLOCK-II

UNIT-5: Relational Model: Introduction to the Relational Model, Integrity Constraint over Relations,

Enforcing Integrity constraints, Querying relational data,

UNIT-6: Logical data base Design, Introduction to views, Destroying/altering Tables and Views.

UNIT-7: Relational Algebra and Calculus: Relational Algebra, set operations, Select ion and project ion,

renaming, Joins, Division, Examples of Algebra overviews,

UNIT-8: Relational calculus: Tuple relational Calculus, Domain relational calculus, Expressive Power of

Algebra and Calculus.

BLOCK-III

UNIT-9: Schema Refinement, Functional dependencies: Problems Caused by redundancy, Decompositions, Problem related to decomposition,

UNIT-10: Normalization: FIRST, SECOND, THIRD Normal forms, BCNF, Lossless join Decomposition,

UNIT-11: Dependency preserving Decomposition, Schema refinement in Database Design, Multivalued

Dependencies, forth Normal Form.

UNIT-12: Transaction Management: ACID Properties, Transact ions and Schedules, Concurrent

Execution of transaction, Serializability and recoverability.

BLOCK-IV

UNIT-13: Concurrency Control: Introduction to Lock Management, Lock Conversions, Dealing with

Deadlocks, Concurrency without Locking, Recovery Techniques, Database Security.

UNIT-14: Introduction to Oracle: Getting started, Modules of Oracle, Invoking SQLPLUS, Data types,

Data Constraints,

UNIT-15: Operators, Data manipulation - Create, Modify, Insert, Delete and Update; Searching,

Matching and Oracle Functions.

UNIT-16: SQL* Forms: Basic concepts, Form Construction, creating default form, user-defined form,

multiple-record form, Master-detail form.

References :

1. Raghurama Krishnan : Data base Management Systems, Johannes Gehrke, Tata McGraw Hill.
2. Siberschatz, Korth : Data base System Concepts, McGraw Hill.
3. P. Radha Krishna : Database Management Systems, HI-TECH Publicat ions.
4. C.J. Date : Introduction to Database Systems, Pearson Education.
5. Rob & Coronel : Data base Systems design, Implementation, and Management, Thomson.

6. Elmasri Navrate : Data base Management System, Pearson Education.
7. Mathew Leon : Data base Management System, Leon Vikas Publishers.

MCS DSC 2.3 (HC) Statistics LAB credit-2

Unit 1: Programming in C / R. (The purpose of this unit is to introduce programming with the eventual aim of developing skills required to .write statistical software. Should there be previous exposure to programming, this unit can be replaced with a more advanced unit in object oriented programming in C++ or Java. Topics should include Simple syntax, loops, pointers and arrays, functions, input/output, and linking to databases.

Unit 2: Numerical analysis and statistical applications. (The purpose of this unit is to apply programming skills in methods and algorithms useful in probability, statistics and data analysis. Topics should include numerical integration, root extraction, random number generation, Monte Carlo integration, matrix computations, drawing random samples : known univariate probability distributions
-both discrete and continuous.

Unit 3: Analysis of interesting data sets using known techniques on a suitable statistical package such as R / MINITAB / SAS / SPSS / JMPIN; Topics should include graphics, descriptive statistics, representation of multivariate data, hypotheses testing, analysis of variance and linear regression.

Books for Reference:

- Crawley, M. The R programming language, Shareware.
Keminghan, B. W. and Ritchie, D. M. (1988): The C Programming Language, Second Edition, Prentice Hall.
Press, W.H., Teukolsky, S. A., Vetterling, W. T. and Flannery, B. P. (1993): Numerical recipes in C, Second Edition, Cambridge University Press.
Ryan, B. and Joiner, B. L. (2001):MINITAB Handbook, Fourth Edition, Duxbury. Thisted, R. A. (1988): Elements of Statistical Computing. Chapman and Hall.

MCS DSC 2.4 RDBMS LAB credit-2

1. Database Customization
2. Creating Databases/Table spaces
3. Create Objects
4. Moving Data
5. Recovery
6. Locking
7. Preparing Applications for Execution using a front end tool
8. Application Performance Tool

The students are supposed to practice and develop a mini application for above mentioned lab. The students can do the activity in a group (team) consisting of not more than 2 students.

The entire application to be submitted by each team should be done with all the above activities. The examiner may ask to perform any of the above acts

MCS DSC 2.5 Web Programming credit-2

Block – I

UNIT-1: Unit Perl, CGI Programming: Origins and uses of Perl; Scalars and their operations; Assignment statements and simple input and output;

UNIT-2: Control statements; Fundamentals of arrays; Hashes; References; Functions;

UNIT-3: Pattern matching; File input and output; Examples. The Common Gateway Interface; **UNIT-4:** CGI linkage; Query string format; CGI.pm module; A survey example; Cookies.

Block – II

UNIT-5: Servlets and Java Server Pages: Overview of Servlets; Servlet details; A survey example; Storing information on Clients;

UNIT-6: Java Server Pages. PHP: Origins and uses of PHP; Overview of PHP;

UNIT-7: General syntactic characteristics; Primitives, operations and expressions; Output; Control statements;

UNIT-8: Arrays; Functions; Pattern matching; Form handling; Files; Cookies; Session tracking.

Reference

1. Robert W. Sebesta: “Programming the World Wide Web”, 4th Edition, Pearson Education, 2012.
2. M. Deitel, P.J. Deitel, A. B. Goldberg: “Internet & World Wide Web How to program”, 3rd Edition, Pearson Education, 4th edition, PHI, 2011.
3. Chris Bates: “Web Programming Building Internet Applications”, 3rd Edition, Wiley India, 2011.
4. Joyce Farrell, Xue Bai, Michael Ekedahl: “The Web Warrior Guide to Web Programming”, 1st edition, Thomson, 2010.

Web Programming LAB credit-1

1. Develop and demonstrate a XHTML file that includes Javascript script to generate first n Fibonacci numbers.

2. Develop and demonstrate the usage of inline and external style sheet using CSS

3. Develop and demonstrate, using Javascript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.

4. Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.
5. Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
6. Write a Perl program to display a digital clock which displays the current time of the server.
7. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.
8. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
9. Write a PHP program to read student data from an XML file and store into the MYSQL database. Retrieve and display.
10. Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.

MCS DSC 2.6 Object oriented analysis and design using UML Credit-3

BLOCK – I

- UNIT-1:** Introduction: An overview - Object basics - Object state and properties, Behavior, Methods, Messages.
- UNIT-2:** Object Oriented system development life cycle, Benefits of OO Methodology. Overview of Prominent OO Methodologies:
- UNIT-3:** The Rumbaugh OMT, The Booch methodology, Jacobson's OOSE methodologies, Unified Process,
- UNIT-4:** Introduction to UML, Important views & diagram to be modelled for system by UML.

BLOCK-II

- UNIT-5:** Factional View (models): Use case diagram - Requirement Capture with Use case - Building blocks of Use Case diagram - actors,
- UNIT-6:** use case guidelines for use case models - Relationships between use cases - extend, include, generalize. Activity diagram
- UNIT-7:** Elements of Activity Diagram - Action state, Activity state, Object, node, Control and Object flow, Transition (Fork, Merge, Join) –
- UNIT-8:** Guidelines for Creating Activity Diagrams - Activity Diagram - Action Decomposition (Rake) - Partition - Swim Lane.

BLOCK– III

- UNIT-9:** Static structural view (Models): Classes, values and attributes, operations and methods, responsibilities for classes,

UNIT-10: abstract classes, access specification (visibility of attributes and operations). Relationships among classes: Associations, Dependencies. Inheritance - Generalizations, Aggregation.

UNIT-11: Adornments on Association: association names, association classes, qualified association, n-ary associations, ternary and reflexive association. Dependency relationships among classes,

UNIT-12: notations. Notes in class diagram, Extension mechanisms, Metadata, Refinements, Derived, data, constraint, stereotypes, Package & interface notation. Object diagram notations and modeling, relations among objects (links).

Reference

1. Charles Richter, "Designing Flexible Object Oriented systems with UML", Macmillan Technical, 1999
2. Jackson, Burd Thomson, "Object Oriented Analysis & Design", Thomson Course Technology, 2004
3. James Rumbaugh. Micheal Blaha, Object oriented Modeling and Design with UML. Pearson, second edition, 2005.
4. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education, 1999.
5. James Rumbaugh, "Object Oriented Modeling and Design", Prentice Hall, 1991.
6. Joseph Schmuilers, "Teach Yourself UML in 24 Hours", Sams publication, 2004.
7. Mike O'Docherty, "Object-Oriented Analysis and Design: using UML", Wiley Publication, 2005.

MCS DSC 2.7 Computer Networks Credit-2

BLOCK-1

UNIT-1: Computer Networking: Introduction; Data communications: components, direction of data flow (simplex, half duplex, full duplex); Networks, network criteria

UNIT-2: physical structure (type of connection, topology), categories of network (LAN, MAN, WAN); Protocols and standards; Reference models: OSI reference model,

UNIT-3: TCP/IP reference model, their comparative study. Physical layer: Overview of data (analog & digital), Data and Signals; Digital Transmission; Analog Transmission Data link layer:

UNIT-4: Error Detection and Correction; Data Link Control; Multiple Access; Virtual-Circuit Networks: Frame Relay and ATM

BLOCK-2

UNIT-5: Network layer: internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing: Internet address, classful address, subnetting; Routing :techniques,

UNIT-6: static vs. dynamic routing, routing table for classful address; Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing;

UNIT-7: Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols. Transport

layer: Process to process delivery; UDP; TCP; Congestion control algorithms;

UNIT-8: Quality of services. Application layer: DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

References:

1. William Stallings, Data and Computer Communication, Prentice Hall of India.
2. Behrouz A. Forouzan, Data Communication and Networking, McGraw-Hill.

3. Andrew S. Tanenbaum, Computer Networks, Prentice Hall.

Computer Networks LAB credit-1

1. Program to identify the category of the IP address for the given IP address
2. Program to implement sliding window protocol
3. Program for Socket pair system call usage in IPC
4. Program for Socket options using signals
5. Program to implement Echo concurrent Stream Server
6. Program to implement Echo concurrent stream client
7. Program to implement Listener and Talker
8. Program to implement TCP time service
9. Program to implement UDP time service
10. Program to implement Ping service
11. Program to implement Route tracing program
12. Program to implement File Transfer Protocol

References:

1. William Stallings, Data and Computer Communication, Prentice Hall of India.
2. Behrouz A. Forouzan, Data Communication and Networking, McGraw-Hill.
3. Andrew S. Tanenbaum, Computer Networks, Prentice Hall.

MCS DSC 2.8 Ad hoc Networks Credit-3

BLOCK- I

UNIT-1 Introduction: Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation,

UNIT-2: characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs,

UNIT-3: Wireless Internet. Introduction to adhoc/sensor networks: Key definitions of adhoc/sensor networks, unique constraints and challenges,

UNIT-4: advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks,

BLOCK II

UNIT-5: Issues in design of sensor network, sensor network architecture, data dissemination and gathering.

UNIT-6: MAC Protocols: Issues in designing MAC protocols for adhoc wireless networks, design goals,

UNIT-7: classification of MAC protocols, MAC protocols for sensor network,

UNIT-8: location discovery, quality, other issues, S-MAC, IEEE 802.15.4.

BLOCK III

UNIT-9: Routing Protocols: Issues in designing a routing protocol, classification of routing protocols,

UNIT-10: Table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols.

UNIT-11: QoS and Energy Management: Issues and Challenges in providing QoS, classifications, MAC, network layer solutions,

UNIT-12: QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.

Text Book

1. C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks ", Pearson Education - 2008.

Reference Book

1. Feng Zhao and Leonides Guibas, "Wireless sensor networks ", Elsevier publication - 2004.
2. Jochen Schiller, "Mobile Communications", Pearson Education, 2nd Edition, 2003.
3. William Stallings, "Wireless Communications and Networks ", Pearson Education - 2004

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
III	MCSDSC-3.1	Data Science with Python	4	12	20	80	100	08	32	3
	MCSDSC-3.2	Machine Learning	4	12	20	80	100	08	32	3
	MCSDSC-3.3	Python Programming Lab	2	60	10	40	50	04	16	3
	MCSDSC-3.4	Machine Learning Lab	2	60	10	40	50	04	16	3
	MCSDSE-3.5	Business Analytics	3	09	20	80	100	08	32	3
	MCSDSE-3.6	Software Engineering								
	MCSDSE-3.7	Cryptography & Network Security	3	09	20	80	100	08	32	3
	MCSDSE-3.8	Cloud Computing								
	MCSSEC-1	Big-Data Analytics-1	2	06	10	40	50	04	16	1 ^{1/2}
Total			20	168	110	44	550	44	176	-

MCSDSC 3.1 Data Science with python Credits-4

BLOCK-I

UNIT-1: Basics of Data Science Decision Theory, Estimation Theory, Coordinate Systems, Matrices and Linear Algebra,

UNIT-2: Linear Transformations Data Collection, Modelling and Compilation, Data Analysis, Data Presentation and Visualization Data Science Software Tools,

UNIT-3: Programming Languages for Data Science, Applications of Data Science Data and Sampling Distributions Random sampling and sample bias:

UNIT-4: Bias, Random selection, Selection Bias: Regression to mean, Sampling distributions of a statistic: Central limit theorem,

BLOCK- II

UNIT-5: Standard error, Bootstrap, Resampling, Confidence Intervals. Distributions Normal distribution: Standard normal and QQ plots, Long-tailed distributions,

UNIT-6: Student's t-distribution, Binomial distribution, Poisson distribution, Exponential distribution and Weibull distributions.

UNIT-7: Significance Testing A/B Testing, Hypothesis test: Null hypothesis,

UNIT-8: Alternative hypothesis, One-way and Two-way hypothesis test, Resampling.

Python

BLOCK 1II:

UNIT-9: Fundamentals of Python Programming: Data types in Python, Operators in Python, Input and Output Statements, Control Statements. Arrays: Creating, Processing Array Elements and handling Array Operations.

UNIT-10: Strings Characters: Creating, Indexing, Slicing, Repeating and Concatenation, Comparing, removing spaces, Finding sub strings in String. Functions: Defining, Calling Returning results from a function. Pass by Object Reference, Formal, Actual, Positional, Keyword, Default, Variable Length Arguments. Local and Global Variables.

UNIT-11: Lists: Creating List using range () function, Updating the elements of a list, Concatenation of two list, Repetition of lists, Membership in lists, Aliasing and Cloning lists, Sorting list elements, Nested lists.

UNIT-12: Tuples: Creating and Accessing Tuple Elements, Basic Operation on Tuples, Nested Tuples, Inserting, Modifying and Deleting Elements of a Tuple. Dictionaries: Operation on Dictionaries, Dictionary Methods, Sorting Elements of a Dictionary, Converting Lists in to Dictionary.

BLOCK IV:

UNIT-13: Classes and Objects: Creating Class, The Self Variable, Constructor, Types of Variables, Namespaces, Types of Methods, Passing members between classes, Inner Classes.

UNIT-14: Inheritance and Polymorphism: Constructor in Inheritance, Overriding Super Class Constructors and Methods, The super () Method, Types of Inheritance, Method Resolution Order(MRO), Polymorphism,

UNIT-15: Duck Typing Philosophy of Python, Operator and Method Overloading and Method Overriding. Abstract Classes and Interfaces: Abstract Methods and Class, Interfaces in Python, Abstract Classes vs. Interfaces.

UNIT-16: Introduction to Data Science using Python: Creation of Data Frame from Excel spreadsheet, CSV files, Dictionary and Tuples, Operation of data frames. Data Visualization: Creation of Bar graph, Histogram, Pie chart, Line Graph.

References

1. "Fundamentals of Data Science: Take the First Step to Become A Data Scientist", Samuel Burns, Amazon KDP Printing and Publishing.
2. "Practical Statistics for Data Science", Peter Bruce, Andrew Bruce, O'Reilly, 2017.
3. "Statistics for Data Science", James D. Miller, Packt, 2017.
4. "Probability and Statistics for Engineers", Dr. J. Ravichandran, 2010.
5. "Data Analysis with R", Tony Fischetti, 2015.
6. "Mastering Data Analysis with R", Gergely Daroczi, 2015.
7. "R Cookbook", Paul Teetor, O'Reilly, 2017.
8. R Nageswara Rao, "Core Python Programming", Dreamtech Press, 2018 Edition.
9. Mark Lutz, "Programming Python", 4 th Edition, O'Reilly Media.
10. Timothy A. Budd, "Exploring Python", , McGraw Hill Education, 2nd Reprint 2015
11. E Balaguruswamy, "Introduction to Computing and Problem Solving Using Python", McGraw Hill Education.

E BOOKS:

1. Python for Everybody, <http://py4e.com/book.php>
2. Python Cookbook <http://chimera.labs.oreilly.com/books/12300000000393>
3. Functional Programming in Python <http://www.oreilly.com/programming/free/functional-programming-python.csp> Online Courses and Video Lectures:
 1. The Joy Of Computing using Python, <https://nptel.ac.in/courses/106/106/106106182/>
 2. Python for Everybody Specialization, <https://www.coursera.org/specializations/python>

MCSDSC 3.2 Machine Learning Credits-4

BLOCK-1

UNIT-1: Overview and Introduction to Bayes Decision Theory: Machine intelligence and applications,

UNIT-2: pattern recognition concepts classification, regression, feature selection,

UNIT-3: supervised learning class conditional probability distributions,

UNIT-4: Examples of classifiers bayes optimal classifier and error, learning classification approaches.

BLOCK-2

UNIT-5: Linear machines: General and linear discriminants, decision regions, single layer neural network,

UNIT-6: linear separability, general gradient descent, perceptron learning algorithm,

UNIT-7: mean square criterion and widrow-Hoff learning algorithm; multi-Layer perceptrons: two-layers universal approximators,

UNIT-8: backpropagation learning, on-line, off-line error surface, important parameters.

BLOCK-3

UNIT-9: Learning decision trees: Inference model, general domains, symbolic decision trees, consistency, learning trees from training examples entropy, mutual information,

UNIT-10: ID3 algorithm criterion, C4.5 algorithm continuous test nodes, confidence, pruning, learning with incomplete data.

UNIT-11: Instance-based Learning Nearest neighbor classification, k-nearest neighbor, nearest neighbor error probability. Machine learning concepts and limitations:

UNIT-12: Learning theory, formal model of the learnable, sample complexity, learning in zero-bayes and realizable case, VC-dimension, fundamental algorithm independent concepts,

BLOCK-4

UNIT-13: hypothesis class, target class, inductive bias, occam's razor, empirical risk, limitations of inference machines, approximation and estimation errors, Tradeoff.

UNIT-14: Machine learning assessment and Improvement: Statistical model selection, structural risk minimization, bootstrapping, bagging, boosting.

UNIT-15: Support Vector Machines: Margin of a classifier, dual perceptron algorithm, learning nonlinear hypotheses with perceptron kernel functions,

UNIT-16: implicit non-linear feature space, theory, zero-Bayes, realizable infinite hypothesis class, finite covering, margin-based bounds on risk, maximal margin classifier.

Readings:

1. E. Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2006.
2. T. M. Mitchell, Machine Learning, McGraw-Hill, 1997.

3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
4. R. O. Duda, P. E. Hart, and D.G. Stork, Pattern Classification, John Wiley and Sons, 2001.
5. Vladimir N. Vapnik, Statistical Learning Theory, John Wiley and Sons, 1998.
6. J. Shawe-Taylor and N. Cristianini, Cambridge, Introduction to Support Vector Machines, University Press, 2000.

MCSDSC 3.3 Python programming LAB

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

MCSDSC 3.4 Machine Learning LAB Credits-4

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

MCS DSC 3.5 Business Analytics Credits-3

BLOCK-1

UNIT-1: Introduction to Data Science and Business Analytics Data Science overview Data science components

UNIT-2: data visualization, modelling, data prep, communication and presentation

UNIT-3: Business Analytics Fundamentals Business Analytics Fundamentals, descriptive, predictive and prescriptive analytics Types of Digital Data and Data Management Business Intelligence,

UNIT-4: system architecture, OLTP and OLAP systems, OLAP operations, Database, Data Warehouse.

BLOCK-2

UNIT-5: Business Analytics solutions Customer Analytics, Market Analytics, People Analytics,

UNIT-6: Application in Finance and Operations. Data Visualization in Tableau Tableau Fundamentals Design Views and Analyse Data (working with different data sets, charts, maps, dashboards)

UNIT-7: Communication and Presentation of Work Publish workbooks to Tableau public Data Mining basics. Statistics Fundamentals –

UNIT-8: Descriptive and predictive statistics fundamental Hypothesis testing (z-test, t-test, ANOVA) Simple Linear Regression Multiple Linear Regression. Data Modeling and

BLOCK-3

UNIT-9: Introduction to SPSS Model building using relevant datasets Assessing your model

UNIT-10: Drawing insights from your model. Data analysis and Visualization with R Simple data processing with R Data Visualization with R Data Governance

UNIT-11: policies, standards, processes,

UNIT-12: people, and technology used to managing critical data, compliance and risk management.

References

1. Decision Support and Business Intelligence Systems, Turban, Sharda, Delen, Pearson
2. Business Intelligence Success Factors Tools for aligning your business in the global economy by Olivia Parr Rud, John Wiley and sons , 2009
3. Microsoft Excel 2013: Data Analysis and Business Modelling, Winston Wayne L.
4. The Profit impact of Business Intelligence by Steve Williams and Nancy Williams , Morgan Kauffman Publishers/ Elsevier, 2007
3. Business Intelligence: Practices, Technologies, and Management- Rajiv Sabherwal, Irma Becerra-Fernandez
4. Marketing Analytics: Data-Driven Techniques with Microsoft Excel, Wayne L. Winston

MCS DSC 3.6 Software Engineering Credits-2

BLOCK – I

UNIT-1: Software Engineering: The Nature of Software, Changing Nature of Software, Defining the Discipline, Software Process, Software Engineering Practice.

UNIT-2: The Software Process: A Generic Process Model, Defining a Framework Activity, Process Assessment and Improvement,

UNIT-3: Prescriptive Process Models, Specialized Process Models, Unified Process, Personal and Team Process Models. Defining Agility, Agile Process, Extreme Programming, Psychology of Software Engineering, Software Team Structures,

UNIT-4: Software Engineering Using the Cloud, Global Teams. Design Concepts: Design within the Context of SE, Design Process, Design Concepts, Design Model. Software Architecture, Architectural Styles, Architectural Considerations, Architectural Design, Component,

BLOCK-2

UNIT-5: Designing Class-Based Components, Conducting Component-Level Design, Component-Based Development,

UNIT-6: User Interface Design Rules. Quality Management: Quality, Software Quality, Software Quality Dilemma, Achieving Software Quality, Defect Amplification and Removal, Reviews,

UNIT-7: Informal Reviews, Formal Technical Reviews, Elements of Software Quality Assurance, SQA Tasks, Goals, and Metrics, Software Reliability,

UNIT-8: A Strategic Approach to Software Testing, Test Validation Testing, System Testing, Debugging, Software Testing Fundamentals, White-Box Testing, Black-Box Testing, Path Testing, Control Structure Testing, Object-Oriented Testing Strategies & Methods, Security Engineering Analysis, Security Assurance, Security Risk Analysis.

References

1. Ian Sommerville, Software Engineering

2. Hans Van Vliet, Software Engineering
3. D. Bell, Software Engineering for Students
4. K.K. Aggarwal, Y. Singh, Software Engineering
5. R. Mall, Fundamentals of Software Engineering
6. Pankaj Jalote, An Integrated Approach to Software Engineering

Software Engineering Lab credit-1

1. Study of case tool

Requirements

2. Implementation of requirements engineering activities such as elicitation, validation, management using case tools.

Analysis and Design

3. Implementation of Analysis and design using case tools
4. Study and usage of software project management tools such cost estimates and scheduling
5. Documentation generators –Study and practice of Documentation generators
6. Data Modeling using automated tools
7. Practice reverse engineering and re-engineering using tools
8. Exposure towards test plan generators, test case generators, test coverage and software metrics.
9. Meta modeling and software life cycle management.

Case Studies:

10. Structure charts, Data Flow Diagrams, Decision tables and ER diagrams for
 - a. Banking System
 - b. Railway Reservation System
 - c. Hotel management system
 - d. Inventory Control System
 - e. Library management system

MCSDSC 3.7 Cryptography and Network Security Credits-3

Block – I

UNIT-1: Introduction to Information Security: Introduction; security, Critical characteristics of information; NSTISSC security model;

UNIT-2: Approaches to information security implementation; The Security System Development Life Cycle; Information Security Terminology. Planning for Security:

UNIT-3: Introduction; Information Security Policy, Standards, and Practices; The Information Security Blue Print. Security Technology: Firewalls and VPNs:

UNIT-4: Introduction, Physical design, Firewalls, Protecting Remote Connections. Intrusion Detection, Access control and Other Security Tools:

Block – II

UNIT-5: Introduction; Intrusion Detection Systems (IDS); Honey Pots, Honey Nets, and Padded cell systems;

UNIT-6: Scanning and Analysis Tools; Access Control Devices. Information Security maintenance;

UNIT-7: Introduction; Security Management Models; The Maintenance Model. Introduction to Network Security: Attacks, Services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security;

UNIT-8: Internet Standards and RFCs. Cryptography: Conventional Encryption Principles and Algorithms; Cipher Block Modes of Operation; Location of encryption devices; Key distribution;

BLOCK-III

UNIT-9: Approaches to message authentication; Secure Hash functions and HMAC; Public Key Cryptography Principles and Algorithms;

UNIT-10: Digital Signatures; Key management. Authentication Applications: Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.

UNIT-11: IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management.

UNIT-12: Web Security: Web security requirements, Secure Socket layer (SSL) and Transport layer Security (TLS), Secure Electronic Transaction (SET). Network Management Security: Basic concepts of SNMP, SNMPv1 community facility, SNMPv3.

Reference

1. Michael E. Whitman and Herbert J. Mattord: “Principles of Information Security”, 4th Edition, Thomson, 2012.

2. William Stallings: “Network Security Essentials Applications and Standards”, 4th edition, Person Education, 2012.

3. Behrouz a Forouzan, Debdeep Mukhopadhyay: “Cryptography and Network Security”, 2nd edition, Tata McGraw-Hill, 2011.

4. Deven N. Shah: Mark Stapsms Information Security Principles & Practice, 1st edition, Wiley India, 2010.

MCS DSC 3.8 Cloud Computing Credits-2

BLOCK – I

UNIT-1: Era of Cloud Computing (CC): introduction, cloud and other similar configurations, CC vs. peer-to-peer architecture, CC vs. client-server architecture, CC vs. GC, components of CC, impact of CC on businesses.

UNIT-2: Introduction Virtualization: Introduction, virtualization benefits, implementation levels of virtualization, virtualization at the OS level, virtualization structure,

UNIT-3: open source virtualization technology, Xen virtualization architecture, binary translation with full virtualization, para-virtualization with compiler support, virtualization of CPU, memory, I/O devices, hardware support for virtualization, virtualization in multicore processors.

UNIT-4: Cloud Computing Services: IaaS, PaaS, leveraging PaaS for productivity, guidelines for selecting a PaaS provider, concerns with PaaS, languages and PaaS, SaaS, DBaaS. Cloud Computing and Business Value: key drivers for CC, CC and outsourcing,

BLOCK – II

UNIT-5: types of scalability, use of load balancers to enhance scalability, variable operating costs using CC, time-to-market benefits of CC, distribution over the internet, levels of business values from CC.

UNIT-6: Cloud Types and Models: private cloud, public cloud, hybrid cloud. Open Source Cloud Implementation and Administration: Eucalyptus& OpenStack cloud architectures, CSB (158) Recent Trends in Cloud Computing and Standards:

UNIT-7: conflicts of interest for public cloud and IT product providers, BYOD and encryption exposures, cloud standards, cloud ratings, CC trends that are accelerating adoption. Host Security in the Cloud: security for virtualization products, host security for SaaS, PaaS, IaaS. **UNIT-8:** Data Security in the Cloud: challenges with cloud data and data security, data confidentiality and encryption, data availability, data integrity, CSGs. Cloud application requirements, SOA for cloud applications.

Text Kailash J, Jagannath K, Donald J H, Deven Shah, Cloud Computing – Black Book

- References**
1. Rajkumar Buyya, Cloud Computing: Principles and Paradigms
 2. Arshdeep Bahga, Vijay Madisetti, Cloud Computing – A Hands-On Approach
 3. David E.Y. Sarna, Implementing and Developing Cloud Computing Applications
 4. Kai Hwang, Distributed and Cloud Computing From Parallel Processing to Internet of Things

Cloud computing LAB – Credit-1

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create hello world app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like word count.

MCSSEC –1 Big-Data Analytics – Credit-2

BLOCK – I

UNIT-1: Overview of Big Data: What is Big Data? Evolution of Big Data, Structuring Big Data,

UNIT-2: Elements of Big Data, Big Data Analytics. Exploring the Use of Big Data in Business Context:

UNIT-3: Use of Big Data in Social Networking, Use of Big Data in Preventing Fraudulent Activities,

UNIT-4: Use of Big Data in Detecting Fraudulent Activities in Insurance Sector, Use of Big Data in Retail Industry.

BLOCK – II

UNIT-5: Introducing Technologies for Handling Big Data: Distributed and Parallel Computing for Big Data,

UNIT-6: Introducing Hadoop. Understanding Hadoop Ecosystem: Hadoop Ecosystem,

UNIT-7: HDFS, MapReduce, Hadoop YARN, HBase, Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, Oozie.

UNIT-8: Understanding MapReduce Fundamentals and HBase: The MapReduce Framework, Techniques.

References

1. Radha S, M. Vijayalakshmi, Big Data Analytics
2. Arshdeep B and Vijay M, Big Data Science & Analytics – A Hands-On Approach.
3. Frank Ohlhorst, Big Data Fundamentals – Concepts, Drivers, Techniques
4. Tom White, Hadoop: The Definitive Guide
5. Shiva Achari, Hadoop Essentials
6. Alex Holmes, Hadoop in Practice

Big-Data Analytics-1 LAB – Credit-1

1. Perform setting up and installing Hadoop in its three operating modes: stand alone, Pseudo distributed.
2. Perform some tasks by using web based tools of Hadoop system.
3. Implement the following file management tasks in Hadoop: *f* Adding file and directories *f* Creating file, Retrieving file and deleting files
4. Write a Map Reduce program for basic word count.
5. Write a Map Reduce program for sorting text data.
6. Write a Map Reduce program for analyzing student report.

7. Write a Map Reduce program for mining weather data.

Sem	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Min. Passing Marks		Duration of Exam
					Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
IV	MCSDSC-4.1	Artificial Intelligence	4	12	20	80	100	08	32	3
	MCSDSC-4.2	Introduction to IOT	4	12	20	80	100	08	32	3
	MCSDSE-4.3	Dissertation/Project work	8	240	30	120	150	12	48	3
	MCSDSE-4.4	Introduction to Block Chain	3	09	20	80	100	08	32	3
	MCSDSE-4.5	Nature Inspired Computing Methods								
	MCSSEC-2	Big-Data Analytics-2	2	06	10	40	50	04	16	1 ^{1/2}
	Total			21	279	100	400	500	40	160

Note: Students are recommended to opt any one from MCSDSE-4.4/ MCSDSE-4.

MCSDSC 4.1 Artificial Intelligence credit-4

BLOCK – I

UNIT-1: Introduction to Artificial Intelligence: introduction, AI techniques, problem solving with AI, AI models, data acquisition and learning aspects in AI.

UNIT-2: Problem Solving: problem-solving process, formulating problem, problem types and characteristics,

UNIT-3: problem analysis and representation, problem space and search, toy problems, real-world problems, problem reduction methods.

UNIT-4: Uniformed Search: general search algorithm, uniformed search methods – BFS, uniform cost search, DFS, DLS, IS, bi-directional search, comparison of the uniformed techniques.

BLOCK – II

UNIT-5: Informed Search: generate and test, best first search, greedy search, A* search, memory bounded heuristic search, heuristic function, AO* search,

UNIT-6: local search algorithms and optimization problems, adversarial search methods (game theory), online search algorithms. What is an intelligent agent? Types of agent, what is constraint satisfaction problem (CSP), CSP as search problem, local search for CSP, formulating problem structure.

UNIT-7: Knowledge and Reasoning: knowledge representation, knowledge-based agents, the wumpus world,

UNIT-8: logic, propositional logic, predicate logic, unification and lifting: inference in FOL, representing knowledge using rules, semantic networks, frame systems, inference, types of reasoning.

BLOCK – III

UNIT-9: Uncertain Knowledge and Reasoning: uncertainty and methods, Bayesian probability and belief network, probabilistic reasoning, probabilistic reasoning over time, forward and backward reasoning,

UNIT-10: perception, making simple decisions, making complex decisions, other techniques in uncertainty and reasoning process. Planning problem, simple planning agent, planning languages,

UNIT-11: blocks world, goal stack planning, means-ends analysis, planning as a state-space search. Learning: what is machine learning? Learning paradigms, learning concepts, methods and models,

UNIT-12: statistical learning methods, artificial neural networks–based learning, support vector machines, reinforcement learning.

BLOCK– IV

UNIT-13: Expert Systems: architecture of expert system, confidence factors, existing expert systems, knowledge acquisition, shell and explanations, self-explaining system, rule-based expert systems,

UNIT-14: forward and backward chaining, frame-based expert systems, uncertainty management in expert systems, expert system and DSS, pros and cons of expert systems, case study. Pattern Recognition: machine perception and pattern recognition, feature extraction,

UNIT-15: classification, object recognition, speech recognition, pattern mining. Game Playing: important concepts of game theory, game playing and knowledge structure, game as search problem, alpha-beta pruning, game theory problems, robotics.

UNIT-16: Concepts and terminology of ANN, feed-forward NN, feedback networks, pattern associative networks, competitive learning, fuzzy sets, fuzzy inference process, neuro-fuzzy systems, range of AI applications, AI applications and examples, case study: agricultural domain – farmer’s intelligent assistant.

Text Parag kulkarni, Prachi Joshi, Artificial Intelligence: Building Intelligent Systems

References

1. Nils J Nilsson, Artificial Intelligence: A New Synthesis
2. Kevin Knight, Elaine Rich, B Nair, Artificial Intelligence

3. Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach
4. Eugene Charniak, Drew McDermott, Introduction to Artificial Intelligence

MCSDSC 4.2 Introduction to IOT Credits-4

BLOCK– I

UNIT-1: Introduction to Internet of Things: Introduction, Physical Design of IoT, Logical Design of IoT

UNIT-2: , IoT Enabling Technologies, IoT Levels & Deployment Templates, Domain Specific IoTs:

UNIT-3: Home Automation, Cities, Environment, Energy, Retail, Agriculture, Health & Lifestyle.

UNIT-4 IoT and M2M: Introduction to M2M, Difference between IoT and M2M, SDN and NFV for IoT.

BLOCK – II

UNIT-5 IoT System Management with NETCONF-YANG: Need for IoT Systems Management, SNMP,

UNIT-6 Network Operator requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG.IoT Platforms Design Methodology:

UNIT-7: Introduction, IoT Design Methodology, Case Study on IoT system for weather Monitoring.

UNIT-8: Motivation for Using Python. Python Packages for IoT. IoT Physical Devices & Endpoints: What is an IoT Device, Exemplary Device:

BLOCK-III

UNIT-9: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, programming Raspberry Pi with Python, Other IoT Devices.

UNIT-10: IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs,

UNIT-11: WAMPAutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework-Django,

UNIT-12: Designing a RESTful Web API, Amazon Web Services for IoT, SkyNet IoT Messaging Platform.

BLOCK-VI

UNIT-13: Case Studies of IoT Design: Home Automation, Cities, Environment, Agriculture, Productivity Applications.

UNIT-14: Introduction to Data Analytics for IoT, Apache Hadoop, YARN, Oozie,

UNIT-15: Spark, Storm, Health Monitoring Case study.

UNIT-16: An IoT Tool: chef, Chef Case Studies.

Text Arshdeep Bahga, Vijay Madisetti, Internet of Things – A Hands on Approach

References

1. Graham Meikle, Mercedes Bunz, The Internet of Things
2. Rajkumar Buyya, Amir Vahid Dastjerdi, Internet of Things
3. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things
4. Olivier H, David B, Omar E, The Internet of Things: Key Applications and Protocols
5. Jean Philippe V, Adam Dunkel, Interconnecting Smart Objects with IP: The Next Internet
6. Daniel Minoli John, Building the Internet of Things with IPv6 and MIPv6 – The Evolving World of M2M Communications
7. Ovidiu Vermesan, Peter Friess, Internet of Things Converging Technologies for Smart Environments and Integrated Ecosystem.

MCS DSC 4.3 Dissertation / Project work Credits-4

The total allotted marks 200 are divided in to the following way

- ✓ Internal Assessment (100 marks)
- ✓ External Assessment (100 marks) *f*
 - The students should submit one page of synopsis on the project work for display on the notice board. *f*
 - The project presentation is for 10 minutes followed by 05 minutes for discussion.
 - The student should submit a technical write-up on the project. *f*
 - At least two teachers will be associated with the project seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items (synopsis, presentation, technical write-up). *f*
 - The project seminar presentation should include the following components of the project
 - Problem definition and specification.
 - Literature survey (familiarity with research journals).

- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of bar(activity) charts
- Presentation-oral and written. *f*

I – Algorithm based Project	II – System-Based Projects
<ul style="list-style-type: none"> • Title Page • Certificates by HoD, guide(s) and • Declaration Acknowledgements • Abstract • Contents • List of Figures 	<ul style="list-style-type: none"> • Title Page • Certificates by HoD, guide(s) and • Declaration Acknowledgements • Abstract • Contents • List of Figures
Chapters	Chapters
<ul style="list-style-type: none"> • Introduction • Literature Survey /Related Work • Outline the Solution • Results and Discussion • Conclusion and Future Work • References 	<ul style="list-style-type: none"> • Introduction • Literature Survey /Related Work • Outline the Solution • Results and Discussion • Conclusion and Future Work • References

References and Bibliography should be written in the format given below:

- Author(s) Title of the Paper, Publisher, Volume No., Issue No., Year
- Example:
 - Ganesh S., Vijayalakshmi M. and Kannan A., “Intelligent Agent based Approach for transaction Processing in mobile Database Systems”, The IAJIT, Vol. 4, No. 2, pp, 97-102, 2007. *f*
 - Text format: Font Type: Time New Roman; Font Size: 12; Line Space: 1 ½ *f*
 - Pages, Figures, Tables and Algorithms should be titled and numbered, Students should be discouraged writing about languages, platforms, operating systems and packages used for the purpose of project in the project report. *f*
 - The report should be organized into chapters, chapter into sections, sections into subsections etc. Hierarchical numbering should be followed in numbering the chapters, sections, subsections etc. (1, 1.1, 1.1.1), three (2 copies of the project report hard bound should be submitted to the department).

MCS DSC 4.4 Introduction to Block Chain Credits-3

BLOCK- I:

UNIT-1: Basics: Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. •

UNIT-2: Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof. Blockchain:

UNIT-3: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus,

UNIT-4: Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward,

BLOCK- II:

UNIT-5: Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

UNIT-6: Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

UNIT-7: Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum –

UNIT-8: Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.

BLOCK-III:

UNIT-9: Cryptocurrency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Cryptocurrency Exchange, Black Market and Global Economy.

UNIT-10: Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

UNIT-11: Tutorial & Practical: Naive Blockchain construction, Memory Hard algorithm - Hashcash implementation,

UNIT-12: Direct Acyclic Graph, Play with Go-ethereum, Smart Contract Construction, Toy application using Blockchain, Mining puzzles

Text Book

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Reference Books

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies

2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System

3. DR. Gavin Wood, “ETHEREUM: A Secure Decentralized Transaction Ledger,”Yellow paper.2014.

4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

MCS DSC 4.5 Nature Inspired computing methods Credits-3

BLOCK-1

UNIT-1: Models of Life and Intelligence - Fundamentals of bio-inspired models and bio-inspired computing. Evolutionary models and techniques,

UNIT-2: Swarm models and its self-organisation, swarm and evolutionary algorithms.

UNIT-3: Optimisation problems – single and multi-objective optimisation, heuristic, meta-heuristic and hyper heuristic functions. Genetic algorithms –

UNIT-4: Mathematical foundation, Genetic problem solving, cross over and mutation. genetic algorithms and Markov process, applications of genetic algorithms

BLOCK-2

UNIT-5: Ant Colony Algorithms - Ant colony basics, hybrid ant system, ACO in combinatorial optimization,

UNIT-6: variations of ACO, case studies. Particle Swarm algorithms - particles moves, particle swarm optimisation, variable length PSO, applications of PSO, case studies.

UNIT-7: Artificial Bee Colony algorithms - ABC basics, ABC in optimisation, Multi-dimensional bee colony algorithms, applications of bee algorithms,

UNIT-8: Selected nature inspired techniques - Hill climbing, simulated annealing, Gaussian adaptation, Cuckoo search, Fire fly algorithm, SDA algorithm, bat algorithm, case studies.

BLOCK-3 :

UNIT-9: Other nature inspired techniques - Social spider algorithm, Cultural algorithms, Harmony search algorithm,

UNIT-10: Intelligent water drops algorithm, Artificial immune system, Flower pollination algorithm, case studies

UNIT-11: Selected nature inspired optimization techniques - Bacterial colony optimization, Glowworm Swarm optimization,

UNIT-12: Plant growth adaptation in optimization, Termite colony optimization, African Buffalo optimization, case studies. LEARNING RESOURCES

REFERENCES

- Albert Y.Zomaya - "Handbook of Nature-Inspired and Innovative Computing", Springer, 2006
- Floreano, D. and C. Mattiussi - "Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies", MIT Press, 2008
- Leandro Nunes de Castro - " Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007
- Marco Dorigo, Thomas Stutzle -" Ant Colony Optimization", Prentice Hall of India, New Delhi, 2005
- Vinod Chandra S S, Anand H S - "Machine Learning: A Practitioners Approach", Prentice Hall of India, New Delhi, 2020

MCSSEC-2 Big –Data Analytics –Part 2 -Credits-2

Block-1

UNIT-1: Understanding Hadoop YARN Architecture: Introduction YARN, Advantages of YARN,

UNIT-2: YARN Architecture, Working of YARN. Exploring Hive:

UNIT-3: Introducing Hive, Getting Started with Hive, Hive Services,

UNIT-4: Data Types in Hive, Built-In Functions in Hive, Hive DDL,

Block-1I

UNIT-5: Data Manipulation in Hive, Data Retrieval Queries, Using JOINS in Hive.

UNIT-6: Analyzing Data with Pig: Introducing Pig, Running Pig,

UNIT-7: Getting Started with Pig Latin, Working with Operators in Pig,

UNIT-8: Working with Functions in Pig, Debugging Pig, Error Handling in Pig.

Text DT Editorial Services, Big Data – Black Book (dreamtech)

References

1. Radha S, M. Vijayalakshmi, Big Data Analytics
2. Arshdeep B and Vijay M, Big Data Science & Analytics – A Hands-On Approach.
3. Frank Ohlhorst, Big Data Fundamentals – Concepts, Drivers, Techniques
4. Tom White, Hadoop: The Definitive Guide
5. Shiva Achari, Hadoop Essentials
6. Alex Holmes, Hadoop in Practice

SEC-2 Big –Data Analytics –LAB -Credits-1

1. Installing and running Hive, practice some Hive commands.
2. Using Hive; create, insert, update, alter, delete, and drop the tables
3. Using Hive; query the data from the data base tables.
4. Using Hive; create views, use functions, create indexes for the data base tables.
5. Installing and running Pig, practice some Pig commands.
6. Write Pig Latin scripts using eval functions to analyze your data.
7. Write Pig Latin scripts using math functions to analyze your data.
8. Write Pig Latin scripts using string functions to analyze your data.

INTER- DISCIPLINARY COURSE (Open Elective) for First Semester ವಿಭಾಗ- ಕನ್ನಡ

ಪತ್ರಿಕೆ-೬: ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ EL 1.1 (ಕ್ರೆಡಿಟ್-೩)

ಬ್ಲಾಕ್-೧೯: ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಮುಖ್ಯ ಘಟ್ಟಗಳು

ಘಟಕ-೨೩: ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ ಮತ್ತು ಪ್ರೇರಣೆಗಳು.

ಘಟಕ-೨೪: ನವೋದಯ ಪೂರ್ವ, ನವೋದಯ- ಬಿ.ಎಂ.ಶ್ರೀ., ಕುವೆಂಪು, ದ.ರಾ.ಬೇಂದ್ರೆ, ಶಿವರಾಮಕಾರಂತ, ಮಾಸ್ತಿವೆಂಕಟೇಶ್ ಅಯ್ಯಂಗಾರ್, ಕೆ.ಎಸ್. ನರಸಿಂಹಸ್ವಾಮಿ.

ಘಟಕ-೨೫: ಪ್ರಗತಿಶೀಲ ಮತ್ತು ನವ್ಯ: ಅನಕೃ, ಕಟ್ಟೀಮನಿ, ನಿರಂಜನ, ಚದುರಂಗ, ವಿ.ಕೃ. ಗೋಕಾಕ, ಅಡಿಗ, ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಶಾಂತಿನಾಥ ದೇಸಾಯಿ, ಅನಂತಮೂರ್ತಿ, ಯಶವಂತ ಚಿತ್ತಾಲ, ಲಂಕೇಶ್, ತೇಜಸ್ವಿ, ವೈದೇಹಿ, ವೀಣಾ ಶಾಂತೇಶ್ವರ, ವಿಜಯಾದಿತ್ಯ.

ಘಟಕ-೨೬: ಬಂಡಾಯ ಮತ್ತು ದಲಿತ:

ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ, ಬಿ.ಟಿ. ಲಲಿತಾನಾಯಕ, ಸಾರಾ ಅಬೂಬಕ್ಕರ್, ದೇವನೂರು ಮಹಾದೇವ, ಸಿದ್ದಲಿಂಗಯ್ಯ, ಅರವಿಂದ ಮಾಲಗತ್ತಿ, ಮೊಗ್ಗಿ ಗಣೇಶ್.

ಬ್ಲಾಕ್-೨೦: ಆಧುನಿಕ ಕನ್ನಡ ಕಾವ್ಯ ಮತ್ತು ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು

ಘಟಕ-೨೨: ಕಾವ್ಯ ಪ್ರಕಾರಗಳು: ಭಾವಗೀತೆ, ಸುನೀತ, ಶೋಕಗೀತೆ, ಪ್ರಗಾಥ.

ಘಟಕ-೨೪: ಕಥನ ಕಾವ್ಯ, ಖಂಡ ಕಾವ್ಯ, ಮಹಾಕಾವ್ಯ.

ಘಟಕ-೨೯: ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು: ಕಥೆ, ಕಾದಂಬರಿ, ನಾಟಕ ಜೀವನ ಚರಿತ್ರೆ.

ಘಟಕ-೪೦: ಲಲಿತ ಪ್ರಬಂಧ, ಆತ್ಮಕತೆ, ಪ್ರವಾಸ ಸಾಹಿತ್ಯ, ಸಂಪಾದನೆ, ವಿಚಾರ ಸಾಹಿತ್ಯ, ವಿಚ್ಛಿನ್ನ ಸಾಹಿತ್ಯ

ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು

೧. ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ: ಎಲ್.ಎಸ್. ಶೇಷಗಿರಿರಾವ್, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್, ಬೆಂಗಳೂರು, ೧೯೯೨

೨. ಯುಗಧರ್ಮ ಮತ್ತು ಸಾಹಿತ್ಯ ದರ್ಶನ: ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಮನೋಹರ ಗ್ರಂಥ ಮಾಲೆ, ಧಾರವಾಡ, ೧೯೯೧

೩. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಇತಿಹಾಸ: ರಂ.ಶ್ರೀ. ಮಗುಳಿ, ಗೀತಾ ಬುಕ್ ಹೌಸ್, ಮೈಸೂರು, ೨೦೧೮

೪. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ: ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಹಂಪಿ, ಹೊಸಪೇಟೆ, ೧೯೯೫

೫. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ: (ಪ್ರಸಂ) ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ, ಕರ್ನಾಟಕ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ೨೦೧೮

೬. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ: ತ.ಸು. ಶಾಮರಾಯ, ತಳುಕಿನ ವೆಂಕಣ್ಣಯ್ಯ ಸ್ಮಾರಕ ಗ್ರಂಥಮಾಲೆ, ಮೈಸೂರು, ೨೦೧೪

೭. ಹೊಸಗನ್ನಡ ಕಾವ್ಯ ಪ್ರಕಾರಗಳು: ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ.ರಂಗಸ್ವಾಮಿ, ಲೇ. ಮ. ರಾಮಕೃಷ್ಣ, ಪ್ರಸಾರಂಗ, ಕರಾಮುವಿ, ಮೈಸೂರು, ೨೦೧೦

೮. ಆಧುನಿಕ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು: ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ. ರಂಗಸ್ವಾಮಿ, ಲೇ. ಡಾ. ಜಿ.ಆರ್. ತಿಪ್ಪೇಸ್ವಾಮಿ, ಪ್ರಸಾರಂಗ, ಕರಾಮುವಿ, ಮೈಸೂರು, ೨೦೧೦

DEPARTMENT - ENGLISH

EL-1.1: INTER- DISCIPLINARY COURSE-I (OPEN ELECTIVE)

INDIAN LITERATURE-I

OBJECTIVES

- To help to understand the contribution of Kalidasa to Sanskrit drama as a playwright
- To create an awareness of the importance of Shakuntala and Mrichhakatika as classical Indian texts
- To evaluate Lord Macaulay and Raja Ram Mohan Roy writers of English Prose.
- To introduce the role of Autobiographies in Indian writing in English

BLOCK -I

Kalidasa: Shakuntala

Shudraka: Mrichhakatika

BLOCK -II

Jawaharlal Nehru: An Autobiography

Ram Mohan Roy: Letter to Lord Amherst

Macaulay: Minutes on Indian Education

Vivekananda: Address to the Parliament of Religions

Suggested Reading:

- **M.K.Naik:** Critical Essays on Indian Writing in English. Sahitya Akademi, 1969.
- **Narasimhaiah. C.D:** The Swan and the Eagle. Indian Institute of Advanced Study, 1987.
- **Meenakshi Mukherjee:** The Twice Born Fiction. Heinemann Educational Publishers, 1972.

- **Chirantan Kulshrestha.** Contemporary Indian English Verse: An Evaluation. Arnold-Heinemann, 1981.

DEPARTMENT - HINDI

व्यावहारिक हिंदी एवं व्याकरण

वर्ण विचार

- वर्ण
- स्वर और उसका वर्गीकरण
- व्यंजन और उसका वर्गीकरण
- वर्णों का उच्चारण स्थान
- संधि
- समास

शब्द विचार

- शब्द के भेद
- अर्थ के आधार पर शब्द भेद
- व्युत्पत्ति के आधार पर शब्द भेद
- रचना के आधार पर शब्द भेद
- प्रयोग के आधार पर शब्द भेद
- विकारी और अविकारी शब्द भेद
- अव्यय
- संज्ञा और उसके भेद
- वचन- उसके भेद, वचन परिवर्तन के नियम
- लिंग- उसके भेद, लिंग परिवर्तन के नियम
- काल और उसके भेद
- कारक और विभक्ति- उसके प्रकार,
- सर्वनाम और उसके भेद
- विशेषण और उसके भेद
- क्रिया और उसके भेद
- क्रिया विशेषण और उसके भेद
- समुच्चय बोधक और उसके भेद
- संबंधबोधक और उसके भेद

- विस्मयादिबोधक और उसके भेद
- परसर्ग और उपसर्ग
- वाच्य और उसके प्रकार

वाक्य विचार

- वाक्य का अर्थ और परिभाषा
- वाक्य के प्रकार आदि

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DEPARTMENT - TELUGU

E. L. 1.1 Thilak Prathyeka Adhyayanam

Block - 1:Thilak Kavithvam - 1

Unit - 1:Amrutham Kurisina Raathri

Unit - 2:Thilak Padhya Kavithaa Vaibhavam

Unit - 3:Thilak Abhiruchulu - Alavaatlu

Unit - 4: Thapala bantrothu

Block - 2: Thilak Kavithvam

Unit - 1:Thilak Sahithya Parichayam - 1

Unit - 2: Thilak Sahithya Parichayam - 2

Unit - 3:Thilak vachana kavithaa Vaibhavam - 1

Unit - 4: Thilak Vachana Kavithaa Vaibhavam – 2

DEPARTMENT - HISTORY

ANCIENT WORLD CIVILIZATIONS

(Egypt, Mesopotamia, Greek, Roman, Inca, Chinese)

Objective: The course is aims to understand major world civilizations. It is to provide a global historical perspective of ancient world which special reference to Egypt, china, Greek, Roman, Inca civilizations.

Pedagogy: personal contact programmes, audio video programmes, online lectures
Assignments, etc

Credits: 2.

Examination Duration: 11/2 hours and Maximum Marks:40

Course outcomes:

After completing this course the students should be able to

- Discuss the Egyptian and Mesopotamian civilizations.
- Analyse the political socio economic conditions of Greek Roman civilizations.
- Evaluate the Chinese contributions to ancient world.

Block – I

Unit-1

Egyptian Civilization: Importance of the Nile, Geographical importance, Gift of Nile, Political conditions.

Unit-2

Social, Economic and religious conditions, Literature and learning, arts and architecture.

Unit-3

Mesopotamian Civilization, Sumer and Babylonian, Hammurabi's code, Society and Culture, Economic conditions, art and literature, Assyrian Empire.

Unit - 4

Greek Civilization, Political Organizations, the city, State, Alexander the Great, Greek political theory, Religion, Philosophy, art and architecture, Characteristic of Hellenistic Civilization.

Block – II

Unit - 5

Roman Civilization, The Land and the people, the Government, Roman Republic, Roman Empire, Roman Republic, The Empire, The Patricians and Plebeians, Punic wars.

Unit – 6

Julius Caesar, his wars, fall Augustus Caesar, Social Economic Conditions, Roman art and architecture.

Unit - 7

Painting, Sculpture, Roman Law, Roman Religion, Philosophy, Roman literature, Decline of the Roman Empire.

Unit - 8

Inca Civilisation, Socio – economic Political conditions, Chinese Civilisation, Socio – economic Political conditions.

Suggested readings:

1. Breasted, J.H. : Ancient Times, A History of the early world.
2. Rostovzeff, M.S. : History of Ancient World
3. Schvidler, H. : The History of Civilization
4. Swain, J.E. : A History of World Civilization
5. Breasted, J.H. : History of Egypt
6. Jastrow, M. : The Civilization of Babylonia and Assyria
7. Bury, J.E. & OTHERS: The Hellenistic Age
8. Bailey, C. : The Legacy of Rome and others
9. Abot, F.F.: Society and Politics of Ancient Rome

DEPARTMENT – ECONOMICS

EL1.1: Economic Policies of India Since 1991.

- **Objective:** To enable the Students to understand the economic policies of India in the era of new economic policy.
- **Pedagogy:** A Combination of Lectures, Group Discussion, Assignments.
- **Credits:** 2 ; Examination Duration: 1 1/2 and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

BLOCK – I: India's Economic Policies

UNIT : 1 Economic Policies in India Since 1991

Economic reforms in India – Economic Scenario in India during 1990-91 – Domestic Financial Crisis – Balance of Payment Crisis – Extent of External debt and debt Trap Problem.

UNIT : 2 Need for Reforms

Measures Taken – Devaluation – Privatization – Liberalization – Globalization.

UNIT : 3 Monetary Policy and Fiscal Policy

Narasimhan Committee on Banking and Financial Sector Reforms Since 1998 – Fiscal Reforms: Raja Chellaiah Committee and Tax Reform Policies – Fiscal Prudence and Policies.

UNIT : 4 Structural Adjustments and External Sector in India

Foreign Trade: Trends in Exports and Imports – Balance of Payment and its Crisis – Export Import Policy – In Defence of Import Substitution – Foreign Exchange Policy.

BLOCK : II FDI and the Role of State

UNIT : 5 Foreign Direct Investment (FDI)

Trends in FDI – FDI Policy – Its Impact on the Domestic Economy – Labour Migration: causes and Consequences on Indian Economy – Information and Communication Revolution and India.

UNIT : 6 Challenges to Development in India

Poverty – Unemployment – Poverty alleviation Programmes - urban Poverty and Problems – Income Inequality – Employment Generating Schemes.

UNIT: 7 The Role of State

Parallel Economy in India – Black Money – Corruption – Slams – Redefining the Role of the State and the Markets – Balance between Economic and Socio - Political Goals.

UNIT : 8 Administrative Reforms

Rights to Information – Measures Towards Good Governance – NITI Ayoga and aftermath – Digitalized India – Demonetization – GST – Make in India.

References:

1. Acharya Shankar, (2003) India's Economy: Some Issues and Answers, Academic Foundation, New Delhi.
2. Byres J Terence (Ed.) (1999) The Indian Economy, Major Debates since Independence, OUP, New Delhi.
3. Datt Ruddar, (2002) Economic Reforms in India - A Critique, S.Chand and Co, New Delhi.
4. Kapila Uma (Ed) (2015) Indian Economy since Independence, Academic Foundations, New Delhi.
5. Kapila Uma, (2005) Understanding the Problem of Indian Economy, Academic Foundation, New Delhi.
6. Misra S.K. & V.K. Puri, (2011) Indian Economy-Its Development Experience, Himalaya Pub., House, Mumbai.
7. NCAER, Economic and Policy Reforms in India, NCAER, New Delhi.
8. Rangarajan C, (1998) Indian Economy- Essays on Money and Finance, UBSPD, New Delhi.
9. Sachs D.Jeffrey, A.Varshney & N Bajpai (Ed)(1999) India in the Era of Economic Reforms,OUP, New Delhi.
10. Vaidyanathan A, India's Economic Reforms and Development, OUP, New Delhi

DEPARTMENT - POLITICAL SCIENCE

(OEL-I) Local Government in India

Block-I

- Unit:1 Meaning, Nature and Scope of Local Governments.
- Unit:2 Evolution of Panchayat Raj Institution in India.
- a) Constitute Assembly and Village Panchayat.
 - b) Balavanth Roy Mehta Committee Report
 - c) Ashok Mehta Committee Report.
 - d) G.V.K. Rao Committee Report.
- Unit:3 Constitutional Amendments and Panchayat Raj Institutions:
- a) Basis of Constitutional Amendment.
 - b) 73rd and 74th Constitutional Amendment.
 - c) Karnataka Panchayat Raj At of 1983.
 - d) Karnataka Panchayat Raj Act of 1993.
- Unit:4 Zilla Panchayat: Structure, Functions and Sources of Revenue.

Block-II

- Unit:5 Taluk Panchayat : Structure, Functions, Executive Officer, Powers and Functions.
- Unit:6 Gram Panchayat: Gram Sabha, Ward Sabha: Structure, Functions and Sources of Revenue.
- Unit:7 Panchayat Development Officer and Secretary: Powers and Functions.
- Unit:8 Role of Panchayat Raj Institutions in Development (with Reference to Karnataka)
- a) Panchayat Raj in Rural Development.
 - b) Social Change: Empowerment of the Weaker Sections.

References:

1. Verma B. M, Social justice and Panchayath Raj
2. Mutarib-M.A. and Others, Theory of Local Government,
3. Dr. Arjun darshankar, Panchayath Raj aani Nagari.
4. V. B. Patil, Pancayath Raj.
5. A.N. Kulkarni, Bharatiya Sthanik Swashasan,
6. Shantaram Bhosale, Bharatiya Sthanik Shasan,
7. Kikherji. S, Essays on Rural Development.
8. Balaramu. C. H. Administration of Anty Poverty Programmes.
9. 73rd Constitutional Amendment Act, Government of India, 1993.
10. Karnataka Panchayatraj Acts, 1985, 1995.

DEPARTMENT – PUBLIC ADMINISTRATION

INDIAN POLITY – I

BLOCK – 1

- UNIT – 1 Indian Constitution.
- UNIT – 2 Preamble - Meaning and Importance.
- UNIT – 3 Fundamental Rights and Duties.
- UNIT – 4 Directive Principles of State Policy and Relation with Fundamental Rights.

BLOCK – 2

- UNIT – 5 Indian Federalism and Parliamentary system of Government.
- UNIT – 6 Centre - State Relations. Legislative Administrative and Financial
- UNIT – 7 Union Executive - President Elections, Powers and Positions.
- UNIT – 8 Council of Ministers and Prime Ministers - Powers and Functions

DEPARTMENT - SOCIOLOGY

Invitation to Sociology

(02 Credits)

Course Description

This course introduces learners to the basic concepts of sociology. It is particularly designed to orient the learners from interdisciplinary background about the essence of sociology and intends to inculcate sociological imagination.

Course Objectives

- To introduce the learner to the basic concepts and processes of sociology
- to comprehend the structural and organizational aspects of society
- to examine the process of social change

Learning Outcomes and Competencies

After successfully completing the course, following outcomes and competencies are possible among the learners. Learner will have/can

- Conceptual precision and clarity about the basic sociological concepts
- Develop sociological imagination and apply to analyze the contemporary events
- explain major social processes of society
- analytical view about Indian social structure

- explicate major process of social change and can conceptualize the changing aspects of Indian society

Course Contents

Block-1 Basic Concepts and Processes

- Unit-1 Emergence of Sociology-Factors and Early Thinkers-Sociological Imagination
- Unit-2 Society, Community- Associations and Institutions- Culture and Socialization
- Unit-3 Social System, Structure and Function
- Unit-4 Social Processes-Cooperation, Competition, Conflict, Accommodation and Assimilation

Block-2 Social Organization and Social Change

- Unit-5 Caste and Class System-Changes in Caste
- Unit-6 Social Mobility and Types
- Unit-7 Factors of Social Change
- Unit-8 Process of Social Change in India (Sanskritization, Westernization, Modernization and Globalization)

References

1. Berger, Peter L. 1978. An Invitation to Sociology, Allen and Unwin, London. Davis, Kingsley. Human Society, Macmilan, New Delhi.
2. Dumont, Louis, 1988, Homo Hierarchicus. Oxford University Press. Giddens, Anthony. 2009. Sociology. Politi Press, Malden.
3. Inkles, Alex. 2002. What is Sociology, Prentice Hall India, New Delhi. Jayaram, N, 1990, Introductory Sociology, Macmilan, New Delhi.
4. Johnson Harry M., 2011: Sociology: A Systematic Introduction: Allied Publishers, New Delhi.
5. MacIver, R.M and C.H. Page. Society - Introduction to Sociology, Macmilan, New Delhi
6. Samuel, Koenig. 1957. Sociology: An Introduction to Science of Society, Barnes & Nobel Books, London.
7. Singh, Yogendra. 1993: Social Change in India: Crisis and Resilience, Har-Anand, New Delhi.

DEPARTMENT – ANCIENT HISTORY AND ARCHEOLOGY

Block - 1**Introduction**

Unit - 1 Nature - Scope - Criteria for incorporation of World Heritage sites

Unit - 2 Types of World Heritage sites in India

Block - 2**Archaeological and Cave Heritage sites**

Unit - 3 Bimbetka - Sanchi- Nalanda – Champaner - Dholavira

Unit – 4 Ajanta – Ellora - Elephant

Block - 3**North Indian World Heritage Sites**

Unit – 5 Bodh Gaya — Kajuraho–Konarak–Rani kivav– Jaipur,

Unit – 6 Agra Fort – Red Fort - FatehpurSikri–Taj Mahal – Humayun’s Tomb –
Ahamadabad, Qutub Minar

Block - 4**South Indian World Heritages Sites**

Unit – 7 Mahabalipuram – Pattadakallu – Chola temples

Unit - 8 Monuments of Hampi – Churches and Convents of Old Goa – Ramappa Temple

References:

1. Marco Canneo, Jasmina: The world heritage sites of UNESCO – TheTreasure of Art
2. ASI: World Heritage Sites Series
3. Individual guide: Books on respective city Individual

DEPARTMENT - EDUCATION

IDC – 1 FOUNDATIONS OF EDUCATION

BLOCK-1 FOUNDATIONS OF EDUCATION – I

Unit-1 Philosophical Foundations

Unit-2 Basic Concepts of Philosophy

Unit-3 Psychology as a Science

Unit-4 Basic Concept in Psychology related to Education

BLOCK-2 FOUNDATIONS OF LEARNING – II

Unit-5 Sociological bases of Education

Unit-6 Educational Issues in Indian Society

Unit-7 Cultural and Historical Foundations

Unit-8 Political and Economic bases of Education

References:

1. Harison and Myers (1970), Education, Manpower and Economic Growth, McGrothill, Oxfords, IBH Publishing Co., New Delhi.
2. Kamala Bhatia & Baldev Bhatia, (1974) The Philosophical and Sociological Foundations of Education, Doaba House, New Delhi.
3. Bhatia B.D, (1974), 'Theory and Principles of Education, Doaba House, Delhi'.
4. Sorokim .P, (1947) 'Society, Culture and Personality', Harper and Brothers Publishers, New York.

DEPARTMENT – COMMERCE

EL1.1: Personal Financial Planning

Objective: To enable the Students to understand about the different Investment Avenues, Saving Schemes designed by various agencies particularly for the individuals.

Pedagogy: A Combination of Lectures, Group Discussion, Assignments.

Credits: 2

Examination Duration: 1¹/₂ and Maximum Marks: 50

(Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

Block I

- **Unit -1: Introduction to Financial Planning:** Introduction - The Process Financial Planning – Client Interactions – Time Value of Money Applications – Personal Financial Statements – Cash Flow ad Debt Management – Planning to Finance Education.
- **Unit -2: Financial Planning Process:** Introduction - Setting Goals – Informal Budget Preparation – Investment Opportunities – Financial Vs Physical Investments – Role of a Financial Planner.
- **Unit -3: Savings Plans:** Introduction - Setting Goals – Savings Instruments – Savings Plan – Tax Savings Schemes.
- **Unit -4: Investment Planning:** Introduction - Risk Return Analysis – Mutual Fund – Derivatives – Asset Allocation – Investment Strategies and Portfolio Construction and Management.

Block II

- **Unit -5: Risk Analysis and Insurance Planning:** Introduction - Risk Management and Insurance Decision in Personal Financial Planning – Various Insurance Policies and Strategies for General Insurance – Life Insurance – Motor Insurance – Medical Insurance.
- **Unit -6: Retirement Planning and Benefits:** Introduction - Retirement Need Analysis Techniques – Savings and Investment Plans for Retirement – Employee Provident Fund – Public Provident Fund – Superannuation Fund – Gratuity – Annuity Plans.
- **Unit -7: Tax Planning:** Introduction - Income-tax Computation for Individuals – Companies - Trust and other bodies – Statutory Provisions Pertaining to Capital Gains and Indexation – House Property – Deduction and Allowances.
- **Unit -8:Health Financing:** Introduction - Health Financing Models – Financing of Health in India – National Rural Health Mission – Challenges of Access to Health Care and Service Quality – Health Insurance Mechanism & Financial Protection.

Books Recommended for Reference

01. Khan M.Y, Financial Services, Tata MacGraw Hill.
02. Singhanar V.K, Students’ Guide to Income Tax, Taxmann.
03. Ranganathan and Madhuamathi, Investment Analysis and Portfolio Management, Pearson Publications.
04. Gordon and Natarajan, Emerging Scenario of Financial Services, Himalaya Publishing House.
05. George Rejda, Principles of Risk Management and Insurance, Pearson.

DEPARTMENT - MANAGEMENT

COURSE: OE-1 : Disaster Management - Credit: 2

MBAS 459: DISASTER MANAGEMENT

Objectives	: The course aims at familiarizing the students with the concepts of disaster management, need for disaster management and its relevance.
Pedagogy	: Lectures, assignments, Industrial visits and practical exercises, discussions.

1. Understanding Disasters · Meaning, nature, characteristics and types of Disasters, Causes and effects, Disaster: A Global View, Disaster Profile of India, The Disaster Management cycle.
2. Geological and Mountain Area Disasters · Earthquakes · Volcanic Eruption · Landslides Snow Avalanches, Wind and Water Related Natural Disaster · Floods and Flash Floods · Droughts · Cyclones · Tsunamis, Man Made Disasters · Understanding Man-Made

- Disasters · Fires and Forest Fires · Nuclear, Biological and Chemical disaster · Road Accidents
3. Introduction to disaster Preparedness · Disaster Management: Prevention, Preparedness and Mitigation · Disaster Preparedness: Concept & Nature · Disaster Preparedness Plan · Disaster Preparedness for People and Infrastructure · Community based Disaster Preparedness Plan
 4. Roles & Responsibilities of Different Agencies and Govt. · Roll of Information, Education, Communication & Training · Role and Responsibilities of Central, State, District and local administration. · Role and Responsibilities of Armed Forces, Police, Para Military Forces. Role and Responsibilities of International Agencies, NGO's, Community Based Org. (CBO's)
 5. Technologies for Disaster Management · Role of IT in Disaster Preparedness · Remote Sensing, GIS and GPS · Use and Application of Emerging Technologies · Application of Modern Technologies for the Emergency communication. · Application and use of ICST for different disasters.
 6. Disaster Mitigation · Disaster Mitigation: meaning and concept · Disaster Mitigation Strategies · Emerging Trends in Disaster Mitigation · Mitigation management · Role of Team and Coordination
 7. Disaster Management in India Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter-Governmental Agencies. National Disaster management Authority.

References

1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
2. Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.
3. Central Water Commission, 1987, Flood Atlas of India, CWC, New Delhi.
4. Central Water Commission, 1989, Manual of Flood Forecasting, New Delhi.
5. Government of India, 1997, Vulnerability Atlas of India, New Delhi.
6. Sahni, Pardeep et.al. (eds.) 2002, Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi.

DEPARTMENT - BIO CHEMISTRY

Basics of Bioinorganic and Biophysical chemistry for Biology graduates.

Bioinorganic chemistry

Coordination Compounds: Transition metals, properties (Colour, Oxidation states, Magnetic properties) Coordinate bond, double and complex salts– differences with examples.

Postulates of Warner's theory. Types of ligands: For examples: uni, bi, polydentate ligands. Coordination number, examples.

Porphyrin nucleus and their classification. Important metallo-porphyrins occurring in nature. Structure and biological importance of Heme, cytochrome, chlorophyll, Vitamin B₁₂.

Nitrogen, Fixation of atmospheric nitrogen – Symbiotic and non-symbiotic. Nitrogen cycle.

Environmental pollution by nitrogen compounds. Phosphorous: Importance of Phosphorous compounds in biological system, phosphorous cycle

Oxygen, Formation of ozone in atmosphere. Role of ozone in maintenance of life on earth. Effect of environmental pollutants on ozone layer.

Sulphur and Selenium, Importance of compounds of Sulphur and Selenium in biological systems. Effect of sulphur compounds on environmental pollution.

Biophysical chemistry.

Units in chemistry, Avogadro's number, Mole, Mole fraction, Molarity, Equivalent weight, Normality, Molality. Colligative Properties, Osmotic pressure and its measurements. Hypo-, Hyper- and isotonic solutions. Effect of osmotic pressure on living cells.

Donnan membrane equilibrium. Relative lowering of vapour pressure, Raoult's law. Elevation of boiling point, depression in freezing point.

Adsorption: Freundlich and Langmuir's adsorption isotherm. Applications of adsorption.

Viscosity: Definition, determination of viscosity of liquids & solutions by Ostwald's viscometer (solutions of gum and protein to be taken as examples).

Distribution law, Distribution law, partition coefficient, application of distribution law.

Acids, bases and buffers- Lewis concept of acids and bases. Ionic product of water. pH scale, buffers, Henderson- Hasselbach equation, buffer capacity Choice of buffers. Theory of acid base indicators. pH titration curve and iso-electric pH of amino acids.

Selected References:

1. Basic Principles of Organic Chemistry, Roberts and Caserio, W. A. Benjamin, Inc. (1964).
2. Organic Chemistry, Morrison and Boyd, Allyn and Bacon Inc (1992).
3. Principles of Inorganic chemistry by Cotton & Wilkinson, Wiley (1999).
4. Textbook of Organic chemistry by Ahluwalia V K & Madhuri G Narosa publications (2001).
5. Physical chemistry by Castellan G W, Narosa Publications (2004).
6. Physical chemistry by Chakraborty D K, Narosa Publications (2004).

DEPARTMENT - BIOTECHNOLOGY

MBT EL –I- Biotechnology and its Applications

Introduction to biotechnology. Principles of biotechnology, classification.

Recombinant DNA Technology

Introduction, outline of genetic engineering procedure, restriction endonucleases,

cloning & expression vectors- plasmids, cloning in plasmid, transformation and detection of transformants- lacZ, genomic and cDNA libraries, gene analysis techniques-hybridization: Southern, Northern, Western, in situ, Polymerase chain reaction.

Microbial and food and environmental Biotechnology

Basics of fermentation technology: Types of microbial culture- batch, continuous and fed-batch. Microbial production: Use of microbes in production of vitamins, enzymes, organic acids, amino acids, polysaccharides, flavors, sweeteners, proteins and antibiotics.

Fermented food products- yogurt, cheese, tempeh, sauerkraut; beverages- wine and beer. Pre- and Pro-biotics, single cell proteins, Genetically modified foods, designer foods.

Current status of biotechnology in environment. Bioconservation, biofuels, gasohol, biogas. Bioremediation: Concepts and principles, bioremediation using microbes, in situ and ex situ bioremediation, biosorption and bioaccumulation of heavy metals.

Plant Biotechnology

Landmarks in Plant tissue culture. Types of cultures- embryo, organ, callus and cell cultures, Somatic embryogenesis, Haploid Production, Androgenesis, Protoplast culture and somatic hybridization. Micropropagation- Methods and stages, applications. Synthetic seeds, somaclonal variation. Production of secondary metabolites by plant cells, Biotransformation.

Plant transformation techniques: Direct and indirect methods of gene transfer in plants. Transgenic plants and crop improvement- herbicide tolerance, disease resistance, abiotic stress tolerance, delayed ripening, improvement of nutritional quality, molecular pharming.

Animal Biotechnology

Basics of animal cell culture techniques, cell lines, physical conditions for culturing animal cells, equipments required, scale-up of culture methods.

Application of animal cell culture- Hybridomas, production of therapeutic antibodies, stem cell technology, cell and tissue engineering.

Genetic engineering of animals: Methods for gene transfer in animals, microinjection, nuclear transplantation, retrovirus-mediated gene transfer, gene knockdown techniques. Transgenic- animals- sheep, pigs, cattle, chickens; applications of transgenic animals.

DEPARTMENT - CHEMISTRY

Block-1	Title: Periodic Table and chemical Periodicity
Unit-1	Elements, atomic structure, atomic number, atomic mass, quantum numbers, electronic configuration,
Unit-2	Periodic properties of elements, State of Matter, their resources. Important

	periodic properties of the elements, covalent radii, ionic radii, ionization potential, electron affinity and electronegativity
Unit-3	Concepts of Acids and Bases: Review of acid base concepts. Lux-Flood and solvent system concepts. Hard-soft acids and bases. Applications.
Unit-4	Solutions: Concentration units, solutions of liquids in liquids, Raoult's law, ideal and non-ideal solutions.

Block-2	Title: Bonding and molecular structure
Unit-5	Calcification of matter: (elements, compounds, substance and mixture), The three states of matter, physical and chemical properties of matter, fundamental particles of atoms, atomic number, atomic mass, atomic structure of atom molecular formula, empirical formula, molecular mass.
Unit-6	Ions and ionic compounds, properties of ionic compounds, formation of ionic compounds, covalent compounds, properties of covalent compounds, properties of covalent compounds
Unit-7	Metals, properties of metals, theory of metallic bond formation, types of metals conductor, semiconductor and insulators, n-type semiconductors and p-type semiconductors, alloys and superconducting materials.
Unit-8	Acids and bases, general properties of acid and bases, Acid base reactions, oxidation reduction reactions, oxidation number, types of redox reactions, balancing oxidation-reduction equation, exothermic and endothermic reactions energy change in chemical reactions.

DEPARTMENT : CLINICAL NUTRITION AND DIETETICS

OEL-1: HEALTHY LIFESTYLES AND NUTRITION 3 Credits

BLOCK 1: INTRODUCTION TO FOOD AND NUTRITION

Unit 1.- Factors affecting food habits, choices and dietary patterns – Definition of Food, Nutrition, Health, Fitness. Interrelationship between nutrition and health, concept of a desirable diet for optimum nutrition, health and fitness.

Unit 2.- A brief review of nutrients in general –

- Energy and macronutrients – Carbohydrates, Protein, Fat - functions,

sources deficiency disorders and recommended intakes.

- Micronutrients: Minerals – calcium, Iron, Iodine, and other elements, Vitamins – Fat Soluble & Water Soluble.

Unit 3: Nutritional assessment- Anthropometric, biochemical, clinical, dietary and Biochemical assessments

Unit 4: Basic principles of planning diet –, RDA for Indians, Food groups, Dietary guides and balanced diets.

BLOCK 2: PLANNING OF DIET

Unit 5: Principles of planning a normal diet: characteristics of a normal diet, meeting nutrient requirements of individuals and family. Use of Dietary guidelines for Indians.

Unit 6: Objectives of diet therapy- Regular diet and rationale for modifications in energy and other nutrients, texture, fluid, soft diets etc.

Unit 7: Role of dietician in hospital- specific functions, team approach in patient care, psychological consideration, interpersonal relationship with patients. Nutrition and medical ethics. Hospital dietary- scope and importance, types of food service, quality management.

Unit 8: Nutrition counseling: definition, concept, role of clinical dietician, the recipient and counseling environment and goals of counseling. An overview of systems approach to nutritional care and its components (planning, implementation and evaluation).

REFERENCES

- Srilakshmi B (2004) Nutrition Science. New Age International (P) Ltd, Publishers.
- Kango M (2005) Normal Nutrition, Curing diseases through diet. First Edition CBS Publications. Paul S (2003) Text Book of Bio-Nutrition, Fundamental and Management. RBSA Publishers.
- Williams SR (2000) Nutrition and Diet Therapy. Sixth Edition C.V. Melskey Co.
- Mudambi SR and Rajagopal MV (1997) Fundamentals of Foods and Nutrition. New Age International (P) Ltd, Publishers.
- Swaminathan M (1999) Essential of Food and Nutrition. Vol I and II, Bappco publications, Madras.
- Corinne, H. Robinson 2010– “Normal and Therapeutic nutrition”, Oxford and IBH publishing company, Bombay.
- B. Srilakshmi – 2012 “Dietetics”, 4th edition, New age international publisher, Chennai

DEPARTMENT - ENVIRONMENTAL SCIENCE

ESOEL-1: Basics of Environmental Science

Block I: Ecology and Environment

Unit 1: Definition, Principles and Scope. Biotic and abiotic factors of environment.
Ecosystems: pond, forest, river, grassland and estuary ecosystems

Unit 2: Ecosystem – trophic structure, energy flow, food chain, food web, Ecological pyramids.

Unit 3: Population dynamics: Definition, population density, Natality, Mortality, Age structure, Growth pattern, population dispersion.

Unit 4: Biogeochemical cycle – types, sedimentary and gaseous cycles, N, C, S, P, O cycles. Rock and hydrological cycles.

Block II: Biodiversity and Conservation

Unit 5: Biodiversity, Definition, Types of Biodiversity, importance and roles.

Unit 6: Needs and benefits of biodiversity, Loss of biodiversity- causes and consequences, Need for conservation of biodiversity

Unit 7: Conservation strategies, endemic and exotic species, Red Data book, National parks, wildlife sanctuaries, biosphere reserves, biodiversity hotspots, wildlife protection act, biodiversity act, wetland conservation and management, Hotspots of biodiversity.

Unit 8: Project Tiger, Project elephant, Ramsar site and other conservation projects. Experts Committee Reports on Environmental conservation

DEPARTMENT - GEOGRAPHY

ELMG –01, Introduction to Physical Geography (Credit-2)

Block-1

Origin, Shape and Size of the Earth, Movement of the Earth- Rotation and Revolution, Effects of the movement of Earth, Coordinates -Latitude, Longitude and Time; Structure of the Earth, Rocks - types, significance, Weathering –types; Agents of Denudation - River, Glacier, Wind and Under Ground water; Structure and Composition of Atmosphere, Weather and Climate

Block-2

Atmospheric Pressure, Winds and Precipitation; Distribution of Land and Sea, Submarine Relief of the Ocean, Temperature and Salinity of Sea Water; Ocean Tides and Oceanic Currents- Atlantic, Pacific and Indian Oceans; Biosphere- Elements, Ecology, Ecosystem, World's Biomes, Biodiversity – Importance, Types and Conservation

References

1. B.S. Negi (1993) Physical Geography. S.J. Publication, Meerut
2. D.S.Lal (1998) Climatology. Chaitnya publishing house, Allahabad

3. K. Siddhartha (2001) Atmosphere, Weather and Climate. Kishore Kishore publication, New Delhi
4. R.N. Tikka (2002) Physical Geography. Kedarnath Ramnath & Co, Meerut
5. William D. Thornbury (1997) Principle of Geomorphology. New Age International (Pvt Ltd.) New Delhi.

DEPARTMENT - MATHEMATICS

ELMM –01 - FUNDAMENTALS OF MATHEMATICS

(2 Credits)

Block-I: Number Theory: Natural numbers, integers, Real numbers, GCD, LCM, Prime numbers. Surds, Indices, Logarithms, Progressions, Arithmetic Progression, Geometric Progression, Harmonic Progression,

Block-II: Set Theory: Operations of Union, Intersection, Complement. Relations & Functions: Types of relations One-one, onto, Many-one functions, graphs of functions.

Mathematical Logic: Propositions, logical connectives, Methods of proofs.

Books for Reference:

1. Kolman and Busby: Discrete Mathematics, PHI.
2. S. L. Loney: The Elements of Coordinate Geometry, London Macmillan & Co.
3. B. S. Grewal: Higher Engineering Mathematics, 36th Ed., Khanna Pub.
4. S. Lipschutz and M. Lipson: Theory and Problems of Discrete Mathematics. Schaum Series. 2nd Ed. Tata McGraw Hill.

DEPARTMENT - MICRO BIOLOGY

Microbial World and Microbial Diversity

- i. Introduction to microbial world, Physiochemical and biological characteristics; Characteristics of Acellular microorganisms (Viruses); Baltimore classification, general structure with special reference to viroids and prions.
- ii. Binomial Nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility.
- iii. Difference between prokaryotic and eukaryotic microorganisms
 - i. General characteristics of Cellular microorganisms, types - archaeobacteria, eubacteria, wall-less forms - MLO (mycoplasma and spheroplasts) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance.
 - ii. Structure, reproduction and economic importance of Mycoplasma.
 - i. General concept of Phytoplanktons and Zooplanktons. Characteristics, occurrence, thallus organization and classification of Algae.

- ii. Cyanobacteria - occurrence, thallus organization, cell ultra structure, reproduction and economic importance. Applications of algae in agriculture, industry, environment and food.
- i. Historical developments in the field of Mycology including significant contributions of eminent mycologists.
- ii. General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultra- structure, thallus organization and aggregation, mode of reproduction and
- iii. Economic importance of fungi with examples in agriculture, environment, Industry, medicine and food.
- i. General characteristics, structure, mode of reproduction and economic importance of Actinomycetes with special reference to its application in medicine and industry.
- ii. General characteristics, occurrence, classification structure, reproduction and economic importance of Protozoa.

References:

1. Singh,R.P. General Microbiology. Kalyani Publishers, New Delhi (2007).
2. Aneja, K.R. Experiments in Microbiology, Plant pathology and Biotechnology, Fourth edition, NewAge International publishers.
3. Dubey, R.C. and Maheshwary, D.K. Text book of Microbiology. S.chand and company (1999).
4. Powar, C.B. and Dagainawal, H.F. General Microbiology. Vol-I and Vol- II, Himalaya Publishing House.
5. Chakraborty P. A Textbook Of Microbiology. New central book Agency (2005).
6. Prescott, M.J., Harley,J.P. and Klein, D.A. Microbiology. 5th Edition WCB Mc Graw Hill, New York, (2002).
7. Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. Pearson Education, Singapore, (2004).
8. Alcomo, I.E. Fundamentals of Microbiology. VI Edition, Jonesand Bartlett Publishers. Sudbury. Massachusetts, (2001).
9. Black J.G. Microbiology-Principles and Explorations. JohnWiley &Sons Inc. New York, (2002).
10. Pelczar, MJ Chan ECS and Krieg NR, Microbiology McGraw-Hill.
11. Willey, Sherwood, Woolverton. Prescott, Harley, and Klein's Microbiology McGraw-Hill publication
12. Tortora, Funke, Case. Microbiology. Pearson Benjamin Cummings.
13. JACQUELYN G. BLACK. Microbiology Principles and explorations. JOHN WILEY & SONS, INC.
14. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson
15. Tom Besty, D.C Jim Koegh. Microbiology Demystified Mc GRAW-HILL.

DEPARTMENT -PHYSICS

MP-EL1: Mechanics

BLOCK-A

Unit-1: Laws of Motion: Frames of reference, Newton's Laws of motion, Dynamics of a system of particles, Centre of Mass.

Unit-2: Momentum and Energy: Conservation of momentum, Work and energy, Conservation of energy, Motion of rockets.

Unit-3: Rotational Motion: Angular velocity and angular momentum, Torque, Conservation of angular momentum.

Unit-4: Gravitation: Kepler's Laws (statement only), Newton's Law of gravitation, motion of a particle in a central force field, satellite in circular orbit and applications, geosynchronous orbits, weightlessness, basic idea of global positioning system (GPS).

BLOCK-B:

Unit-5: Oscillations: Simple harmonic motion, differential equation of SHM and its solutions, kinetic and potential energy, total energy and their time averages, damped oscillations.

Unit-6: Elasticity-1: Hooke's law, stress-strain diagram, elastic moduli-relation between elastic constants, Poisson's ratio, expression for Poisson's ratio in terms of elastic constants, work done in stretching and work done in twisting a wire.

Unit-7: Elasticity-2: Twisting couple on a cylinder - determination of rigidity modulus by static torsion, torsional pendulum-determination of rigidity modulus and moment of inertia - q, η and \square by Searles method.

Unit-8: Special Theory of Relativity: constancy of speed of light, postulates of special theory of relativity, length contraction, time dilation.

DEPARTMENT -PSYCHOLOGY

EL-1 Introduction to Psychology 2 Credits

Block 1: Introduction to Psychology-I

Unit 1: Introducing Psychology -Definition, Scope, and goals

Unit 2: Branches of Psychology

Unit 3: Motivation

Unit 4: Emotions

Block 2: Introduction to Psychology-II

Unit 5: Sensation, Attention and Perception

Unit 6: Learning, Memory and Forgetting

Unit 7: Intelligence

Unit 8: Personality

References:

1. Charles G. Morris, Albert A. Maisto Psychology an Introduction , Prentice Hall. New Jersey.
2. Feldman, A. R., Understanding Psychology IV th Ed, 1996, McGraw Hill, New Delhi.
3. Morgan, King, Weisz & Schopler, Introduction to Psychology-V11 Ed, 1993, Tata McGraw Hill, New Delhi.
4. Ernest R Hilgard, Richard C Atkinson , Rita L Atkinson Introduction to Psychology Oxford Publication, New Delhi.

DEPARTMENT : INFORMATION TECHNOLOGY

ELMIT –01: Green Computing

(2 Credits)

Course Objective: Study the concepts related to Green IT, Green devices and hardware along with software methods, green enterprise activities, managing the green IT and various laws, standards, protocols along with outlook of green IT.

BLOCK 1: Overview of Green Computing

Unit 1: Green IT Introduction, Overview and issues, Initiatives and standards, Pathways of Green computing, Benefits of Green IT, Environmental Impacts of IT

Unit 2: Green devices and hardware Environmental issues arising from electronic devices, life cycle of electronic devices, Hazards and E-waste Recycling, Going paperless, Hardware considerations, Greening information systems, Managing Green IT, 3Rs of Green IT, Thinking About Money-Saving Efforts

Unit 3: Green Data Centres and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Storage, Storage Media Power Characteristics,

Unit 4: Green network and communications, objectives and challenges of green networking, Enterprise Green IT strategy, Approaching Green IT strategies, Business drivers and dimensions for Green IT strategies, Steps in Developing a Green IT Strategy, Metrics and Measurements in Green Strategies

BLOCK 2: Management of Green Computing

Unit 5: Sustainable Information Systems and Green Metrics, Sustainable IT Services, Sustainable IT Roadmap, Enterprise, Green IT Readiness, Readiness and Capability Green Enterprises and the Role of IT, Organizational and Enterprise Greening, Information Systems in Greening Enterprises, Greening the Enterprise: IT Usage and Hardware,

Unit 6: Managing Green IT, Strategizing Green Initiatives, Implementation of Green IT,

Regulating Green IT: Laws, Standards and Protocols,

Unit 7: Green Cloud Computing and Environmental Sustainability, Cloud Computing and Energy Usage Model: A Typical Example, Features of Clouds Enabling Green Computing, Green Cloud Architecture

Unit 8: Green IT: An Outlook, Awareness to Implementation, Green IT Trends, Greening by IT, A Seven-Step Approach to Creating Green IT Strategy

Text Books:

1. Gangadharan, G. R., & Murugesan, S. (2012). Harnessing Green IT: Principles and practices. Wiley Publication, ISBN: 9788126539680.
2. Smith, B. E. (2013). Green Computing: Tools and Techniques for Saving Energy, Money, and Resources. CRC Press.

DEPARTMENT -BOTANY

Plant-Microbe Interactions

Overview of plant microbes interactions,

Introduction, beneficial microbes, Rhizobium bacterium and nitrogen fixation, mycorrhizal fungi.

Plant pathogens, Agrobacterium tumefaciens and crown gall disease,

Mechanisms of plant disease mechanism, some bacterial plant diseases,

Plant viruses and mechanism of plant against viruses attacks.

Fungal pathogen- mechanism of plant disease,

Oomycete pathogens, Fungal mediated plant.

General concept of plant immunity,

PAMP-triggered immunity (PTI) and effectors-triggered immunity (ETI).

Transcription activator like effector and their role in virulence and disease resistance.

References

1. Lautenberg, B. (2015). Principles of Plant-Microbes Interactions: Microbes for sustainable Agriculture, Springer.
2. Stacey, G. and Keen, N. T. (1997). Plant-Microbes Interactions, Vol 4, . Springer.
3. Ramasamy, K, (2015). Plant Microbes Interactions, New India Publishing Agency.
4. Martin, F. and Kamoun, S. (2014). Effectors in Plant-Microbes Interactions 1st Edition, Wiley Blackwell.

DEPARTMENT -ZOOLOGY

MZO-IE-1: Parasites, Vectors & Communicable Diseases

Introduction to parasites.

Distribution, types, origin and evolution of parasites. Parasitism.

Types: Ecto-parasites, Endo-parasites and their adaptations.

Pathogenic micro-organisms, brief outline and classification of parasitic protozoan's: Entamoeba, Balantidium, Giardia, Trichomonus, Plasmodium, Leishmania and Trypanosoma and their diseases.

Control measures, diagnosis and therapy.

Pathogenic helminthes and vectors.

Etiology, epidemiology, pathogenesis, diagnosis, prevention and control of disease due to *Trichinella spiralis*, *Ancylostoma duodenale*, *Fasciola hepatica*, Schistosoma species.

Pathogenic Cestodes: Life cycle, treatment of diseases caused by Echinococcus, Hymenolepis and Diphylobothrium. Scope and importance of vectors. Origin and evolution of vectors. Habitat, life cycle, pathogenicity of fleas, mites, ticks, lice's and mosquitoes.

Historical perspectives and scientists involved in the discovery of vectors and communicable Diseases.

Epidemiology, bio-ecology, life cycle of biological and mechanical Vectors. Vector-host-parasites interactions, Host-pathogen interaction, insects transmitting Bacteria and viruses.

Control and management of vectors and vector borne diseases

Control measures: cultural, chemical, biological, genetic and environmental Methods of vectors. Management of biological and mechanical vectors during Different seasons. Integrated Vector Control and Management.

Insecticide resistance in vectors, Drug resistance in pathogens.

Importance of education, awareness among public on communicable diseases and community participation. Covid-19 pandemics. Epidemiology of corona virus and its mutants.

Vaccination against corona virus in India and other parts of the world.

DEPARTMENT –FOOD AND NUTRITION SCIENCE

ELMFNS- 01 FOOD PSYCHOLOGY

Credits: 2

BLOCK 1: FOOD: PREFERENCES AND CHOICES

Unit 1: Food: Physiological definition and significance, meaning of food, food classification, Food as statement of self-identity, Social interaction, Cultural identity

Unit 2: The Role of Food and Eating on Personality and Social Development: Psychology of eating, Food and emotion regulation, Food in daily living, Food Socialization, Food and control of others

Unit 3: Food Preferences and Fluctuations: Developmental Models, Cognitive Models & Psychophysiological Models, Physiology of food choice, Likes and Dislikes, acquired food preferences, Attitudes towards change, Food and sensory stimulus, Factors influencing eating behavior – (biological, environmental, individual, food characteristics, culture etc., Effect of eating on food selection and preferences, Understanding of the body and self – selection of the diet.

Unit 4: Food choices across lifespan and influence of society: The changing role of the senses in food choice and food intake across lifespan, Food in security and health across lifespan, Influence of media and advertisements, Digital platform and influence on food choices

BLOCK 2: EATING DISORDERS AND TREATMENTS

Unit 5: Mood, Emotions, food cravings and addictions: relation with food preferences, Connection between mood and eating, Biological and physiological aspects of food cravings, Stress and eating behavior, Food addiction - description, neurobiology of food addiction

Unit 6: Eating disorders and treatment: Anorexia nervosa, Bulimia nervosa and binge eating Disorder-Definition, Symptoms, believed causes, Classification, Risk factors, Common myths of eating disorders, Treatment & dietary management

Unit 7: Overeating, Obesity and Weight management: Definition, Prevalence, Classification of Body Mass Index, Types & patterns, Etiology, Physiological component, Fad diets, Risk factors, Treatment - Weight management (Behavior & Cognitive), Lifestyle modifications, Dietary modification - (calorie restricted diet)

Unit 8: You are what you eat- Approaches to change the dietary behavior: Multidisciplinary approach, Strategies to support healthy dietary behavior: Encouraging healthy eating, Selection of food, Meal & portion size, developing education materials, Motivation & economics, Benefits of exercise, Stage classification for change, Barriers affecting the clinical outcome

REFERENCES:

1. [Smith John L.](#) (2002), The Psychology of Food and Eating (English, Hardcover, Smith John , Publisher: Palgrave MacmillanL.), ISBN: 9780333800201, 0333800206.

Alexandra W. Logue Oct 2017, The Psychology of Eating and Drinking Fourth Edition.

Annexure II

INTER- DISCIPLINARY COURSE (Open Elective) for Second Semester ವಿಭಾಗ- ಕನ್ನಡ

ಪತ್ರಿಕೆ-೬: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ

EL-2.1 (ಕ್ರೆಡಿಟ್-೨)

ಬ್ಲಾಕ್-೨೮: ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಉಗಮ ಮತ್ತು ವಿಕಾಸ

ಘಟಕ-೧೪೯: ಸಾಹಿತ್ಯದ ಉಗಮ, ಬೆಳವಣಿಗೆ, ಉದ್ದೇಶ.

ಘಟಕ-೧೫೦: ಪ್ರಾಚೀನ ಪೂರ್ವ ಶಾಸನಸಾಹಿತ್ಯ.

ಘಟಕ-೧೫೧: ಪಂಪ ಪೂರ್ವ ಯುಗದ ಸಾಹಿತ್ಯ.

ಘಟಕ-೧೫೨: ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ವಿಭಾಗಕ್ರಮ.

ಬ್ಲಾಕ್-೨೯: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ

ಘಟಕ-೧೫೩: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ ರೂಪಗಳು; ಚಂಪೂ, ವಚನ, ರಗಳೆ, ಷಟ್ಪದಿ, ಸಾಂಗತ್ಯ ಇತ್ಯಾದಿ.

ಘಟಕ-೧೫೪: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪರಿಕಲ್ಪನೆಗಳು;

ಚರಿತ್ರೆ-ಪುರಾಣ, ಧರ್ಮ-ಕಾವ್ಯಧರ್ಮ, ಹಿಂಸೆ-ಅಹಿಂಸೆ, ಮಾರ್ಗ-ದೇಶಿ, ಲೌಕಿಕ-ಆಗಮಿಕ, ವಸ್ತುಕ-ವರ್ಣಕ, ಪ್ರಭುತ್ವ-ಪ್ರತಿರೋಧ.

ಘಟಕ-೧೫೫: ಪ್ರಾಚೀನ ಕನ್ನಡ ಕವಿ-ಕೃತಿ-ಕಾಲ-ದೇಶ-ಭಾಗ ೧.

ಪಂಪ, ರನ್ನ, ಪೊನ್ನ, ೧ನೆ ಚಾವುಂಡರಾಯ, ನಾಗವರ್ಮ ೨ನೆಯ ಚಾವುಂಟರಾಯ, ನಾಗಚಂದ್ರ, ನಯಸೇನ, ದುರ್ಗಸಿಂಹ, ಬ್ರಹ್ಮಶಿವ, ಕರ್ಣಪಾರ್ಯ, ಜನ್ನ.

ಘಟಕ-೧೫೬: ಪ್ರಾಚೀನ ಕನ್ನಡ ಕವಿ-ಕೃತಿ-ಕಾಲ-ದೇಶ-ಭಾಗ ೨.

ಆಂಡಯ್ಯ, ನೇಮಿಚಂದ್ರ, ರುದ್ರಭಟ್ಟ ಪ್ರಮುಖ ವಚನಕಾರರು - ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಬಸವಣ್ಣ, ಅಕ್ಕ ಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಚನ್ನಬಸವಣ್ಣ, ಹರಿಹರ, ರಾಘವಾಂಕ, ಕುಮಾರವ್ಯಾಸ, ಲಕ್ಷ್ಮೀಶ, ಪ್ರಮುಖ

ಕೀರ್ತನಕಾರರು, ಚಾಮರಸ, ಕುಮಾರವಾಲ್ಮೀಕಿ, ಸರ್ವಜ್ಞ, ಷಡಕ್ಷರಿ, ಸಂಚಿ ಹೊನ್ನಮ್ಮ, ನಂಜುಂಡ, ರತ್ನಾಕರವರ್ಣಿ, ಮುದ್ದಣ, ಕೆಂಪುನಾರಾಯಣ.

ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು

೧. ಗತಿಬಿಂಬ : ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಬೆಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಬೆಂಗಳೂರು
೨. ಕಾವ್ಯ ವಿಹಾರ : ಕುವೆಂಪು, ಉದಯರವಿ ಪ್ರಕಾಶನ, ಮೈಸೂರು, ೧೯೬೯
೩. ಸಮಗ್ರ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ಬೆಂಗಳೂರು, ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಬೆಂಗಳೂರು, ೨೦೦೨
೪. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ಕೆ. ವೆಂಕಟರಾಮಪ್ಪ, ಪ್ರಸಾರಾಂಗ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು
೫. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ: ದೇವುಡು, ಶಾರದಾ ಪ್ರಕಾಶನ, ಮೈಸೂರು, ೧೯೩೫
೬. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ : ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಮನೋಹರ ಗ್ರಂಥಮಾಲೆ, ಧಾರವಾಡ
೭. ಶೈಲಿ : ಎಸ್.ವಿ.ರಂಗಣ್ಣ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೧೯೭೬
೮. ಶತಮಾನದ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಸಂಪಾದಕರು, ಜಿ.ಎಸ್. ನಾಯಕ, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ಬೆಂಗಳೂರು
೯. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ : ರಂ. ಶ್ರೀ. ಮುಗಳಿ, ಕೇಂದ್ರ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ನವದೆಹಲಿ, ೧೯೬೩
೧೦. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ರಂ.ಶ್ರೀ. ಮುಗಳಿ, ಉಷಾ ಸಾಹಿತ್ಯ ಮಾಲೆ, ಮೈಸೂರು, ೧೯೭೧
೧೧. ಬಿಂಬ: ಚದುರಂಗ, ಸಂವಹನ ಪ್ರಕಾಶನ, ಮೈಸೂರು
೧೨. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂಪುಟಗಳು : ಕುವೆಂಪು ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ, ಮೈಸೂರು. ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೧೯೮೨
೧೩. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಾಚೀನತೆ: ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ. ರಂಗಸ್ವಾಮಿ, ಲೇ. ಎಚ್.ಪಿ. ಗೀತಾ, ಜನಪ್ರಿಯ ಕನ್ನಡ ಮಾಲೆ, ಕನ್ನಡ ಅಧ್ಯಯನ ಮತ್ತು ಸಂಶೋಧನಾ ವಿಭಾಗ, ಕರಾಮವಿ, ಮೈಸೂರು, ೨೦೧೧
೧೪. ಪ್ರಾಚೀನ ಕನ್ನಡ ಕಾವ್ಯ ಸ್ಥಿರತೆ ಮತ್ತು ಚಲನ ಶೀಲತೆ : ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ. ರಂಗಸ್ವಾಮಿ, ಲೇ. ಶಿವರಾಮಯ್ಯ, ಜನಪ್ರಿಯ ಕನ್ನಡ ಮಾಲೆ, ಕನ್ನಡ ಅಧ್ಯಯನ ಮತ್ತು ಸಂಶೋಧನಾ ವಿಭಾಗ, ಕರಾಮವಿ, ಮೈಸೂರು, ೨೦೧೨
೧೫. ಕನ್ನಡ ಕೈಪಿಡಿ: ಸಂಪುಟ ೨, ಪ್ರಸಾರಂಗ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೨೦೦೭

DEPARTMENT - ENGLISH

EL-2.1: INDIAN LITERATURE-II

OBJECTIVES

- To appreciate artistic values in *Hayavadana* and the use of myth
- To know the importance of Indian English historical plays
- To appreciate Sri Aurobindo as a poet and critic
- To comprehend the different theories of aesthetic experience of art

BLOCK -I

Girish Karnad: Hayavadana

Gurucharan Das: Larin Sahib

BLOCK -II

M. Hiriyanna: Art Experience

Sri Aurobindo: Selections: The Poets of the Dawn and The Poets of the Dawn 3 (The Future Poetry)

Suggested Reading:

- **K.R.Srinivas Iyengar:** Indian Writing in English .Macmillan, 1979.
- **M.K.Naik:** Critical Essays on Indian Writing in English.Sahitya Akademi, 1969.
- **Narasimhaiah C.D:** The Swan and the Eagle. Indian Institute of Advanced Study, 1987.
- **Meenakshi Mukherjee:** The Twice Born Fiction. Heinemann Educational Publishers, 1972.

DEPARTMENT - HINDI

हिंदी सिनेमा

- सिनेमा का उद्भव और विकास
- मूक चलचित्र और दादा साहब फाल्के युग
- दूसरा पढ़ाव, सवाक चलचित्र अथवा आलमआरा
- रंगीन सिनेमा का युग
- सामाजिक सिनेमा एक विवेचन
- धर्म एवं सांस्कृतिक सिनेमा एक विवेचन
- राजनैतिक सिनेमा एक विवेचन
- आर्थिक सिनेमा एक विवेचन
- हास्य एवं व्यंग्य सिनेमा एक विवेचन
- बाल सिनेमा
- सिनेमा एवं संवेदना
- सिनेमा एवं भाषा-शिल्प सिनेमा एवं गायन
- सिनेमा एवं पात्र संयोजना
- सिनेमा एवं नैतिक मूल्य
- अनूदित सिनेमा
- सिनेमा का तुलनात्मक अध्ययन
- फिल्म समीक्षा.....**आदि**

□□□□□□ □□□□□□

- सिनेमा साहित्य और समाज- प्रहलाद अग्रवाल, अनामिका प्रकाशन, नई दिल्ली
- कथाकार कमलेश्वर और हिंदी सिनेमा- उज्ज्वल अग्रवाल, राजकमल प्रकाशन, नई दिल्ली
- बॉलिवुड पाठ विमर्श के संदर्भ- ललित जोशी, वाणी प्रकाशन, नई दिल्ली
- फलैशबैक, प्रभुनाथ आजमी, शिल्पायन, नई दिल्ली
- नाटक के सौ बरस, हरिश्चंद्र अग्रवाल और अजित पुष्कल, शिल्पायन, नई दिल्ली

DEPARTMENT - TELUGU

E. L. 2.1 TELUGU SAMSKRUTHI - SAMAJAM

Block - 1: ANDHRULA CHARITHRA - SAMSKRUTHI

Unit - 1: Samskruthi Vaisistyam

Unit - 2: Andhrula Charithra - Samskruthi Paraspara Prabhavam

Unit - 3: Andhrula kalalu

Unit - 4: Andhrula basha - samajam

Block - 2: ANDHRULA AACHARALU -SAMPRADHAYALU

Unit - 1: Andhrula Pandugalu

Unit - 2: Sthrela Nomulu - Vrathalu

Unit - 3: Andhrula Sangikaacharalu

Unit - 4: Andhrula Sampradhayalu

DEPARTMENT - HISTORY

OEL2.1 Social Reform Movements in Modern India

Objective: The course aims to trace the causes for the division of society in various sections and need for reformation. Further it explains age old social evils which crippled Indian society.

Pedagogy: personal contact programmes, audio video programmes, online lectures
Assignments, etc

Credits: 2. **Examination Duration:** 1 1/2 hours and Maximum Marks: 40

Course outcomes

After completing this course the students should be able to

- Understanding the contributions of the Raja ram Mohan Roy Dayananda Sarawathi towards the Indian modernity
- Analyse the Jyothibai pule Savithribai Pule Ambedkar's contributions to Indian social reform movements
- Evaluate the works of Sahu Maharaj and Krishna raja wadiyar IV patronage to social Justice.

Block-I

Unit : 1

Colonial Discovery of India : Orientalism, Anglicism, Evangelism-Understanding Indian Society, Meaning of Social Reform. The Concept of Modernity : Western Impact – Indian Response.

Unit : 2

Rajaram Mohan Roy and Brahma Samaj, Dayananda Sarawathi and Arya Samaj-Nationalism and Society – Prarthana Samaj.

Unit : 3

Jyothi Ba- Phle and Savithri Ba Pule, Social and education reforms.

Unit : 4

Communalism, Eradication of Communalism, Muslim League, Wahhabi and Pan Islamism-Syed Ahmed and Aligarh Movement.

Block-II**Unit : 5**

The debate over the interpretation of Shastras – Ishwar Chandra Vidya Sagar - B.M.Malabari – Vivekananda –M.G. Ranade—Bal Gangadhar Tilak.

Unit :6

Dr. B.R.Ambedkar-, His views on Society, A caste and its annihilation, Religion and Economy, M.K.Gandhi- E.V.Ramswamy Periyar and Sri.Narayanguru, Ayyan kali.

Unit :7

The reformers – Kandukuri Veereshalingam – Pandit Shivanatha Shastry – Gopal Ganesh Agarkar-K.T.Telang-Maharma.

Unit :8

D.K.Karve, Maharaj Saiyyaji Rao Gaekwad of Baroda – Chatrapathi Shahu Maharaj of Kolhapur and Maharaja Krishnaraja Wodeyar IV of Mysore.

Suggested readings:

1. Nararajan : A Century of Social Reform in Indian.
2. Seetharam Singh : Nationalism and Social Reform in India
3. Dhananjaya Keer : Ambedkar, Life and Mission
4. Dhananjaya Keer :Mahatma Jyoti Rao Phule : Father of Social Revolution in India
5. Charless Heimsath R : Indian Nationalism and Hindu social Reform
6. A.S.Altekar : Position of Women In Hindu Civilization.
7. Gail Omvedt : Cultural Revolt in a Colonial Society – The Non – Brahmin Movements in Western India.
8. Gail Omvedt : Dalits and Democratic Revolution.
9. Ravindrakumar : Selected Documents of B.G.Tilak.
10. S. Ramkrishna : Social Reform Movements in Andhra
11. M.K.Gandhi : Women and Social Injustice.

ವಿಜಯ ಪೋಣಚ್ಚು ತಂಬಂಡ (ಸಂ), ಭಾರತ ಉಪಖಂಡದ ಆಧುನಿಕ ಪೂರ್ವ ಚರಿತ್ರೆ ವಿವಿಧ ಆಯಾಮಗಳು
– ಸಂಪುಟ-03, ಪ್ರಸಾರಾಂಗ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಹಂಪಿ.

DEPARTMENT - ECONOMICS

EL2.1: Institutions for International Development

- **Objective:** To enable the Students to understand the need and importance of various International Institutions.
- **Pedagogy:** A Combination of Lectures, Group Discussion, Assignments.
- **Credits:** 2 ; Examination Duration: 1½ and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

- Block – I Economic Issues at Global and National Level**
- Unit – 1 Globalisation**
Globalisation – Forces Driving Globalisation – Income Inequality – National Integrity – Impact on Labour – Multinational corporations – Global Business Environment – National Business Environment.
- Unit – 2 Legal Issues of Business at Global and National Level**
Political Risks – Legal System – Business Ethics – Centrally Planned Economy – Mixed Economy – Market Economy – Human Development
- Unit – 3 International Trade**
Importance – Volume – Direction – Composition – Trends – Theories of Trade - Mercantilism – Absolute Advantage – Comparative Advantage – International Product Life Cycle – Political, Economic and Cultural Motives behind Government Intervention.
- Unit – 4 GATT and WTO**
Importance – objectives – Functions - GATT and W.T.O – India and WTO.
- Block – II Economic Integration and International Business Issues**
- Unit – 5 Regional Economic Integration**
Meaning – Effects – Integration in Europe: European Union – Integration in Americas : North American Free Trade Agreement (NAFTA) – Latin American Integration Association (LAIA) – Free Trade Area of Americans (FTAA) and Transatlantic Economic Partnership.
- Unit – 6 Integration in Asia**
Association of Southern East Asian Nations (ASEAN) - Asia Pacific Economic Cooperation (APEC) – Integration in middle East : Gulf Cooperation Council (GCC) – BRICS – SAARC.
- Unit – 7 International Financial Markets**
International capital markets – Foreign Exchange markets – Currency Convertibility – International Monetary System.
- Unit – 8 Issues in International Business**
Trade War – Balance of Payment – Terrorism – Oil Crisis – Smuggling – Dumping – Environmental Degradation – Exhibit of Nuclear power – Covid 19 and other pandemics.

References:

01. Apte A.N. (2011) International Financial Management, Tata McGraw Hill Pub., Co. Ltd., New Delhi.
02. Bhambari C.P, (1980) The World Bank and India, Vikas Publishing House, New Delhi.
03. International Development Association, Annual Reports.
04. International Finance Corporation, Annual Reports.
05. International Monetary Fund, Annual Reports.
06. World Bank, (1995) The Evolving Role of the World Bank in the First Half Century, Washington D.C.
07. World Bank, World Bank in India, Washington, D.C. USA
08. World Bank, World Development Reports, and Annual Reports.
Palle Krishna Rao, (2005) WTO, Text and Cases, PSG Excel Series, New Delhi.

DEPARTMENT - POLITICAL SCIENCE

(OEL-I) Indian Constitution

Block-I

- | | |
|--------|---|
| Unit:1 | Framing of the Indian Constitution. |
| Unit:2 | Preamble and Salient Features of the Indian Constitution. |
| Unit:3 | Fundamental Rights and Duties. |
| Unit:4 | Directive Principles of the State Policy. |

Block-II

- | | |
|--------|--|
| Unit:5 | Union Legislature : Composition, Powers and Functions. |
| Unit:6 | Union Executive : President and Vice-President - Election, Powers and Functions, Prime ministers and Council of Minister - Powers and Functions. |
| Unit:7 | State Legislature : Composition, Powers and Functions, State Executive -Governor and Chief Minister. |
| Unit:8 | The Judiciary : Supreme Court and High Court - Composition, Jurisdiction and Functions. |

References:

1. Andre Beteille, 1965. Caste,class, and Power. Berkley: University of California Press.
2. Appadorai, A 1968. india: Studies In Social And Political Development 1947-1967. New Delhi: Aisa Publishing House.
3. Desai, A R. 2016. Social Background of Indian Nationalism. Los Angeles: Papular Prakashan.
4. Granville Austin, 2000. The Indian Constitution: Cornerstone of a Nation. Melbourne: Oxford University Press.
5. Hanson and Douglas, 1972. India`s Democracy. New York city: W W Norton & Co Inc.
6. Johari J C 1974. Indian Government and Politics. New Delhi: Vishal Publications.
7. Karunakaran, K.P 1964. Continuity and Change in Indian Politics. New Delhi: People`s Pub. House.
8. Kochanek. A. 1968. The Congress Party of India: the Dynamics of a One-Party Democracy. New Jersey: Princeton University Press.

9. Morris Jones, 1967. The Government and Politics of India. London: Hutchinson University Library.
10. Myron Weiner, 1957. Party Politics in India. New Jersey: Princeton University Press.
11. Myron Weiner, 1967. Party Building in New Nation. Chicago: University of Chicago Press.
12. Palmer, N D 1971. The Indian Political System. Boston: Houghton Mifflin.
13. Partha Chatterjee, 1998. State and Politics in India. University of Michigan: Oxford University Press.
14. Pylee, M V 1960. Constitutional government in India. Bombay: Asia Pub. House.
15. Rajni Kothari, 1970. Politics in india. The University Of Michigan: Little Brown
16. Rajni Kothari, 1995. Caste in Indian Politics. Telangana: Orient Blackswan.
17. Venkatarangaiya: M Shiviah, 1975. Indian Federalism. New Delhi: Arnold-heinemann Publishers.
18. Zoya Hasan, 2000. The State in Indian Politics. Landon: Sage publication.

DEPARTMENT - SOCIOLOGY

Study of Indian Society -02 Credits

Course Description

Every science has its own classical theories, which stand as eternal in their explanatory power and prowess to transcend the time and region. This course intends to introduce the learners to the classical period of sociology which is not just a bundle of theories but a consistent tradition and formative period, even contemporary theories cannot eschew from being inspired. After studying this course, following learning outcomes can be expected.

Course Objectives

1. To appreciate the organizational framework of Indian society
2. To appreciate the aspects unity and diversity of Indian society
3. Examine the social issues in contemporary India

Learning Outcomes

Following outcomes are expected from the learners after successfully completing the course.

Learner can/has

LOC-1: sociological insights about the social structural and organizational aspects of Indian society

LOC-2: present the changes in institutional framework of Indian society

LOC-3: recognize the causes for major social issues and present realistic remedies

Course Content

Block-1 Social Organizations

Unit-1 Unity and Diversity-Problem of Integration

Unit-2 Caste-Characteristics and Recent Changes

Unit-3 Marginalization-SC, ST, OBC and Minorities

Unit-4 Changes in Family and Concerns of the Aged

Block-2 Social Issues in Contemporary India

Unit-5 Environmental Sanitation and Ecological Degradation

Unit-6 Educated Unemployment and Employability

Unit-7 Social Unrest-Terrorism, Naxalism, Communalism and Corruption

Unit-8 Child Rights and Right to Education (RTE)

References

- Ahuja, Ram. 2002. Study of Social Problems. Jaipur & New Delhi: Rawat Publications
- Atal, Yogesh. 1979. The Changing Frontiers of Caste. National Publishing House: Delhi
- Beteille, Andre. 1971. Caste, Class and power. Berkeley: University of California.
- Beteille, Andre. 1974. Social Inequality, New Delhi: Oxford University Press.
- Beteille, Andre. 1992. Backward Classes in Contemporary India. New Delhi: Oxford University Press.
- Berreman, G.D. 1979. Caste and Other Inequalities: Essays in Inequality. Meerut: Folklore Institute.
- Dube, Leela. 1997. Women and Kinship, Comparative Perspectives on Gender
- **Southern South Asia.**
- Das, Veena. 2006. Oxford Handbook of Indian Sociology. New Delhi: Sage
- Dube, S C. 1990. Study of Indian Society. New Delhi: National Book Trust
- Jha, Hetukar. 2015. Sanitation in India. Delhi: Gyan Books.
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- Pathak, Bindeshwar. 2015. Sociology of Sanitation. Delhi: Kalpaz Publications.
- Singer, Milton & Cohen, Bernards. 1996. Structure and change in Indian Society. Jaipur: Rawat
- Singh, Yogendra, Modernization of Indian Tradition. Jaipur & New Delhi: Rawat
- Srinivas, M N. 1995. Social Change in Modern India: Orient Blackswan
- Srinivas, M. N. 1962. Caste in Modern India and Other Essays. Asia Publishing House: Delhi

DEPARTMENT – ANCIENT HISTORY AND ARCHEOLOGY

AHA
OE 2.1

Cultural History of Hoysalas (OE)

Block - 1

Early Kings

Unit - 1 Archeological and Literary Sources

Unit - 2 Theories of Origin of Hoysalas – Sala – Nripakama – Ereyanga

Block - 2

Important Rulers

Unit - 3 Vishnuvardhana - VeeraNarasimha – I

Unit - 4 Ballala – II - Narasimha – II - Narasimha III and Ballala – III

Block - 3

Cultural Contributions

- Unit - 5 Hoysala polity - Economy
 Unit –6 Hoysala Society – Religion – Education - literature
Block - 4 Art and Architecture
 Unit - 7 Hoysala Architecture
 Unit – 8 Hoysala Art

References:

1. Epigraphia Carnatica: Relevant Volumes
2. Derrett Duncan, M.J: The Hoysalas, 1957
3. Dhakey M.A: Encyclopedia of Indian Temple Architecture
4. Desai P.B: History of Karnataka
5. Foekema Gerard: A Complete Guide to Hoysala Temples
6. Gopinatha Rao T.A: Elements of Hindu Iconography, Vols
7. Kelleson Collyer: The Hoysala Artists – Their Identity Style
8. Krishna Murthy M.S: The Hoysala Art, Kuppam, 2007
9. Padmnabha K: Hoysala Sculptures : A cultural Study
10. Sheik Ali B (Ed): The Hoysala Dynasty , 1972
11. William Cohelo: The Hoysala Vamsha, 1950
- 12. Annual Reports of the Department of Archaeology, Mysore 1939 – 46**
- 13. Settar S: Hoysala Temples**
14. Marg: In Praise of Hoysala Art
15. Narasimhachar R; Lakshmidēvi Temple at Doddagaddhāvalli
16. Shastri KAN: The Cholas, 17. Shastri KAN: History of South India

DEPARTMENT - EDUCATION

IDC - 2 HIGHER EDUCATION

BLOCK - 1 HIGHER EDUCATION – ORGANIZATION AND TEACHING – LEARNING

- Unit-1 Higher Education
 Unit-2 Teaching Learning in Higher Education – I
 Unit-3 Teaching-Learning in Higher Education – II
 Unit-4 Problems and Innovations in Higher Education

BLOCK - 2 HIGHER EDUCATION – SOCIO-PSYCHOLOGICAL AND MANAGEMENT DIMENSIONS

- Unit-5 Socio-Psychological Background of College Students
 Unit-6 Problems of College Students
 Unit-7 Higher Education – Management Dimensions
 Unit-8 Higher Education Teacher

References:

1. Shills Edward (1989) 'The modern university Liberal Democracy'.
2. Abraham, Abu (1988) The Penguin, Book of Indian cartoons, New Delhi.
3. Chandra, Bipan (1984) Communalism Modern India, New Delhi.
4. Chauhan S.S (1989) Innovations in Teaching Learning Process, New Delhi, Vikas.
5. Srivastva A.B and Sharma K.K (1985) Elementary Statistics in Psychology and Education, New Delhi, Sterling Publishers Pvt. Ltd.,

DEPARTMENT - COMMERCE

Elective Course – EL2.1: Entrepreneurship Development

- **Objective:** To enable the Students to understand about the different aspects of Entrepreneurship Development.
- **Pedagogy:** A Combination of Lectures, Group Discussion, Assignments.
- **Credits:** 2 ; Examination Duration: 1 1/2 and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

Block I

- **Unit -1: Entrepreneur and Entrepreneurship:** Introduction - Evolution – Characteristics – Distinction between Entrepreneur and Manager – Functions – Types – Entrepreneur - Concept of Entrepreneurship – Growth of Entrepreneurship in India – Role of Entrepreneurship in Economic Development
- **Unit – 2: Women Entrepreneurship:** Introduction - Concept – Statistical Evidence – New Age Women – Functions – Growth - Problems – Recent trends in Development of Women Entrepreneurship.
- **Unit -3: Rural Entrepreneurship:** Introduction - Meaning – Need – Rural Industrialisation in Retrospect – Problems – Development of Rural Entrepreneurship – NGOs and Rural Entrepreneurship.
- **Unit -4: Conceptual Models of Entrepreneurship:** Introduction - Models of John Kao – Udai Pareek and Nadakarni– NISIET.

Block II

- **Unit – 5: Factors Affecting Entrepreneurial Growth And Competencies:** Introduction - Economic Factors – Non-Economic Factor – Government Actions - Entrepreneurial Competencies: Meaning – Major Entrepreneurial Competencies – Developing Competencies.
- **Unit -6: Entrepreneurial Motivation and Mobility:** Introduction - Motivation – Motivation Theories – Motivating Factors – Achievement Motivation – Factors Influencing Mobility – Occupational Mobility – Locational Mobility.
- **Unit – 7: Entrepreneurship Development Programmes:** Introduction - Need for EDPs - Objectives of EDPs – Course Contents and Curriculum of EDPs – Phases of EDPs – Evaluation of EDPs.
- **Unit -8: Institutional Support System for Entrepreneurship:** Introduction - DICs – SISIs – SIDCOs – NISIET – EDIT – NIESBU – TCOs- A Broad Overview of Central and State Level Financing Institutions.

Books Recommended for Reference

- a. Vasanth Desai, The Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House.
- b. A. N Desai, Entrepreneurship Management, Ashish Publishing House.
- c. Chandra Prasanna, Project Preparation, Appraisal and Implementation, Tata McGraw Hill.
- d. Khanka, S.S, Entrepreneurial Development, S. Chand Publications.
- e. Prasanna Chandra, Projects: Planning, Analysis, Selection, Implementation and Review, Tata McGraw Hill.

DEPARTMENT - MANAGEMENT

E-COMMERCE

Credits: 2

Module 1: E-commerce and its Technological Aspects:

Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E-Commerce, Produce a generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture.

Module 2: Electronic Data Interchange: Benefits of EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.

References:

1. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
2. Ravi Kalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
3. Efraim Turban, Jae Lee, David King, H.Michael Chung, "Electronic Commerce–A Managerial Perspective", Addison-Wesley.
4. Elias M Award, "Electronic Commerce from Vision to Fulfilment", 3rd Edition, PHI, Judy Strauss, Adel El-Ansary, Raymond Frost, "E-Marketing", 3RDEdition, Pearson Education

DEPARTMENT - BIO CHEMISTRY

Basics of Bioorganic chemistry for Biology graduates.

Introduction to Organic chemistry: Classification of organic compounds, unique characteristics, IUPAC nomenclature of organic compounds (including bifunctional).

Reaction mechanisms: Classification of organic reactions: substitution, addition, elimination and rearrangement with one example for each. Concepts of the following – carbon anions, carbon cations, free radicals, carbenes, nucleophiles and electrophiles.

Cycloalkanes: Reactivities and relative stability, Bayer's strain theory. Sachse-Mohr theory. Boat and chair form of cycloalkanes. Axial and equatorial bonds.

Arenes: Structure of Benzene—resonance and molecular orbital theories. Aromaticity. Mechanism of Nitration and Friedel-Craft's reaction. Electronic interpretation of the orienting influence of substituents in the electrophilic substitution of Toluene, Chlorobenzene, Nitrobenzene and Phenol. Polynuclear hydrocarbons—Resonance structures of Naphthalene, Anthracene and phenanthrene.

S_N1 and S_N2 reactions, mechanism with an example for each. Concept of elimination reactions. Example –n-butyl chloride.

Alcohols: Classification, monohydric, alcohols-distinguishing reactions for primary, secondary and tertiary alcohols.

Trihydric alcohols: Glycerol, Properties, (KHSO₄, HNO₃, Oxalic acid and HI)

Phenols: Acidity of phenols, Effect of substitution on acidity

Stereochemistry: Stereoisomerism, types, Fischer-projection formulae, asymmetric carbon atom, molecular dissymmetry, chirality, optical isomerism: ex. Glyceraldehyde, Lactic acid, Tartaric acid. Nomenclature of enantiomers. D- and L- system, Racemisation and resolution.

Heterogeneous and Homogenous hydrogenation of oils.

Selected References:

1. Basic Principles of Organic Chemistry, Roberts and Caserio, W. A. Benjamin, Inc. (1964).
2. Organic Chemistry, Morrison and Boyd, Allyn and Bacon Inc (1992).
3. Principles of Inorganic chemistry by Cotton & Wilkinson, Wiley (1999).
4. Textbook of Organic chemistry by Ahluwalia V K & Madhuri G Narosa publications (2001).
5. Physical chemistry by Castellan G W, Narosa Publications (2004).
6. Physical chemistry by Chakraborty D K, Narosa Publications (2004).

DEPARTMENT - BIOTECHNOLOGY

MBT EL-2 FUNDAMENTAL OF BIOTECHNOLOGY

Scope and Introduction to Biotechnology History & Introduction to Biotechnology What is Biotechnology? Definition of Biotechnology, Traditional and Modern Biotechnology, Branches of Biotechnology

Plant, Animal Biotechnology, Marine Biotechnology, Agriculture, Healthcare, Industrial Biotechnology, Pharmaceutical Biotechnology, Environmental Biotechnology.

Applications Biotechnology Applications of Biotechnology in Agriculture : GM Food, GM Papaya, GM Tomato, Fungal and Insect Resistant Plants BT Crops, BT Cotton and BT Brinjal Pros and Cons Biotechnological applications in Crop and Livestock Improvements

Modifications in Plant Quality Golden Rice, Molecular Pharming, Plant Based Vaccines
Ethics in Biotechnology and IPR 15 lectures

Food and Fermentation Biotechnology Food Biotechnology Biotechnological applications in enhancement of Food Quality Unit Operation in Food Processing Quality Factors in Pre processed Food Deterioration and its Control Rheology of Food Products Microbial role in food products Yeast, Bacterial and other Microorganisms based process and products Fermentation Technology Definition, Applications of Fermentation Technology Microbial Fermentations Overview of Industrial Production of Chemicals (Acetic Acid, Citric Acid and Ethanol), Antibiotics, Enzymes and Beverages

Molecular Biology - Replication DNA Replication in Prokaryotes and Eukaryotes Semi-conservative DNA replication, DNA Polymerases and its role, E.coli Chromosome Replication, Bidirectional Replication of Circular DNA molecules. Rolling Circle Replication, DNA Replication in Eukaryotes DNA Recombination – Holliday Model for Recombination Transformation

Mutation and DNA Repair Definition and Types of Mutations. Mutagenesis and Mutagens. (Examples of Physical, Chemical and Biological Mutagens) Types of Point Mutations, DNA REPAIR Photo reversal, Base Excision Repair, Nucleotide Excision Repair, Mismatch Repair, SOS Repair and Recombination Repair.

Genetic Engineering Experimental evidences for DNA and RNA as Genetic Material. Genetic Engineering in Ecoli and other Prokaryotes, Yeast, Fungi and Mammalian Cells Cloning Vectors-Plasmids (pBR 322, pUC) Vectors for Plant and Animal Cells, Shuttle Vectors, YAC Vectors, Expression Vectors Enzymes- DNA Polymerases, Restriction Endonucleases, Ligases, Reverse Transcriptase's, Nucleases, Terminal Transferees, Phosphatases Isolation and Purification of DNA (Genomic, Plasmid) and RNA,, Identification of Recombinant Clones

DEPARTMENT - CHEMISTRY

Block-1	Title: Physical parameters of molecules
Unit-1	Thermodynamics: First and second laws of thermodynamics. Concept of entropy and free energy, entropy as a measure of unavailable energy. Entropy and free energy changes and spontaneity of process.
Unit-2	Chemical kinetics: Rate and order of reaction. Factor affecting the rate of reaction. And determination Order of reaction. Energy of activation and its determination. Brief account of collision and activated complex theories.
Unit-3	Ionic equilibria: pH scale, buffer solutions, calculation of pH of buffer solutions, buffer capacity and buffer index, buffer mixtures.
Unit-4	Electrochemistry: Electrolytic conductance, specific, equivalent and molar conductance, ionic mobility and transference number, factors affecting the electrolytic conductance, Arrhenius theory of strong and weak electrolytes,

	assumptions of DebyeHuckel theory of strong electrolytes.
Block-2	Title: Organic molecules
Unit-5	Introduction to organic chemistry, atomic orbitals, sigma and pi bond formation-molecular orbital (MO) method, sp, sp ² and sp ³ hybridization, bond length, bond dissociation energies and bond angles
Unit-6	Electronegativity and polarity of the bonds. Classifications and reactions of organic compounds (with examples).
Unit-7	Biological importance of natural products: Amino acids, proteins, carbohydrates (cellulose, starch, glycogen), lipids (fats and oils, phospholipids), nucleic acids, steroids, alkaloids, vitamins, flavonoids.
Unit-8	Applications of synthetic products: Dyes, drugs, polymers (plastics), soaps and detergents, pesticides and pheromones.

DEPARTMENT – CLINICAL NUTRITION AND DIETETICS

OEL - 2: NUTRACEUTICALS AND HEALTH FOODS

2

Credits

BLOCK 1. NUTRACEUTICALS:

Unit - 1: Introduction to Nutraceutical

Unit - 2: Use of Nutraceuticals in Traditional Health Sciences

Unit – 3: Functional Foods

Unit – 4: Development of Nutraceutical and Functional Foods

BLOCK 2: FUNCTIONAL FOODS AND NUTRACEUTICALS OF PLANT, ANIMAL AND MIRCIBIAL ORIGIN

Unit - 5: Prebiotics and Probiotics

Unit - 6: Bio Active Peptides and Phyto- Chemicals

Unit - 7: Fats and Oils- Omega 3 Fatty Acids:

Unit - 8: Sugar Substitutes / Sweeteners

REFERENCES:

- **Tai Hu Guan, (2018), text book of Nutraceuticals and Health, Scitus Academics Publisher, Wilmington DE 19804, United States of America.**

- Wildman REC, (2016), Handbook of Nutraceuticals and Functional Foods, 2nd edition, CRC Press publishers, Boca Raton, Florida (USA).
- Athapol Noomhorm, Imran Ahmad, Anil Kumar Anal (2014), Functional Foods and Dietary Supplements Processing, Effects and Health Benefits, first edition, published by John Wiley & Sons, Ltd. UK 111 River Street, Hoboken, NJ 07030-5774, USA
- Wildman REC, (2001) Handbook of Nutraceutical and Functional Foods, CRC Press, USA. Ghosh D et al, (2012) Innovations in Healthy and Functional Foods, CRC Press, USA. Pathak YV (2011) Handbook of nutraceuticals Volume 2, CRC Press, USA.

DEPARTMENT - GEOGRAPHY

ELMG –02 Regional Geography of Karnataka (Credits – 2)

Block-1

Physical setting - Location, Administrative divisions, Geology, Physiographic divisions of the Karnataka; Climate and Rivers; Soils and Vegetation; Irrigation in Karnataka, Major Multipurpose River Valley Projects, Major water problems and Issues - Yetthinahole, Linganamakki, Mekedatu, Krishna-Cauvery valley-linking Rivers.

Block-2

Agriculture - Major of Crops: Rice, Jowar, Ragi, Wheat, Oil seeds, Sugarcane, Cotton, Tobacco and Coffee; Minerals Resources - Iron ore, Manganese, Bauxite, Copper, Gold; Major Power Projects - Hydrel, Thermal and Atomic Energy power plants; Industries - Cotton Textile, Silk Textile, Sugar, Iron and Steel, Cement and Paper industries, Industrial Regions of Karnataka; Transportation - Roads, Railway, Water way, Ports/Harbors and Airways; Population - growth, distribution and density

References:

1. Directorate of Information and Tourism,
Government of KarnatakaKarnataka State
Gazetteer
2. Mallappa, P., (2014) Geography of Karnataka, Chethana book publishers, Mysuru
3. N.B.K Reddy & G.S. Murthy, (1967) Regional Geography of Mysore State
4. R.P. Misra, (1973) Geography of Mysore
5. Ranganath, (2018) Geography of Karnataka, Mysore Book House, Mysuru

DEPARTMENT - MATHEMATICES

Combinatorics and Graph Theory (ELMM –02) 2 Credits

Block-I: Permutations and Combinations, Pigeon-hole principle, Principle of inclusion and exclusion.

Block-II: Graphs, Vertices of graphs, Walks and connectedness, Degrees, Operations on graphs, Blocks – Cutpoints, bridges, Block graphs and Cutpoint graphs. Trees - Elementary properties of trees,

Books for Reference:

1. C. L. Liu – Elements of Discrete Mathematics, McGraw-Hill, 1986.
2. Kenneth H. Rosen – Discrete Mathematics and its Applications, McGraw-Hill, 2002.
3. F. Harary – Graph Theory, Addition Wesley Reading Mass, 1969.
4. N. Deo – Graph Theory With Applications to Engineering and Computer Science, Prentice Hall of India, 1987.
5. K. R. Parthasarathy – Basic Graph Theory, Tata McGraw-Hill, New Delhi, 1994.
6. G. Chartand and L. Lesniak – Graphs and Diagraphs, wadsworth and Brooks, 2nd Ed.,
7. Clark and D. A. Holton – A First Look at Graph Theory, Allied publishers.
8. D. B. West – Introduction to Graph Theory, Pearson Education Inc.,2001, 2nd Ed.,
9. J. A. Bondy and U. S. R. Murthy – Graph Theory with applications, Elsevier, 1976.

DEPARTMENT - MICROBIOLOGY

Microbes in Sustainable Agriculture and Development

- i. Soil Microbiology: Soil as Microbial Habitat, Soil profile and properties,
- ii. Soil formation, Diversity and distribution of microorganisms in soil.
- iii. Microbial Activity in Soil and Green House Gases- Carbon dioxide, methane, nitrous oxide, nitric oxide – production and control
- i. Mineralization of Organic & Inorganic Matter in Soil: Mineralization of cellulose, hemicelluloses, lignocelluloses, lignin and humus, phosphate, nitrate, silica, potassium .
- ii. Microbial Control of Soil Borne Plant Pathogens: Biocontrol mechanisms and ways, Microorganisms used as biocontrol agents against Microbial plant pathogens, Insects, Weeds.
- iii. Biofertilization, Phytostimulation,
- iv. Bioinsecticides: Plant growth promoting bacteria, biofertilizers – symbiotic (Bradyrhizobium, Rhizobium, Frankia),
- v. Non Symbiotic (Azospirillum, Azotobacter, Mycorrhizae, MHBs, Phosphatesolubilizers,algae),
- vi. Novel combination of microbes as biofertilizers, PGPRs
- i. Secondary Agriculture Biotechnology: Biotech feed, Silage, Biomanure, biogas, biofuels – advantages and processing parameters.
- ii. GM crops: Advantages, social and environmental aspects, Bt crops, golden rice, transgenic animals.

References:

1. Eldor A. Paul. Soil Microbiology. Ecology and Biochemistry. VI Edition: Academic Press, (2007).
2. Eugene L. Madsen. Environmental Microbiology: From Genome to Biogeochemistry. I Edition, Wiley-Blackwell Publishing. (2008).
3. Agrios, G.N. Plant pathology. Harcourt Asia Pvt. Ltd. (2000).
4. Buchanan. B.B., Grissem, W. and Jones, R.L Biochemistry and Molecular Biology of Plants. I.K. International Pvt. Ltd. (2000).
5. Mehrotra R S and Ashok Agrawal. Plant Pathology. Tata Mc Graw Hill ,6th reprint (2006).
6. K. S. Bilgrami, H. C. Dube. A textbook of modern pathology. 6th Edition, Vani Educational Books, a division of Vikas, (1984).
7. K.R. Aneja .Experiments in Microbiology, Plant Pathology and Biotechnology . New Age Publications.2017

DEPARTMENT - PHYSICS

MP-EL2: Waves and Optics

BLOCK-A:

- Unit-1: Superposition of Two Collinear Harmonic oscillations:** linearity & superposition principle. (i) Oscillations having equal frequencies and (ii) oscillations having different frequencies (Beats).
- Unit-2: Waves Motion- General:** Transverse waves on a string, travelling and standing waves on a string, normal modes of a string, group velocity, phase velocity, plane waves, Spherical waves, wave intensity.
- Unit-3: Fluids: Surface tension:** synclastic and anticlastic surface - excess of pressure - application to spherical and cylindrical drops and bubbles. viscosity - rate flow of liquid in a capillary tube - Poiseuille's formula - determination of coefficient of viscosity of a liquid.
- Unit-4: Sound: Simple harmonic motion - forced vibrations and resonance** intensity and loudness of sound, intensity levels, musical notes, musical scale, acoustics of buildings: reverberation and time of reverberation, absorption coefficient, Sabine's formula - measurement of reverberation time.

BLOCK-B:

- Unit-5: Wave Optics:** electromagnetic nature of light, definition and properties of wave front, Huygen's Principle.
- Unit-6: Interference:** Interference: division of amplitude and division of wavefront. Young's double slit experiment, interference in thin films: parallel and wedge-shaped films, Newton's Rings: measurement of wavelength and refractive index.

Unit-7: Diffraction: Fraunhofer diffraction- single slit and double Slit, multiple slits and diffraction grating, Fresnel diffraction: half-period zones, zone plate, Fresnel diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.

Unit-8: Polarization: Transverse nature of light waves, plane polarized light – production and analysis, circular and elliptical polarization.

DEPARTMENT -PSYCHOLOGY

EL-2 Psychology in Everyday Life 2 Credits

Block 1: Applications of Psychology-I

Unit 1: Psychology as a Profession

Unit 2: Memory Improving Techniques

Unit 3: Stress and Emotional Management

Unit 4: Personality Development

Block 2: Applications of Psychology-II

Unit 5: Psychology in Educational Settings

Unit 6: Psychology in Health Setting

Unit 7: Psychology in Organizational Setting

Unit 8: Adjustment to Family and Work Place

References:

1. Charles G.Morris. Albert A. Maisto Psychology an Introduction , Prentice Hall. New Jersey.
2. Feldman, A. R., Understanding Psychology IV th Ed, 1996, McGraw Hill, New Delhi.
3. Morgan, King, Weisz & Schopler, Introduction to Psychology-V11 Ed, 1993, Tata McGraw Hill, New Delhi.
4. Ernest R Hilgard, Richard C Atkinson , Rita L Atkinson Introduction to Psychology Oxford Publication, New Delhi.

DEPARTMENT -INFORMATION TECHNOLOGY

ELMIT –02 E-Commerce (2 Credits)

Block 1: Fundamentals of E-commerce

Unit 1 : Introduction to E-commerce

What Is E-commerce? The Difference Between E-commerce and E-business, Technological Building Blocks Underlying E-commerce: the Internet, Web, and Mobile Platform, Major Trends in E-commerce, Unique Features of E-commerce Technology

Unit 2 : Types of E-commerce:

Business-to-Consumer (B2C) E-commerce, Business-to-Business (B2B) E-commerce. Consumer-to-Consumer (C2C) E-commerce, Mobile E-commerce (M-commerce), Social E-

commerce, Local E-commerce E-commerce: A Brief History, Understanding E-commerce: Organizing Themes, Academic Disciplines Concerned with E-commerce

Unit 3 : E-Commerce Infrastructure

The Internet, Technology Background , Internet – Key Technology concepts, TCP/IP, IP addresses, Domain names, DNS and URLs, Client Server Computing, Cloud computing model, Mobile platform

Unit 4 : Internet and Web

Hypertext, HTML, XML, Web servers and clients, Web browsers, Communication tools – E mail, messaging apps, online message boards, Internet Telephony

Block 2: Construction of E-commerce presence

Unit 5: E-commerce presence – Building an e-commerce idea, Systematic approach, Choosing software and hardware, E-commerce site tools

Unit 6: E-commerce security E-commerce System environment, Security threats, Technology solutions

Unit 7: E-commerce payment systems : Management policies, E-commerce payment systems, Electronic billing presentment and payment

Unit 8: E-commerce Business Strategies : E-commerce business models, Major B2C Business models, B2B Business models,

References:

1. Laudon, Kenneth C., and Carol Guercio Traver. *E-Commerce 2020-2021*. Pearson, 2020.
2. Laudon, Kenneth C., and Carol Guercio Traver. *E-commerce Essentials*. Pearson, 2014

DEPARTMENT - BOTANY

Plant Diversity and Human Welfare

Plant Diversity and its Scope Levels of biodiversity: Genetic, Species and Ecosystem; Agrobiodiversity and cultivated plant taxa and related wild taxa.

Values and uses of Biodiversity, Methodologies for valuation, Ethical and aesthetic values, Uses of plants; Ecosystem services.

Loss of Biodiversity Loss of biodiversity- causes and implications, Hot spots of biodiversity, extinction of species, projected scenario for biodiversity loss.

Management of Plant Biodiversity Organizations associated with biodiversity management, IUCN, UNEP, WWF, UNESCO, NBPGR; Methodology for execution;

Biodiversity legislation; Information management and communication.

Conservation of Biodiversity, Role of Plants in Relation to Human Welfare
Conservation of genetic, species and ecosystem diversity,

In situ and ex situ conservation strategies, India's biodiversity and its conservation Social approaches to conservation,

Biodiversity awareness programmes, Sustainable development.

Importance of forestry their utilization and commercial aspects; Avenue trees; Ornamental plants of India; Alcoholic beverages; Fruits and nuts; Wood and its uses; their commercial importance.

References

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
2. Singh, J.S., Singh, S.P. and Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
3. Reddy, K.V. and Veeraiah, S. (2010). Biodiversity and Plant Resources. Aavishkar publication, New Delhi.
4. Heywood, V. H. and Watson, R. T. (1995). Global biodiversity and Assessment. Cambridge University Press.

DEPARTMENT –FOOD AND NUTRITION SCIENCE

OEL-2: NUTRITIONAL MANAGEMENT IN DISASTER CONDITIONS

BLOCK- I: NATURAL / MANMADE DISASTERS

Unit-1: Emergency Situations-Famine, Drought, Flood, Earthquake, Cyclone, War, Civil and Political Emergencies.

Unit-2: Nutrition in Emergencies, Nutritional Problems and Communicable Diseases.

Unit-3: Feeding Programs during Emergencies.

Unit-4: Assessment and monitoring of Nutritional Status and relief measures during emergencies.

BLOCK- I: NUTRITIONAL RELIEF AND REHABILITATION

Unit-5: Assessment of Food needs in emergency situations, Food Distribution Strategy, Local food rehabilitation.

Unit-6: Special Foods/ Rations for Nutritional Relief, Organizations for Mass Feeding/ Food Distribution, and Supplementary Feeding.

Unit-7: Transportation, Storage, Feeding Centres, Sanitation, Hygiene and Identifying Reaching the Vulnerable Group.

Unit-8: Public Nutrition Approach to Tackle Nutritional and Health Problems in Emergencies, food security.

REFERENCES:

Jaspars, S. & Young, H. (1996), General Food Distribution in Emergencies: from Nutritional Needs to Political Priorities. Good Practice Review 3. 1996. Relief and Rehabilitation Network, Overseas Development Institute. London.

Young H., Jaspars S., Brown R., Frize J. & Khogali H (2001), Food Security and Assessments in Emergencies: A Livelihoods Approach. Humanitarian Practice Network, Overseas Development Institute. London

**I Semester, M.Sc. in Biotechnology Examination
May 2014Biomolecules**

Time: 3 Hours

Max. Marks: 80

Instruction: Answer all the sections.

Section A

Answer any **FOUR** questions from the following
= 20

4 × 5

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Section B

Answer any **THREE** questions from the following
10 = 30

3 ×

- 7.

8.

9.

10.

11.

Section C

Answer any **TWO** questions from the following
15 = 30

2 ×

12.

1. 13.

2. 14.

3. 15.