12(c). Syllabi of Core Courses in Statistics of B.Sc. Computer Applications (Model III) Programme

The Structure of the 6 Core Courses in Statistics offered for B.Sc. Computer Applications (Model III) Programme is as given under :

Semester	Course Type	Course Code with Title	Credits	Lecture Hours	
				Per Week	Total
1	CORE (CR)	ST1CRT01 - Descriptive Statistics	3	4	72
2	CORE (CR)	ST2CRT02 - Probability Theory	3	4	72
3	CORE (CR)	ST3CR03 - Probability Distributions	4	5	90
4	CORE (CR)	ST4CRT04 - Statistical Inference	4	5	90
5	CORE (CR)	ST4CRT05 - Sample Survey Designs	4	5	90
6	CORE (CR)	ST5CRT06 - Environmental Studies, Human Right and Design of Experiment	4	5	90

Core Course to B. Sc. Computer Applications Programme

Semester I - Course I

ST1CRT01 - DESCRIPTIVE STATISTICS

(Common to B. Sc. Mathematics, B.Sc. Physics and B. Sc. Computer Applications

Programme)

Hours per week - 4

Number of credits - 3

Module I:Different aspects of data, and its collection

Statistics as collected facts and figures, and as a science for extracting information from data. Concepts of a statistical population and sample. Different types of characteristics and data- qualitative and quantitative, cross-sectional and time-series, discrete and continuous, frequency and non-frequency. Different types of scale- nominal and ordinal, ratio and interval. Collection of data- census and sampling. Different types of random samples- simple random sample, systematic, stratified and cluster (description only).

(20L)

Module II :Central tendency and Dispersion

Averages- Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean and Weighted averages. Absolute Measures of dispersion- Range, Quartile Deviation, Mean Deviation and Standard Deviation. Combined mean and standard deviation, C.V, relative measures of dispersion, Ogives and Box plot.(problems based on the above topics)

(20L)

Module III :, Moments, Skewness and Kurtosis

Raw moments, central moments and their inter relation. Skewness- Pearson's, Bowly's and moment measures of skewness. Kurtosis- percentile and moment measure of kurtosis(problems based on the above topics). (15L)

Module IV : Index Numbers

Definition of Index Numbers. Price Index Numbers. Price Index Numbers as Simple (A. M.,G. M.)and Weighted averages (A. M.)of price relatives. Laspeyer's, Paasche's and Fisher's Index Numbers. Time-Reversal and Factor-Reversal tests. Cost of living index numbers-family budget

and aggregate expenditure methods. An introduction to Whole sale Price Index and Consumer Price Index.(problems based on the above topics)

(17L).

SCHEME OF QUESTION PAPER

(The number of questions from the four modules to be asked in the four parts of the question paper)

Use of non - programmable Calculator and Statistical tables allowed.

Part	Marks of each Question	No. of Questions				Total	Total Marks	To be answered	
		Module				Total		No. of Questions	Total Marks
		1	2	3	4				
A	2	3	3	3	3	12	24	10	20
B	5	3	2	2	2	9	45	6	30
C	15	0	1	1	2	4	60	2	30
Total Questions		7	6	6	6	25	129	18	80
Total Mark		36	31	31	31	129			

REFERENCES

1. Goon, A. M.,Gupta M. K. and Dasgupta,B(1986).Fundamentals of Statistics,Volume1, world press, Kolkota
2. Gupta, S. C. and Kapoor, V. K.(2002). Fundamentals of Mathematical Statistics, 11th edition, Sultan Chand and Sons.
3. Gupta, S. C. and Kapoor, V. K.(2007).Fundamentals of applied Statistics,SultanChandand Sons.

4. R.S.N. Pillai, Bagavathi(2010). STATISTICS- Theory and Practice, S.Chand publications.

5. Miller, I. and Miller, M.(2014). Mathematical Statistics, 8th edition, Pearson Education Inc.

6. Mood, A. M., Graybill, F.A. and Bose, F.A.(1974).Introduction to Theory of Statistics, Oxford and IBH publishers.

7. Medhi J.(2006). Statistical Methods, 2nd edition, New Age International Publishes.

8. Mukhopadhya, P. (1999). Applied Statistics, New central book agency private limited, Kolkata

9. Seemon, T.(2014). Basic Statistics.Narosa Publishing House

Note: The 5 marks for the Assignment component of Internal assessment

may be given for solving problems from the above syllabus, at least two assignment.

Core Course to B. Sc. Computer Applications Programme

Semester II - Course II

ST2CRT02 - PROBABILITY THEORY

(Common to B. Sc. Mathematics, B.Sc. Physics and B. Sc. Computer Applications

Programme)

Hours per week - 4

Number of credits - 3

Module I : Probability

Random experiments. Complement, union and intersection of events and their meaning. Mutually exclusive, equally likely and Independent events. Classical, Frequency and Axiomatic approaches to probability. Monotone property, Addition theorem (up to 3 events. Conditional probability. Multiplication theorem(up to 3 events). Independence of events.. Bayes' theorem.(problems based on the above topics)   (20L)

Module II : Probability Distribution of Univariate Random Variables

Concept of random variables. discrete and continuous random variables. Probability mass and density functions, and cumulative distribution functions. Evaluation of conditional and unconditional probabilities. Change of variables- methods of jacobian and cumulative distribution function (one variable case).(problems based on the above topics)

(17L)

Module III : Probability Distribution of Bivariate Random Variables

Concept of a two-component random vector. Bivariate probability mass and density functions. Marginal and conditional distributions. Independence of bivariate random variables.(problems based on the above topics).   (15L)

Module IV : Correlation and Regression

Bivariate data. types of correlation. scatter diagram. Karl Pearson's product- moment

And Spearman's rank correlation coefficients. regression equations- fitting of polynomial

equations of degree one and two ; exponential curve, power curve. Two type of regression

curves, Identification of regression equations. (problems based on the above topics)

(20L)

SCHEME OF QUESTION PAPER

(The number of questions from the four modules to be asked in the 3 parts of the question paper)

Use of non - programmable Calculator and Statistical tables allowed.

Part	Marks of each Question	No. of Questions					Total Marks	To be answered	
		Module				Total		No. of Questions	Total Marks
		1	2	3	4				
A	2	3	3	3	3	12	24	10	20
B	5	3	2	2	2	9	45	6	30
C	15	0	1	1	2	4	60	2	30
Total Questions		7	6	6	6	25	129	18	80
Total Mark		36	31	31	31	129			

REFERENCES

1. Gupta S. C. and Kapoor V. K.(2002). Fundamentals of Mathematical Statistics, 11th edition, Sultan Chand and Sons.

2. Hogg R. V., Mckean J. W., and Craig A. T.(2014) Introduction to Mathematical Statistics, 6th edition, Pearson Education Inc.

3. R.S.N. Pillai, Bagavathi(2010). STATISTICS- Theory and Practice, S.Chand publications.

4. Medhi J.(2006). Statistical Methods, 2nd edition, New Age International Publishes.

5. Miller, I. and Miller, M.(2014). Mathematical Statistics, 8th edition, Pearson Education Inc.

6. Mood, A. M., Graybill, F.A. and Bose, F.A.(1974).Introduction to Theory of Statistics, Oxford and IBH publishers.

7. Ross, S.(2003). A first comes in probability Pearson, Education Publishers, Delhi

Note: The 5 marks for the Assignment component of Internal assessment may be given for solving problems from the above syllabus, at least two assignment.

Core Course to B. Sc. Computer Applications Programme

Semester III - Course III

ST3CRT03 - PROBABILITY DISTRIBUTIONS

(Common to B. Sc. Mathematics, B.Sc. Physics and B. Sc. Computer Applications

Programme)

Hours per week - 5

Number of credits - 4

Module I : Mathematical Expectation

Expectation of random variables and their functions. Definition of - Raw moments, central moments and their interrelation, A.M, G.M, H.M, S.D, M.D., covariance, Pearson's correlation coefficient in terms of expectation.MGF and characteristic function and simple properties. Moments from mgf. (Problems based on these topics)

(20L)

Module 2 : Standard Probability Distributions

Uniform(discrete/continuous), Bernoulli, binomial, Poisson, geometric, hyper-geometric, exponential, gamma- one and two parameter(s),beta(type I and type II),- mean, variance, mgf, additive property, lack of memory property. Normal distribution with all properties.(Problems based on these topics). (25L)

Module 3 - Law of Large Numbers and Central Limit Theorem

Chebychev's inequality, Weak Law of Large Numbers- Bernoulli's and Chebychev's form. Central Limit Theorem(Lindberg- Levy form with proof).(Problems based on these topics).

(20L)

Module 4 - Sampling Distributions

Concept of sampling from a probability distribution .i.i.d. observations. Concept of sampling distributions, Statistic(s) and standard error(s). Mean and variance of sample mean when sampling is from a finite population. Sampling distribution of mean and variance from normal distribution. Chi-square, t, F distributions and statistics following these distributions. Relation among Normal, Chi-square, t and F distributions.(Problems based on these topics)

(25L)

SCHEME OF QUESTION PAPER

(The number of questions from the four modules to be asked in the 3 parts of the question paper)

Use of non - programmable Calculator and Statistical tables allowed.

Part	Marks of each Question	No. of Questions					Total Marks	To be answered	
		Module				Total		No. of Questions	Total Marks
		1	2	3	4				
A	2	3	3	3	3	12	24	10	20
B	5	3	2	2	2	9	45	6	30
C	15	0	1	1	2	4	60	2	30
Total Questions		7	6	6	6	25	129	18	80
Total Mark		36	31	31	31	129			

REFERENCES

1. Goon A. M., Gupta M. K., and Dasgupta B.(2005). Fundamentals of Statistics, Vol.II, 8th edition, World Press, Kolkatta.

2. Gupta S. C. and Kapoor V. K.(2002). Fundamentals of Mathematical Statistics, 11th edition, Sultan Chand and Sons.

3. Hogg R. V., Mckean J. W., and Craig A. T.(2014). Introduction to MathematicalStatistics, 6th edition, Pearson Education Inc.

4. R.S.N. Pillai, Bagavathi(2010). STATISTICS- Theory and Practice, S.Chand publications.

5. Miller, I. and Miller, M.(2014). Mathematical Statistics, 8th edition, Pearson EducationInc.

6. Medhi J.(2006). Statistical Methods, 2nd edition, New Age International Publishes.

Note: The 5 marks for the Assignment component of Internal assessment may be given for solving problems from the above syllabus, at least two assignment.

Core Course to B. Sc. Computer Applications Programme

Semester IV - Course IV

ST4CRT04 - STATISTICAL INFERENCE

(Common to B. Sc. Mathematics, B.Sc. Physics and B. Sc. Computer Applications

Programme)

Hours per week - 5

Number of credits - 4

Module I : Point Estimation

Concepts of Estimation, Estimators and Estimates. Point and interval estimation. Properties of good estimators- unbiasedness, efficiency, consistency and sufficiency. factorization theorem(statement). (problems based on these topics). (25L)

Module II : Methods of Estimation, Interval Estimation

Methods of moments, maximum likelihood. Invariance property of ML Estimators (without proof).minimum variance. Cramer-Rao inequality(statement only) $100(1-\alpha)\%$ confidence intervals for mean, variance and proportions(problems based on these topics).

(20L)

Module III : Testing of Hypotheses, Large Sample Tests

Statistical hypotheses, null and alternate hypotheses, simple and composite hypotheses, type-I and type-II errors. Critical Region. Size and power of a test, p-value, Neyman-Pearson approach. Large sample tests - z-tests for means, difference of means, proportion and difference of proportion, chi-square tests for independence, homogeneity.

(25L)

Module IV : Small Sample Tests

Normal tests for mean, difference of means and proportion (when σ known), t-tests for mean and difference of means (when σ unknown), paired t-test, test for proportion(binomial), chi-square test, F-test for ratio of variances. (derivation not required)

(20L)

SCHEME OF QUESTION PAPER

(The number of questions from the four modules to be asked in the four parts of the

question paper)

Use of non - programmable Calculator and Statistical tables allowed.

Part	Marks of each Question	No. of Questions					Total Marks	To be answered	
		Module				Total		No. of Questions	Total Marks
		1	2	3	4				
A	4	3	4	2	1	10	40	6	24
B	6	3	2	3	2	10	60	6	36
C	10	0	1	1	2	4	40	2	20
Total Questions		6	7	6	5	24	140	14	80
Total Mark		30	38	36	36	140			

REFERENCES

1. Goon A. M., Gupta M. K., and Dasgupta B.(2005). Fundamentals of Statistics, Vol. I, 8th edition, World Press, Kolkatta.

2. Gupta S. C. and Kapoor V. K.(2002). Fundamentals of Mathematical Statistics, 11th edition, Sultan Chand and Sons.

3. Hogg R. V., Mckean J. W., and Craig A. T.(2014). Introduction to Mathematical Statistics, 6th edition, Pearson Education Inc.

4. R.S.N. Pillai, Bagavathi(2010). STATISTICS- Theory and Practice, S.Chand publications.

5. Miller, I. and Miller, M.(2014). Mathematical Statistics, 8th edition, Pearson EducationInc.

6. Medhi J.(2006). Statistical Methods, 2nd edition, New Age International Publishes.

Note: The 5 marks for the Assignment component of Internal assessment may be given for a mini group project using real life data (primary or secondary). This gives the students an opportunity to understand the application of the statistical Techniques they studied.

Core Course to B. Sc. Computer Applications Programme

Semester IV - Course V

ST4CRT05 - SAMPLE SURVEY DESIGNS

Hours per week - 5

Number of credits - 4

Module I:Basic Concepts-Census and sampling, types of sampling – probability and non-probability sampling, advantages and disadvantages, principal steps in a sample survey, sampling and non-sampling errors, organizational aspects of sample survey.

Indian Official Statistics-Methods of collection of official Statistics. Role of Ministry of Statistics &Programme Implementation (MOSPI), Central Statistical Office (CSO), National Sample Survey Office (NSSO) and National Statistical Commission (NSC).Government of India's principal publications containing data on the topics such as population, industry and finance.

Module II: Simple Random Sampling-Simple random sampling with and without replacement, procedures of selecting a sample, unbiased estimates of the population mean and population total-their variances and estimates of the variances, confidence interval for population mean and total, simple random sampling for attributes, determination of the sample size based on desired accuracy for variables and attributes.

Module III: Stratified Random Sampling-Estimation of the population mean and population total-their variances and estimates of the variances, proportional allocation and Neyman allocation of sample sizes, cost function – optimum allocation, comparison with simple random sampling.

Module IV: Systematic and Cluster Sampling- Linear and circular systematic sampling, estimates of the population mean and population total, comparison of systematic sampling with simple random sampling. Cluster sampling – clusters with equal sizes –estimation of population mean and total – their variances and estimates of the variances.

Books for Study

1. Gupta,S.C. and. Kapoor,V.K .(2014).*Fundamentals of Applied Statistics*, Sultan Chand & Co. New Delhi.

2. Cochran, W.G. (2007).*Sampling Techniques*, (3rd ed.),John Wiley and Sons.

3. http://mospi.nic.in

References

1. Singh,D. andChoudhary,F.S.(2013)*Theory and Analysis of sample survey Designs*, New Age International Publishers.

2. Mukhopadhyay, P. (2008). *Theory and Methods of Survey Sampling*, (2[nd]ed.) Prentice-Hall of India.

3. Sampath,S.(2005).*Sampling Theory and Methods*,(2nd ed.),Alpha Science International Limited.

SCHEME OF QUESTION PAPER

Use of non-programmable calculator and statistical tables allowed

Part	Marks of each Question	No. of Questions					Total Marks	To be answered	
		Module				Total		No. of Questions	Total Marks
		1	2	3	4				
A	2	3	3	3	3	12	24	10	20
B	5	3	2	2	2	9	45	6	30
C	15	1	1	1	1	4	60	2	30
Total Questions		7	6	6	6	25	129	18	80
Total Mark		36	31	31	31	129			

Core Course to B. Sc. Computer Applications Programme

Semester V - Course VI

ST5CRT06–ENVIRONMENTAL STUDIES, HUMAN RIGHTS AND DESIGN OF EXPERIMENTS

Hours per week – 5

Number of credits -4

The importance of environmental science and environmental studies cannot be disputed. The need for sustainable development is a key to the future of mankind. Continuing problems of pollution, solid waste disposal, degradation of environment, issues like economic productivity and national security, Global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues. The United Nations Conference on Environment and Development held in Rio de Janerio in 1992 and World Summit on Sustainable Development at Johannesburg in 2002 have drawn the attention of people around the globe to the deteriorating condition of our environment. It is clear that no citizen of the earth can afford to be ignorant of environment issues..

India is rich in biodiversity which provides various resources for people. Only about 1.7 million living organisms have been described and named globally. Still many more remain to be identified and described. Attempts are made to conserve them in ex-situ and in-situ situations. Intellectual property rights (IPRs) have become important in a biodiversity-rich country like India to protect microbes, plants and animals that have useful genetic properties. Destruction of habitats, over-use of energy resource and environmental pollution have been found to be responsible for the loss of a large number of life-forms. It is feared that a large proportion of life on earth may get wiped out in the near future.

In spite of the deteriorating status of the environment, study of environment have so far not received adequate attention in our academic programme. Recognizing this, the Hon'ble Supreme Court directed the UGC to introduce a basic course on environment at every level in college education. Accordingly, the matter was considered by UGC and it was decided that a six months compulsory core module course in environmental studies may be prepared and compulsorily implemented in all the University/Colleges of India.

The syllabus of environmental studies includes five modules including human rights. The first two modules are purely environmental studies according to the UGC directions. The second two modules are strictly related with the core subject and fifth module is for human rights.

Objectives

- Environmental Education encourages students to research, investigate how and why things happen, and make their own decisions about complex environmental issues by developing and

enhancing critical and creative thinking skills. It helps to foster a new generation of informed consumers, workers, as well as policy or decision makers.

- Environmental Education helps students to understand how their decisions and actions affect the environment, builds knowledge and skills necessary to address complex environmental issues, as well as ways we can take action to keep our environment healthy and sustainable for the future. It encourages character building, and develop positive attitudes and values.

- To develop the sense of awareness among the students about the environment and its various problems and to help the students in realizing the inter-relationship between man and environment and helps to protect the nature and natural resources.

To help the students in acquiring the basic knowledge about environment and the social norms that provide unity with environmental characteristics and create positive attitude about the environment.

Module I:

Unit 1 :Multidisciplinary nature of environmental studies

Definition, scope and importance   **(2 L)**
Need for public awareness.

Unit 2 : Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a) **Forest resources** : Use and over-exploitation, deforestation, case studies.

Timber extraction, mining, dams and their effects on forest and tribal people.

b) **Water resources** : Use and over-utilization of surface and ground water,

floods, drought, conflicts over water, dams-benefits and problems.

c) **Mineral resources** : Use and exploitation, environmental effects of extracting

and using mineral resources, case studies.

d) **Food resources** : World food problems, changes caused by agriculture and

overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water

logging, salinity, case studies.

e) **Energy resources**: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.

f) **Land resources**: Land as a resource, land degradation, man induced landslides, soil erosion and desertification

- Role of individual in conservation of natural resources.
- Equitable use of resources for sustainable life styles.   (**10 L**)

Unit 3: Ecosystems

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem

(**6 L**)

Module II:

Unit 1: Biodiversity and its conservation

- Introduction
- Biogeograhical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- India as a mega-diversity nation
- Hot-sports of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered and endemic species of India

(**8 L**)

Unit 2: Environmental Pollution

Definition

Causes, effects and control measures of: -

h.   Air pollution
i.   Water pollution
j.   Soil pollution
k.   Marine pollution
l.   Noise pollution
m.   Thermal pollution
n.   Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.   (**8 L**)

Unit 3:   Social Issues and the Environment

- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people: its problems and concerns, Case studies
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies
- Consumerism and waste products
- Environment Protection Act
- Air (Prevention and Control of Pollution) Act
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness   (**10 L**)

Module III: Principle of Experimentation, Linear Estimation. Estimability of parametric functions, BLUE, Gauss-Markov Theorem (without Proof), Testing of Linear Hypothesis, ANOVA of one-way classified data, ANOVA of two-way classified data with multiple and equal number of observation per cell.

(20L)

Module IV: Layout and Analysis of the basic designs CRD, RBD and LSD. Missing plot Techniques, Relative Efficiency of Designs**.**

(13L)

Module V:

Unit 1- Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

Unit-2 Human Rights and United Nations – contributions, main human rights related organs- UNESCO,UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights.

Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities

Unit-3 Environment and Human Rights - Right to Clean Environment and Public   Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment

Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthurirengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc.

(8 L)

Internal: Field study

- Visit to a local area to document environmental grassland/ hill /mountain
- Visit a local polluted site – Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds etc
- Study of simple ecosystem-pond, river, hill slopes, etc

(Field work Equal to 5 lecture hours)

Books for study

1. Bharucha, E. (2010). *Text Book for Environmental studies for undergraduate Courses*, University Grants Commission, New Delhi.
2. M.N.Das and N.C.Giri(1986). *Design and Analysis of Experiment*. Wiley Eastern Limited.

3. D.D.Joshi (1987): *Linear Estimation and Design of Experiment*, Wiley Eastern Limited.

4. Amartya Sen, The Idea Justice, New Delhi: Penguin Books, 2009.

5. Chatrath, K. J.S., (ed.), Education for Human Rights and Democracy (Shimla: Indian Institute of Advanced Studies, 1998)

References

1. Agarwal, K. C. (2001). *Environmental Biology,* Nidi Publishers Ltd, Bikaner.

2. Gupta, S.C. and. Kapoor, V.K .(2014). *Fundamentals of Applied Statistics*, Sultan Chand & Co. New Delhi.

3. Clark.R.S., Marine Pollution, Clanderson Press Oxford (Ref)

4. Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001 Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p .(Ref)

5. Dc A.K.Enviornmental Chemistry, Wiley Eastern Ltd.(Ref)

6. Down to Earth, Centre for Science and Environment (Ref)

7. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)

8. Jadhav.H & Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p (Ref)

9. Mekinney, M.L & Schock.R.M. 1996 Environmental Science Systems & Solutions. Web enhanced edition 639p (Ref)

10. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)

11. Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)

12. Rao.M.N & Datta.A.K. 1987 Waste Water treatment Oxford & IBII Publication Co.Pvt.Ltd.345p (Ref)

13. Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University Press, Published: 2016 (TB)

14. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut (Ref)

15. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (Ref)

16. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards, Vol I and II, Enviro Media (Ref)

17. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (Ref)

18. Law Relating to Human Rights, Asia Law House,2001.

19. Shireesh Pal Singh, Human Rights Education in 21st Century, Discovery Publishing House Pvt.Ltd, New Delhi,

20. S.K.Khanna, Children And The Human Rights, Common Wealth Publishers,1998. 2011.

21. Sudhir Kapoor, Human Rights in 21st Century,Mangal Deep Publications, Jaipur,2001.

22. United Nations Development Programme, Human Development Report 2004: Cultural Liberty in Today's Diverse World, New Delhi: Oxford University Press, 2004.

SCHEME OF QUESTION PAPER

Use of non-programmable calculator and statistical tables allowed

Part	Marks of each Question	No. of Questions					Total	Total Marks	To be answered	
		Module							No. of Questions	Total Marks
		1	2	3	4	5				
A	2	2	2	4	3	1	12	24	10	20
B	5	1	2	3	2	1	9	45	6	30
C	15	1	1	1	1	0	4	60	2	30
Total Questions		4	5	8	6	2	25	129	18	80
Total Mark		24	29	38	31	7	129			

Core Course of B. Sc. Statistics Programme

Semester VI-Core Course XII

ST6CRT12 -STATISTICAL COMPUTING USING R SOFTWARE

Hours per week – 5
Number of credits -4

This course is intended to give the students a first-hand training on writing and run the R-code for the computation of various statistical tools and drawing of different charts, graphs and diagrams. This may be practiced in a computing laboratory. No external examiner is needed for conducting the end semester examinations, but may be conducted in a computing laboratory, where computers with softwares and Statistical Tables available.

Module I: - Descriptive Statistics Using R– Diagrammatic and Graphical representation of data – bar diagram, histogram, pie diagram, box plot, Q-Q plot, the plot function and curve function; Measures of central tendency, Measures of dispersion, Measures of skewness and Kurtosis, Selection of representative samples, Scatter diagram.

(25L)

Module II: Probability Distributions Using R – Probability distributions, some special discrete distributions (Binomial, Poisson), Continuous probability distribution, some special continuous distributions (Normal, exponential); Methods for generating random variables– Introduction, random generation of standard uniform, standard normal and other common probability distributions in R, the inverse transform method, quantiles, transformation methods.

(25L)

Module III: **Correlation and Regression Analysis** – Correlation, inference procedures for correlation coefficient, linear regression, the coefficient of determination, inference procedures for simple linear model.

(20L)

Module IV: Statistical Inference (R Commands and implementation only) Obtaining MLE using available data, confidence intervals for mean, difference of means, variance and proportion, hypothesis testing – the p-value –definition and interpretation, Tests for mean: Z-test, Z test for comparing means, one sample t-test, two sample t-test, paired t-test, χ^2-test for variance, F- test for comparing variances, χ^2- test of Goodness of fit, χ^2-test for independence , χ^2-test for homogeneity, one way ANOVA and two way ANOVA.

(20L)

Book for study
1. Purohit, S.G, Gore, S.D and Deshmukh, S.R. (2015).*Statistics Using R*, (2nd ed.), Narosa Publishing House.

References
1. Zuur, A.F, Leno, E.N.andMeesters, E.H.W.G. (2009): *Use R*, Springer.
2. Rizzo, M.L. (2007).*Statistical Computing with R*, Chapman and Hall/CRC.
3. Dalgaard,P. (2008).*Introductory Statistics with R*, Springer.

SCHEME OF QUESTION PAPER

For this course 5 questions are to be answered from a set of 8 questions each carrying 16 marks.
Two questions from each module are included in the question paper.
Computers with R software and Statistical tables allowed

First Semester

MM1CRT01: Foundation of Mathematics

4 hours/week (Total Hours: 72)   **3 credits**

Brief Description of the Course

This course introduces the concepts of mathematical logic methods of proofs, sets, functions, relations and partial orderings. A brief introduction of theory of Equations is also included. These topics are foundations of most areas of modern mathematics and are applied frequently in the succeeding semesters.

Syllabus

Text Books:

1. K.H. Rosen: Discrete Mathematics and its Applications (Sixth edition), Tata McGraw Hill Publishing Company, New Delhi.
2. S. Bernard and J.M Child: Higher Algebra, AITBS Publishers, India,2009

Module 1: Basic Logic   **(20 hours)**

Propositional logic, Propositional equivalences, Predicates and quantifiers, Rules of inference, Introduction to proofs.

 Text 1: Chapter – 1excluding sections 1.4 & 1.7

Module 2: Set theory   **(12 hours)**

Sets, set operations, functions

Text 1: Chapter – 2 excluding section 2.4

Module 3: Relations   **(20hours)**

 Relations and their properties, representing relations, equivalence relations, partial orderings.

(Text 1: Chapter 7 excluding Sections 7.2 & 7.4)

Module 4: Theory of Equations   **(20 hours)**

Roots of Equations, Relation Connecting the roots and coefficients of an equation, Transformation of equations, Special Cases, The Cubic equation, The Biquadratic Equation, Character and Position of the Roots of an Equation, Some General Theorems, Descartes's Rule of Signs, Corollaries, Reciprocal Equations

Text 2: Chapter VI Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, Chapter XI Section 1

References:

1. Lipschutz: Set Theory and related topics (Second Edition), Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi. (Reprint 2009).

2. P.R. Halmos :   Naive Set Theory, Springer.

3. Ian Chiswell&Wifrid Hodges: Mathematical Logic, Oxford university press

4. Richard Johnsonbaugh; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt. Ltd

5. Clifford Stien, Robert L Drysdale, KennethBogart ; Discrete Mathematics for Computer Scientists; Pearson Education; Dorling Kindersley India Pvt. Ltd

6. Kenneth A Ross; Charles R.B. Wright ; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt. Ltd

7. Ralph P. Grimaldi, B.V.Ramana; Discrete And Combinatorial Mathematics ; Pearson Education; Dorling Kindersley India Pvt. Ltd

8. Winfried Karl Grassman, Jean-Paul Tremblay; Logic And Discrete Mathematics A Computer Science Perspective ; Pearson Education; Dorling Kindersley India Pvt. Ltd

9. Lipschutz:Set Theory And Related Topics (2ndEdition), SchaumOutlineSeries, Tata McGraw-Hill Publishing Company, New Delhi

10. H.S.Hall, S.R. Knight: Higher Algebra, Surjit Publications, Delhi.

Question Paper Pattern

Module	Part A (2 marks)	Part B (5 marks)	Part C (15 marks)	Total
I	3	2 or 3	1	7 or 6
II	3	2	0.5	5.5
III	3	2	1.5	6.5
IV	3	2 or 3	1	6 or 7
Total no. of questions	12	9	4	25
No. of questions to be answered	10	6	2	18
Total marks	20	30	30	80

B.Sc. DEGREE PROGRAMME MATHEMATICS (UGCBCS2017)
SECOND SEMESTER
MM2CRT01: ANALYTIC GEOMETRY, TRIGONOMETRY AND
DIFFERENTIAL CALCULUS

4 hours/week (Total Hours : 72)   **3 credits**

Text books:

1. **Manicavachagom Pillay, Natarajan : Analytic Geometry (Part I Two Dimensions)**

2. **S.L.Loney : Plane Trigonometry Part II , S.Chand and Company Ltd**

3. **Shanti Narayan , P.K.Mittal : Differential Calculus , S.Chand and Company**

MODULE I: Conic Sections   **(22 hrs)**

Tangent and Normals of a Conic (Cartesian and Parametric form), Orthoptic Locus, Chords in terms of given points, Pole and Polar and Conjugate diameters of Ellipse.

Relevant Sections of Text 1

MODULE II: Polar Co-ordinates   **(15 hrs)**

Polar Co-ordinates, Polar Equation of a line , Polar Equation of Circle, Polar Equation of Conic , Polar Equations of tangents and Normals , Chords of Conic Sections.

Relevant Sections of Text 1

MODULE III:Trigonometry   **(17 hrs)**

Circular and Hyperbolic functions of complex variables, Separation of functions of complex variables into real and imaginary parts, Factorization of $x^n - 1, x^n + 1$, $x^{2n} - 2x^n a^n \cos n\theta + a^{2n}$ and Summation of infinite Series by $C + iS$ method

Relevant Sections of Text 2 Chapter ─ V, VI, VIII, IX.

Module IV: Differential Calculus   **(18 hrs)**

Successive Differentiation and Indeterminate forms

Text 3: Chapter 5 and Chapter 10

References:

1. S. K. Stein : Calculus And Analytic Geometry, McGraw Hill

2. P. K. Jain , Khalil Ahmad : Analytic Geometry of Two Dimensions ,(2ndEdition) New AgeInternational (P) Limited Publishers

3. Thomas and Finney : Calculus and Analytic Geometry , Addison Wesley

QUESTON PAPER PATTERN

Module	Part A 2 Marks	Part B 5 Marks	Part C 15 Marks	Total
I	4	2	1	7
II	2	1	1	4
III	3	3	1	7
IV	3	3	1	7
Total No. of Questions	12	9	4	25
No. of Questions to be answered	10	6	2	18
Total Marks	20	30	30	80

B. Sc DEGREE PROGRAMME MATHEMATICS (UGCBCS 2017)
THIRD SEMESTER
MM3CRT01: CALCULUS

5 hours/week (Total Hours: 90)   **4 credits**

Syllabus

Text Books:

1. **Shanti Narayan, P.K.Mittal: Differential Calculus , SChand and Company**

2. **George B Thomas Jr: Thomas' Calculus (12thEdition), Pearson.**

Module I: Differential Calculus   **(27 hrs)**
Expansion of functions using Maclaurin's theorem and Taylor's theorem, Concavity and points of inflexion. Curvature and Evolutes. Length of arc as a function derivatives of arc, radius of curvature - Cartesian equations only. (Parametric, Polar, Pedal equation and Newtonian Method are excluded) Centre of curvature, Evolutes and Involutes, properties of evolutes. Asymptotes and Envelopes.
Text 1: Chapter 6, Chapter 13, Chapter 14 , Chapter 15 (Section 15.1 to 15.4 only), Chapter 18 (Section 18.1 to 18.8 only).

Module II: Partial Differentiation   **(18 hrs)**

Partial derivatives, The Chain rule, Extreme values and saddle points, Lagrange multipliers.

Text 2 Chapter 14 (Sections 14.3, 14.4, 14.7 and 14.8 only) All other sections are excluded

Module III: Integral Calculus   **(20 hrs)**
Volumes using Cross-sections, Volumes using cylindrical shells, Arc lengths, Areas of surfaces of Revolution.

Text 2: Chapter 6 (Section 6.1 to 6.4 only (Pappus Theorem excluded)

Module IV: Multiple Integrals   **(25 hrs)**
Double and iterated integrals over rectangles, Double integrals over general regions, Area by double integration, Triple integrals in rectangular coordinates, Triple integrals in cylindrical and spherical coordinates, Substitutions in multiple integrals.

Text 2: Chapter 15 (Sections 15.4 and 15.6 are excluded)

References

1. T.M Apostol- Calculus Volume I & II(Wiley India)

2. Widder-Advanced Calculus, 2nd edition

3. K.C. Maity& R.K Ghosh- Differential Calculus(New Central Books Agency)

4. K.C. Maity& R.K Ghosh- Integral Calculus(New Central Books Agency)

5. Shanti Narayan, P.K. Mittal- Integral Calculus- (S. Chand & Co.)

6. Howard Anton et. Al. Calculus, Seventh Edition, John Wiley

QUESTION PAPER PATTERN

Module	Part A 2 Marks	Part B 5 Marks	Part C 15 Marks	Total
I	4	2	1	7
II	3	2	1	6
III	3	2	1	6
IV	2	3	1	6
Total number of questions	12	9	4	25
No. of Questions to be answered	10	6	2	18
Total Marks	20	30	30	80

B. Sc DEGREE PROGRAMME MATHEMATICS (UG CBCS 2017)
FOURTH SEMESTER
MM4CRT01 : VECTOR CALCULUS, THEORY OF NUMBERS AND LAPLACE TRANSFORM

5 hours/week(Total Hours : 90)   **4 credits**

Syllabus
Text Books:
1. Thomas Jr., Weir M.D, Hass J.R – Thomas' Calculus (12th Edition) Pearson, 2008.
2. David M Burton - Elementary Number Theory, 7th Edition,McGraw Hill Education(India) Private Ltd.
3. Erwin Kreyszig : Advanced Engineering Mathematics, Ninth Edition, Wiley, India.

Module I: Vector Differentiation   **(25 hrs)**
(A quick review of vectors), A vector equation and Parametric equations for lines and equation for a plane in space only (the distance from a point to a line and a plane and angle between planes are excluded) Vector functions, Arc length and Unit tangent vector, Curvature and the Unit normal vector, Tangential and Normal Components of Acceleration, Directional derivatives and Gradient vectors, tangent planes and Normal lines only.

Relevant sections from 12.5, 13.1, 13.3, 13.4, 13.5, 14.5, 14.6 (tangent planes and normal lines only) of Text 1

Module II: Vector Integration   **(30 hrs)**
Line integrals, Vector fields and line integrals: Work, Circulation and Flux, Path Independence, Conservative Fields and Potential Functions (Proofs of theorems excluded), Green's theorem in the plane (Statement and problems only), Surfaces and Area: Parameterisations of surfaces, Implicit surfaces, Surface integrals, Stokes' theorem (Statement and simple Problems only), Divergence theorem only (Statement and Problems only) Gauss' law onwards are excluded.

Sections 16.1 to 16.6 and relevant portions from 16.7 & 16.8 of Text 1

Module III: Theory of Numbers   **(15 hrs)**
Basic properties of congruence, Fermat's theorem, Wilson's theorem, Euler's phi function.

Text 2 : Chapter 4: section 4.2, Chapter 5: sections 5.2, 5.3 and Chapter 7: section 7.2.

Module IV: Laplace transforms   **(20 hrs)**
Laplace transform, Linearity of Laplace transform, First shifting theorem, Existence of Laplace

transform, Transforms of derivatives, Solution of ordinary differential equation & initial value problem, Laplace transform of the integral of a function, Convolution and Integral equations.

Text 3 (Sections 6.1, 6.2 and 6.5)

References
1. Anton, Bivens and Davis, Calculus (10th Edition) International Student Version, John Wiley & sons 2015
2. David M. Burton, Elementary Number Theory (7th Edition), Mc Graw Hill Education
3. H.F. Davis and A.D. Snider: Introduction to Vector Analysis, 6th ed., Universal Book Stall, New Delhi.
4. Shanti Narayan, P.K Mittal – Vector Calculus (S. Chand)
5. Merle C. Potter, J. L. Goldberg, E. F. Aboufadel – Advanced Engineering Mathematics (Oxford)
6. Ghosh, Maity – Vector Analysis (New Central books)

QUESTON PAPER PATTERN

Module	Part A 2 Marks	Part B 5 Marks	Part C 15 Marks	Total
I	3	2	1 or 2	6 or 7
II	3	3	1 or 2	7 or 8
III	3	2	1	6
IV	3	2	1	6
Total No. of Questions	12	9	4	25
No. of Questions to be answered	10	6	2	18
Total Marks	20	30	30	80

B. Sc DEGREE PROGRAMME MATHEMATICS (UGCBCS 2017)

FIFTH SEMESTER

MM5CRT01 : MATHEMATICAL ANALYSIS

6 Hrs/Week (Total Hours : 108)   **4 Credits**

SYLLABUS

Text Book : Introduction to Real Analysis – Robert G Bartle and Donald R Sherbert (3rd Edition) John Wiley & Sons, In. 2007

MODULE I: REAL NUMBERS   **30 hours**
Finite and Infinite Sets, The Algebraic and Order Properties of R, Absolute Value and Real Line, The Completeness Property of R, Applications of the Supremum Property, Intervals.

Chapter 1: Section 1.3 and Chapter 2 : Sections 2.1, 2.2,2.3,2.4,2.5

MODULE II: SEQUENCES   **30 hours**
Sequences and their Limits, Limit Theorems, Monotone Sequences, Subsequences and the Bolzano- Weierstrass Theorem, The Cauchy Criterion, Properly Divergent Sequences.

Chapter 3 : Sections 3.1,3.2,3.3,3.4, 3.5,3.6

MODULE III: SERIES   **24 hours**
Introduction to Series, Absolute Convergence, Tests for Absolute convergence, Tests for nonabsoute Convergence

Chapter 3 : Section 3.7, Chapter 9 : Sections 9.1,9.2,9.3

MODULE IV: LIMITS   **24 hours**
Limits of Functions, Limit Theorems, Some Extensions of the Limit Concept.

Chapter 4 : Sections 4.1,4.2,4.3

References:
1. Richard R Goldberg - Methods of real Analysis, 3rd edition , Oxford and IBM Publishing Company (1964)
2. Shanti Narayan - A Course of Mathematical Analysis, S Chand and Co. Ltd (2004)
3. Elias Zako - Mathematical Analysis Vol 1, Overseas Press, New Delhi (2006)
4. J.M Howie - Real Analysis, Springer 2007.
5. K.A Ross- Elementary - Real Analysis, Springer, Indian Reprints.
6. S.C Malik, Savitha Arora - Mathematical Analysis, Revised Second Edition

QUESTION PAPER PATTERN

Module	Part A 2 Marks	Part B 5 Marks	Part C 15 Marks	Total
1	3	2	1	6
2	3	3	1	7
3	3	2	1	6
4	3	2	1	6
Total number of questions	12	9	4	25
Total number of questions to be answered	10	6	2	18
Total	20	30	30	80

B.Sc DEGREE PROGRAMME(UGCBCSS2017)
MATHEMATICS (CORE COURSE 6)
FIFTH SEMESTER
M5CRT02 DIFFERENTIAL EQUATIONS

6 hours/week (Total: 108 hours)   **4 credits**
Syllabus

Text Book:

1. **G.F. Simmons, S.G. Krantz - Differential Equations, (Tata McGraw Hill-New Delhi).**
   (Walter Rudin Student Series)
2. **Ian Sneddon – Elements of Partial Differential Equation (Tata Mc Graw Hill)**

Module I What is a differential equation(26 hrs.)
        The nature of solutions, Separable equations, First order linear equations, Exact equations, Orthogonal trajectories and families of curves, Homogeneous equations, Integrating factors, Reduction of order-dependent variable missing-independent variable missing

        Text 1. Chapter 1 (Sections 1.2 to 1.9)

Module II Second order linear equations(26 hrs.)
        Second order linear equations with constant coefficients (which includes Euler's equidimensional equations given as exercise 5 in page 63 of Text 1), The method of undetermined coefficients, The method of variation of parameters, The use of a known solution to find another, Higher order linear equations

        Text 1. Chapter 2 (Sections 2.1, 2.2, 2.3, 2.4, 2.7 (example 2.17 is excluded))

Module III Power Series solutions and special functions(26 hrs.)
        Introduction and review of power series,Series solutions of first order differential equations, Second order linear equations: ordinary points (specially note Legendre's equations given as example 4.7), Regular singular points, More on regular singular points.

        Text 1. Chapter 4 (Sections4.1 4.2, 4.3, 4.4, 4.5)

Method IV Partial Differential equations (30 hrs.)

        Methods of solution of $\dfrac{dx}{P} = \dfrac{dy}{Q} = \dfrac{dz}{R}$, Origin of first order partial differential equations,

Linear equations of the first order , Lagrange's method(proof of theorem 2 and theorem 3 are excluded)Integral surfaces passing through a given curve
    Text 2. Chapter 1 (Section 3)
            Chapter 2 (Section 1, 2 and section 4 (no proof of theorem 2 and theorem 3)
    and section5)
Reference:
1.   **Shepley L. Ross - Differential Equations, 3rd ed., (Wiley India).**
2.   **A.H.Siddiqi& P. Manchanda – A First Course in Differential Equation with Applications (Macmillian)**

3. **G.F. Simmons – Differential equation with applications and historical notes 2ndEdn (Tata McGraw Hill)**
4. **E.A. Coddington- An Introduction to Ordinary Differential Equation, PHI.**
5. **Zafar Ahsan - Differential Equations and their Applications, 2nd edition, PHI**

QUESTON PAPER PATTERN

Module	Part A 2 Mark	Part B 5 Marks	Part C 15Marks	Total
I	3	4	1	**8**
II	4	2	1	**7**
III	2	2	1	**5**
IV	3	1	1	**5**
Total No. of Questions	**12**	**9**	**4**	**25**
No. Questions to be answered	**10**	**6**	**2**	**18**
Total Marks	**20**	**30**	**30**	**80**

B. Sc DEGREE PROGRAMME MATHEMATICS (UGCBCS 2017)

SIXTH SEMESTER

MM6CRT01 : REAL ANALYSIS

5 Hrs/Week (Total Hours : 90)   **4 Credits**

SYLLABUS

Text Book : Introduction to Real Analysis – Robert G Bartle and Donald R Sherbert (3rd Edition) John Wiley & Sons, In

MODULE I: CONTINUOUS FUNCTIONS   **30 hours**
Continuous Functions, Combinations of Continuous Functions, Continuous Functions on Intervals, Uniform continuity, Monotone and Inverse Functions.

Chapter 5: Sections 5.1,5.2,5.3,5.4,5.6

MODULE II: DIFFERENTIATION   **30 hours**
The Derivative, The Mean Value Theorem, L' Hospital Rules, Taylor's Theorem

Chapter 6: Sections 6.1,6.2,6.3,6.4

MODULE III: THE REIMANN INTEGRAL   **24 hours**
The Riemann Integral, Riemann Integrable Functions, The Fundamental Theorem

Chapter 7: Sections 7.1,7.2,7.3

MODULE IV: SEQUENCES AND SERIES OF FUNCTIONS   **24 hours**
Point wise and Uniform Convergence, Interchange of Limits, Series of Functions.

Chapter 8: Sections 8.1,8.2,   Chapter 9: Section 9.4

References:
1. Richard R Goldberg - Methods of real Analysis, 3rd edition , Oxford and IBM Publishing Company (1964)
2. Shanti Narayan - A Course of Mathematical Analysis, S Chand and Co. Ltd (2004)
3. Elias Zako - Mathematical Analysis Vol 1, Overseas Press, New Delhi (2006)
4. J.M Howie - Real Analysis, Springer 2007.
5. K.A Ross- Elementary - Real Analysis, Springer, Indian Reprints.
6. S.C Malik, Savitha Arora - Mathematical Analysis, Revised Second Edition

QUESTON PAPER PATTERN

Module	Part A (2 marks)	Part B (5 marks)	Part C (15 marks)	Total
I	3	2	1	6
II	3	3	1	7
III	3	2	1	6
IV	3	2	1	6
Total No. of Questions	12	9	4	25
No. of questions to be answered	10	6	2	18
Total Marks	20	30	30	80

SEMESTER I

CA1CRT01 : Computer fundamentals and digital principles (Core)

Unit-1:

Introduction: Functional units of a computer system, Different types of computers, Computer Software and Hardware, Types of software-System software and Application programme. Characteristic of computers. Input Devices – Keyboard, Mouse, Optical input devices, Output devices – Monitors and Printers.

Unit-2:

Introduction to Operating Systems and Networking: Definition of an Operating System - Different types of PC Operating Systems. Computer Networks- categories of networks - LAN, WAN,MAN. The Internet - Working of Internet - Major Features of Internet.

Unit 3:

Number Systems: Base or radix ,Positional number system, Popular number systems(Decimal, Binary, Octal and Hexadecimal), Conversion-From one number system to another, Concept of binary addition and subtraction, Complements in binary number systems,1^sComplement, 2^sComplement and their applications, Signed magnitude form, BCD numbers- concept and addition.

Unit 4:

Boolean Algebra and Gate Networks: Logic gates- AND, OR, NOT, NAND and NOR Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgans theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Dont care conditions, XOR and its applications, parity generator and checker.

Unit 5:-

Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave , Adders-Half adder, Full adder(need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers(working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle), : Concept of Registers, Shift Registers

Books of study :

1. Peter Nortons- Introduction to Computers, Sixth Edition, Published by Tata McGraw Hill

2. P K Sinha & Priti Sinha - Computer Fundamentals , Fourth Edition, BPB Publications.

3. M Morris Mano-Digital Logic and Computer design, Fourth Edition, Prentice Hall.

References :

 1. Thomas C Bartee- Digital computer Fundamentals, Sixth Edition, TATA McGraw Hill Edition

2. Thomas L Floyd- Digital Fundamentals, Ninth edition, PEARSON Prentice Hall.

3. Malvino & Leach- Digital Principles and Applications, Sixth Edition, Tata McGraw Hill, 2006

CA1CRT02-**Methodology Of Programming And C Language (Core)**

UNIT 1

Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudocode, Control structures (sequence, selection, Iteration), Testing and debugging.

UNIT 2

C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables, Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions- Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators, Assignment operators and expressions, Logical Operators, Bitwise operators

UNIT 3

Input and Output in C – Formatted functions, unformatted functions, commonly used library functions, Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if. Loop control- for loops, nested for loops, while loops, do while loop.

UNIT 4

Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Pointers, Features of Pointer,

Pointer and address, Pointer declaration, void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays.

UNIT 5

Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef, bitfields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.

Book Of Study:

> 1. Ashok Kamthane - Programming in C, Third Edition, Pearson Education

> 2. P K Sinha & Priti Sinha - Computer Fundamentals , Fourth Edition, BPB Publications.

Reference Text

1. E. Balaguruswamy -Programming in ANSI C ,Seventh Edition , McGraw Hill Education
2. Byron Gotfried - Programming with C, Second Edition, Schaums Outline series. McGraw Hill

CA1CRP01-Software Lab I (Core)

Software Lab: 4 hrs. per week

Credits:2

Syllabus

1. Programs to familiarize printf() and scanf() functions.

2. Programs Based on Decision statements , break, goto, continue, switch and Loop controls statements.

3. Programs Based on One dimensional and two dimensional arrays.

4. Programs on Strings and string handling functions.

5. Programs based on Pointers, operations on pointers, Arrays & Pointers,

6. Programs based on functions, Call by value, Call by reference, Recursion,

7. Programs based on structure and union, array of structures, Pointer to structure, structure and functions

8. Simple programs using pointers and malloc().

Scheme of Evaluation for software lab I external is as follows:

Division of Marks (Practical - 3 hours External)

First program from part 1& 2   **- 25 marks**

      1.Flowchart   -   5 marks

      2.Logic   – 10 marks

      3.Successful compilation   – 5 marks

      4.Result   –   5 marks

Second program should be based on advanced concepts ,part 3 to part 5   **- 35 marks**

      1.Logic   – 20 marks

      2.Successful compilation   – 10 marks

      3. Result   – 5 marks)

Viva Voce   **- 10 marks**

Lab Record (minimum of 25 Programs)   **- 10 marks**

Total Marks   **- 80 marks**

CA2CRT03-Database Management Systems (Core)

Theory:4 Hours per week
Credit:3

Unit 1: Introduction (12 hrs.)

Characteristics of the Database Approach – Database users :DBA , Database Designers ,End users – Advantages of using the DBMS Approach – Data models, Schemas , and Instances – Three-Schema Architecture and Data Independence.

DBMS Languages: DDL, DML – The Database System Environment: DBMS Component Modules.

Unit 2: Relational Model (16 hrs.)

Entity Relationship Modeling: Introduction –Entity Types , Entity Sets , Attributes and Keys – Relationship Types ,Relationship Sets, Roles , and Structural Constraints – Weak Entity Types – Notation for ER diagrams – Sample ER diagrams.

Relational Model concepts: Domains ,Attributes , Tuples , and Relations – Characteristics of Relations – Relational Model Constraints and Relational Database Schemas : Domain Constraints, Key Constraints , Relational Database Schemas , Entity Integrity , Referential Integrity, and Foreign Keys .

Unit 3: SQL(14 hrs.)

Data Types – Data Definition commands : CREATE , ALTER ,DROP - Adding constraints in SQL –

Basic SQL Queries : INSERT ,SELECT ,DELETE ,UPDATE - Substring comparison using LIKE operator ,BETWEEN operator – Ordering of rows – SQL set operations UNION , EXCEPT , INTERSECT – Complex Queries : Comparison involving NULL and Three-valued logic ,Nested queries , EXISTS and UNIQUE functions, Renaming of attributes and Joining of tables, Aggregate functions ,Grouping – Managing Views.

Unit 4: Normalization and Indexing Structures for Files(15 hrs.)

Normalization: Informal Design Guidelines for Relational Schemas –Functional Dependencies – Normal forms : First Normal Form , Second Normal Form , Third Normal Form – General Definitions of Second and Third Normal Forms –BCNF.

Indexing Structures for files: -Types of Single-Level Ordered Indexes: Primary Indexes, Clustering Indexes, and Secondary Indexes.

Unit 5: Transaction Processing and Database Security (15 hrs.)

Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts – Desirable properties of Transactions.

Database Security and Authorization: Types of Security – Control measures – Database Security and DBA – Access Control , User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges.

*Books of study***:**

1.Ramez Elmasri and Shamkant B.Bavathe - DATABASE SYSTEMS , Sixth Edition, Pearson

   Education.

.

References:

1. C.J Date- An Introduction to Database Systems, Eighth edition, Pearson Education,2003

2. Reghu Ramakrishnan and Johannes Gehrke- Database Management Systems , Third edition,

    Mc Graw Hill International Edition.

3. Dipin Desai , An Introduction to Database Systems , First Edition, Galgoria Publications

CA2CRT04-Object Oriented Programming using C++

Unit I:Principles of Object Oriented Programming, Beginning with C++
Procedure Oriented Programming-Object Oriented Programming-Basic concepts of object-oriented programming- Benefits of OOP- Applications of OOP-A simple C++program-Structure of C++ program- C++ data types- Symbolic constants- Reference by variables-Operatorsin C++- Operator precedence- Control structures- Function in C++ - The main function, Function prototyping- Call byreference- Return by reference- Inline function- Default arguments- Functionoverloading.

Unit II:Classes and Objects
Specifying a class- Defining member functions- Nesting of member functions -Private member functions - Arrays within a class - Memory allocation for objects-Staticdata members -Static member functions - Arrays of objects - objects asfunction arguments -Friendly functions- Returning Objects.

Unit III: **Constructers and Destructors, Overloading**

Constructors- Default constructor-Parameterized constructor-Copy constructor- Multiple constructors- Constructors withdefault arguments- Dynamic constructor-Destructors- Operator overloading- Unary andBinary operator overloading- Overloading using friends- Rules for overloading- Type conversion.

Unit IV:Inheritance

Inheritance- Defining derived classes-Visibility modes-Single,Multilevel,Multiple, Hierarchical andHybrid inheritance- Virtual base classes- Abstractclasses- Constructors in derived classes- Nesting of classes.

UnitV:Pointers, Virtual Functions and Polymorphism, Working with Files

Pointers- Pointers to objects- this pointer-Pointers to derivedclasses- Virtual functions- Pure virtual functions- File Stream classes, Opening and closing a file- File opening modes- File pointers and their manipulations- Sequential input and output operations.

Book of Study:

1. E. Balagurusamy - Object Oriented Programming with C++, Fifth edition, Tata McGraw Education Hill , 2011.

Reference:

1. Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India
2. Robert Lafore, Object Oriented Programming in Turbo C++, First Edition, Galgotia Publications.
3. D Ravichandran, Programming with C++, Second edition, Tata McGraw- Hill

CA2CRP02-Software Lab II

I. SQL Commands (2 hrs. per week)

1. Data definition commands - CREATE, ALTER, DROP, Adding Constraints Primary

   key, foreign key, unique key, check, not null.

2. Basic SQL queries INSERT, SELECT, DELETE, UPDATE, Using multiple tables,

   ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT,

   INTERSECT, Substring   Comparison using LIKE operator, BETWEEN operator.

3. Complex Queries Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL

   values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.

4. Managing views, Simple stored procedures.

5. Data Control commands - Access Control and Privilege commands.

II. Object Oriented Programming using C++ (3 hrs. per week)

1. Programs based on default arguments, function overloading.
2. Programs based on array of objects, friend functions, passing objects as arguments to function.
3. Programs based on operator overloading (binary, unary) using member functions and friend functions.
4. Programs based on constructors, different types of constructors.
5. Programs based on inheritance, different types of inheritance.

Scheme of Evaluation for software lab II external is as follows:

(There will be two questions; the first from DBMS and second from C++)

Division of Marks (Practical - 3 hours External)

First program - questions from DBMS   **- 25 marks**

    1. Logic   – 10 marks

    2.Successful compilation   – 8 marks

    3. Result   – 7 marks

Second program – questions from Object Oriented Programming using C++ **- 35 marks**

    1. Logic   – 20 marks

    2.Successful compilation   –10 marks

    3. Result   – 5 marks

Viva Voce   **- 10 marks**

Lab Record   **- 10 marks**

(DBMS   -Minimum of 10 Programs

 C++   -Minimum: of 15 Programs)

Total Marks   **- 80 marks**

B.Sc. Computer Application - SEMESTER III

CA3CRT05-Data Structures using C++ (Core)

Module I
Concept of Structured data - Data structure definition, Different types and classification of data structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications - sparse matrix representation and operations, polynomials representation and addition, Concept of search and sort – linear search, binary search, selection sort, insertion sort, quick sort.

Module II
Stacks – Concepts, organization and operations on stacks using arrays (static), examples, Applications - Conversion of infix to postfix and infix to prefix, postfix evaluation, subprogram calls and execution, Multiple stacks representation. Queues - Concepts, organization and operations on queues, examples. Circular queue – limitations of linear queue, organization and operations on circular queue. Double ended queue, Priority queue.

Module III
Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion examples, circular linked list, doubly linked lists, Applications- linked stacks and queues, memory management basic concepts, garbage collection.

Module IV
Trees - Concept of recursion, trees, tree terminology, binary trees, representation of binary trees, strictly binary trees, complete binary tree, extended binary trees, creation and operations on binary tree, binary search trees, Creation of binary search tree, tree traversing methods – examples, binary tree representation of expressions.

Module V
File - Definition, Operations on file (sequential), File organizations - sequential, Indexed sequential, random files, linked organization, inverted files, cellular partitioning, hashing – hash tables, hashing functions, collisions, collision resolving methods.

Books of study :

1. G.S Baluja - Data Structures Through C++ (A Practical Approach), Second Edition-2004, Danapat Rai & Co.

2. Ellis Horowitz and Sartaj Sahni - Fundamentals of Data Structures in C++ , Second Edition, Galgotia Publications.

References:

1. Seymour Lipschutz, Theory and Problems of Data Structures, Schaums Outline Series,2006, McGraw Hill

2. Yedidyah Lanngsam, Moshe Augustein, Aaron M Tenenbaum- Data structures using C and C++ , Second Edition,   Prentice Hall

CA3CRT06- Computer Networks

Unit 1:
Introduction to Networks, Data and signals-analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth. Transmission impairments- attenuation, distortion and noise.
Data communication protocols and standards, Network models - OSI model-layers and their functions. TCP/IP protocol suite.

Unit 2:
Bandwidth utilization Multiplexing: FDM, TDM, spread spectrum. Transmission Media- guided media and unguided media. Switching: message, Circuit and packet switched networks, datagram networks, virtual- circuit networks.

Unit 3:
Data link layer: Error Detection and Correction, Framing, flow and error control, Protocols - Noiseless channels (Simplest, Stop and Wait) and Noisy channels (Stop and Wait and Piggy Backing).
Multiple Access Protocols. Random Access-ALOHA, CSMA. Wired LANs-IEEE standards, wireless LANs-Bluetooth, Cellular Telephony

Unit 4:
Network layer and Transport layer: Repeaters, Bridges, Gateways and routers. Logical addressing – IPV4 and IPV6 addressing, Internet protocol - IPV4 and IPV6. Connectionless and Connection Oriented Services: UDP and TCP. Congestion Control, Quality of Service.

Unit 5:
Application layer: HTTP, FTP, SMTP, DNS. Network security: Common Threats- Firewalls (advantages and disadvantages), Cryptography.

Book of study:

1. B. A. Forouzan - Data communication and Networking, Fourth edition-,TMH
2. Andrew S Tanenbaum - Computer Networks ,Fourth Edition, Prentice Hall of India.

CA3CRT07-SYSTEM ANALYSIS AND SOFTWARE ENGINEERING

Module 1:
Information systems concepts, Business information systems; Describing the business organization – organization chart , organization function list ; information system levels - operational, lower, middle, top management; the system development life cycle concepts; hardware and software end products. Life cycle activities- life cycle flow chart, task, management review, baseline specifications, role of system analyst.

Module 2:

Introduction to Software Engineering - Definition, Program Vs Software, and Software process, Software Characteristics, Brief introduction about product and process, Software process and product matrices. Software life cycle models - Definition, Waterfall model, Increment process models, Evolutionary process models, Selection of a life cycle model.

Module 3:
Software Requirement Analysis and Specification Requirements Engineering type of requirements, Feasibility Studies, Requirement Elicitation, Various steps for requirement analysis, Requirement documentation, Requirement validation, an example to illustrate the various stages in Requirement analysis. Project planning-Size estimation, cost estimation, the constructive cost model (COCOMO).

Module 4:
Software Design - Definition, Various types, Objectives and importance of Design phase, Modularity, Strategy of design, Function oriented design, IEEE recommended practice for software design descriptions. Steps to Analyze and Design Objected Oriented System. Software Reliability Definition, McCall software quality model, Capability Maturity Model.

Module 5:
Software Testing What is testing?, Test, Test case and Test Suit, Verification and Validation, Alpha, beta and acceptance testing, functional testing, techniques to design test cases, boundary value analysis, Equivalence class testing, decision table based testing, cause effect graphing technique, Structural testing path testing, Graph matrices, Data flow testing; Levels of testing Unit testing, integration testing, system testing, validation testing, a brief introduction about debugging and various testing tools.

Book of Study:

1. Marvin Gore & John Stubbe -Elements Of System Analysis, Fourth Edition, Galgotia Book Source.

2. K K Aggarwal, Yogesh Singh - Software Engineering,Third Edition, New Age International Publications.

References :

1. Roger S Pressman - Software Engineering: A Practitioner's Approach, Sixth Edition, McGraw-Hill Higher Education.
2. Ian Sommerville - Software Engineering , Seventh Edition, Pearson Education.
3. Pankaj Jalote - An Integrated approach to Software Engineering, Second Edition, Narosa Publishing Company.

CA3CRP03-Software Lab III (Core)

Software Lab: 6 hrs. per week

Credits:2

Syllabus

Module I

Array – Insertion , Deletion, Polynomial addition using arrays

Sort – Selection, Insertion, Quick

Search – Linear search, Binary search

Sparse matrix – Sparse form representation, transpose and addition using the sparse form

Module II

Stack - Implementation using arrays (linear stack), Infix to postfix conversion, Postfix evaluation

Queue – Implementation using arrays (linear queue), Implementation of circular queue

Module III

Singly linked list – Implementation using dynamic memory allocation techniques, arrange the list based on the ascending or descending order of the information field, concatenate two linked lists, interchange any two nodes in a list, Implementation of circular list, Implementation of linked stacks and queues.

Doubly linked list – Implementation of doubly linked list, Implementation of circular doubly linked list.

Module IV

Creation of binary search trees, Insertion and deletion of nodes, Tree traversals.

Scheme of Evaluation for software lab III external is as follows:

(There will be two questions)

Division of Marks (Practical - 3 hours External)

First program - questions from module 1 & II   **- 25 marks**

       1. Logic   – 10 marks

       2.Successful compilation   – 8 marks

       3. Result   – 7 marks

Second program – questions from module III & IV   **- 35 marks**

       1. Logic   – 20 marks

       2.Successful compilation   –10 marks

       3. Result   – 5 marks

Viva Voce   **- 10 marks**

Lab Record   **- 10 marks**

(Minimum of 25 Programs)

Total Marks   **- 80 marks**

CA4CRT08-Linux Administration (Core)

Unit-I

Overview of Linux : What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux standard directories. Commands for files and directories cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, Creating and viewing files using cat, file comparisons.

Unit II

Essential Linux commands: Processes in Linux, process fundamentals, connecting processes with pipes, redirecting input/output, Background processing, managing multiple processes, process scheduling – (at, batch), nohup command, kill, ps, who, find, sort, touch, file, file processing commands - wc, cut, paste etc Mathematical commands - expr, factor etc. Creating and editing files with vi editor.

Unit III

Shell programming - Basics of shell programming, various types of shell available in Linux,comparisons between various shells, shell programming in bash. Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks

Unit-IV

System administration - Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of users accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command.

Unit-V:

Simple filter commands: pr, head, tail, cut, sort, uniq, tr - Filter using regular expression grep, egrep, sed Understanding various Servers **:**DHCP, DNS, Squid, Apache, Telnet, FTP,Samba.

Book of study :
1. Cristopher Negus - Red Hat Linux Bible, Wiley Dreamtech India 2005 edition.
2. Yeswant Kanethkar - UNIX Shell Programming, First edition, BPB.

References :

1. Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India

2. Graham Glass & King Ables - UNIX for programmers and users, Third Edition, Pearson Education.

5. Neil Mathew & Richard Stones - Beginning Linux Programming, Fourth edition, Wiley Dreamtech India.

CA4CRT09- Web Programming Using PHP

MODULE I

Introduction to web, WWW architecture, Fundamentals of HTML, text formatting tags, marquee, inserting images, links, lists, creating tables, frames, working with form elements.

MODULE II

CSS introduction, <link> and <style> elements, CSS properties, Controlling Fonts, Text formatting, Text- pseudo classes, Selectors, Links, Backgrounds, lists

Introduction to Java Script, Java Script variables, operators, decision control statements, looping, functions, arrays, events, popup boxes-alert, prompt, conform box, built-in objects, writing JavaScript, form validation

MODULE III

Introduction to PHP, server side scripting, role of web server software, php comments, variables, echo and print, PHP operators, datatypes, branching statements, loops, arrays

MODULE IV

PHP functions, PHP form, Passing information between pages, $_GET, $_POST, $_REQUEST. String functions, include and require, session and cookie management, error handling in PHP, Object Oriented Programming using PHP

MODULE V

Introduction to MySQL, datatypes, SQL commands-CREATE, UPDATE, INSERT, DELETE, SELECT, PHP functions for MySQL connectivity and operation- mysql_connect, mysql_select_db, mysql_query,

mysql_fetch_row, mysql_fetch_array, mysql_result, mysql_list_fields, mysql_num_fields, insertion, updation and deletion of data using PHP, displaying data from MySQL in webpage.

Book of Study:

1. Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi - "Beginning PHP", Wiley Publishing, Inc
2. Ivan Bayross - "HTML, DHTML, JavaScript, Pearl & CGI ", Fourth Revised Edition, BPB Publication.
3. "Programming PHP",Rasmus Lerdorf and Kevin Tatore, Shroff Publishers & Distributors Pvt. Ltd

4. "Beginning PHP", Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi, Wiley Publishing, Inc

CA4CRP04 - Software Lab IV (Core)

Software Lab: 6 hrs. per week

Credits:2

I. Linux (2 hrs. per week)

Sl.No	Topic and Details
1	Getting started –Commands
2	The Linux Architecture and command usage – Commands, General-purpose utilities
3	The File system –Commands
4	Process related commands
5	Handling ordinary files, Basic file attributes
6	The vi editor
7	Simple Filters, Filters using regular expressions-use of grep command
8	Introduction to shell concept and writing shell script
9	Introduction to shell concept and writing shell script, Essential Shell Programming
10	User management, monitoring system performance, disk usage etc.

II. Web Programming using PHP (4 hrs. per week)

1. Creating programs based on HTML

2. Creating Java script based programs

3. Creating simple programs based on PHP

4. Programs using PHP functions

5. Programs based on MY SQL

Scheme of Evaluation for software lab IV external is as follows:

(There will be two questions; the first from LINUX and second from PHP)

Division of Marks (Practical - 3 hours External)

First program - questions from LINUX   **- 25 marks**

        1. Logic   – 10 marks

        2. Successful compilation   – 8 marks

        3. Result   – 7 marks

Second program – questions from PHP   **- 35 marks**

        1. Logic   – 15 marks

        2. Successful compilation   –15 marks

        3. Result   – 5 marks

Viva Voce   **- 10 marks**

Lab Record   **- 10 marks**

 (LINUX   -Minimum of 10 Programs

  PHP   -Minimum of 15 Programs)

    Total Marks   **- 80 marks**

CA5CRT10 – Java Programming using Linux (Core)

Theory:3 hrs. per week

Credits:3

UNIT 1 (10 hrs.)

Concepts of Object oriented programming, Benefits of OOP, Features of java. Java environment, java tokens, Constant, variables, data types, operators, Control Statements-branching statements, looping statements, jump statements, labeled loops.

UNIT 2 (10 hrs.)

Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, Constructors, constructor overloading, super keyword, static Members, Inheritance, overriding methods, dynamic method dispatch, final(variables, methods and classes), abstract methods and classes, interfaces, visibility control.

UNIT 3 (12 hrs.)

Arrays- One dimensional arrays, declaration, creation, initialization of arrays, two dimensional arrays, String class. Packages: - java API packages overview (lang, util, io, awt, swing, applet), user defined packages-creating packages, using packages

Exception Handling Techniques-try-catch-throw-throws-finally -Multithreading- creation of multithreaded program-Thread class-Runnable interface, Thread life cycle.

UNIT 4 (10 hrs.)

Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event Listeners- Event classes- Swing- architecture, components of swing- JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame, Layout Managers(Flow Layout, Grid Layout, Card Layout, Border Layout, Box Layout, Null Layout).

UNIT 5 (10 hrs.)

Applet Fundamentals -applet tag, applet life cycle, passing parameters to applets. Working with graphics -Line, Rectangle, Oval, Arc, color setting. JDBC architecture- JDBC connection, JDBC statement object, JDBC drivers.

Book of study :

1. E. Balagurusamy- Programming with Java , Third Edition, McGraw Hill Companies.

2. K. Somasundaram - PROGRAMMING IN JAVA2, First Edition, Jaico Publishing House.

Reference:

1. Patrick Naughton - Java2 The Complete Reference, Seventh Edition:

2. Cay S Horstmann & Gary Cornell - Core Java Volume 1- Fundamentals, Eighth edition.

3. Java 6 Programming Black Book 2007 Edition, Dreamtech press.

CA5CRP05 : Software Lab V (core)

Software Lab**: 5** hrs. per week

Credits: 2

 Syllabus

Part I. Applet, JDBC connection and swing based Programs

Part II (using class and read inputs from keyboard)

Java Programs: Method Overloading- Method Overriding-inheritance-abstract class

interfaces- packages-Exception Handling-Multithreading

Scheme of Evaluation for software lab V external is as follows:

(There will be two questions; the first from Part I and second from Part II)

Division of Marks (Practical - 3 hours External)

First program - questions from Part I   **- 25 marks**

    1. Logic   – 10 marks

    2.Successful compilation   – 8 marks

    3. Result   – 7 marks

Second program – questions from Part II   **- 35 marks**

      1. Logic   – 20 marks

      2.Successful compilation   –10 marks

      3. Result   – 5 marks

Viva Voce   **- 10 marks**

Lab Record   **- 10 marks**

(Minimum   of 25 Programs)

Total Marks   **- 80 marks**

OPEN COURSES

CA5OPT01 -Informatics and Cyber Ethics

Theory:4 hrs. per week

Credits:4

Unit I (12 hrs.)

The Internet, TCP/IP, IP Addressing, Client Server Communication, Intranet, WWW, Web Browser and Web Server, Hyperlinks, URLs, Electronic mail.

Unit II (16 hrs.)

Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, opens access publishing models, Introduction to use of IT in teaching and learning -Educational software, Academic services–INFLIBNET, NPTEL, NICNET, BRNET.

Unit III (16 hrs.)

Introduction to purchase of technology, License, Guarantee, Warranty, Basic concepts of IPR, copyrights and patents, plagiarism. IT & development, the free software movement

Unit IV (14 hrs.)

Cyber space, information overload, cyber ethics, cyber addictions, cybercrimes– categories –person, property, Government–types-stalking, harassment, threats, security & privacy issues.

Unit V(14 hrs.)

Cyber Addiction, Information Overload, Health Issues, e-Waste and Green computing impact of IT on language & culture-localization issues- Unicode- IT and regional languages e-Governance in India, IT for National Integration, Role of IT.

Book of Study:

1. Alan Evans, Kendall Martin, Mary Anne Poatsy - "Technology in Action", Pearson

References:

1. Dinesh Maidasani "Learning Computer Fundamentals, MS Office and Internet & Web Technology",

 Firewall Media, Lakshmi Publications.

2. V Rajaraman - "Introduction to Information Technology", Prentice- Hall of India.

3. Barkhs and U. Rama Mohan - HTML Black Book 3. "Cyber Law Crimes", Asia Law House,

   New Edition

4. Peter Nortons- Introduction to Computers, Sixth Edition, Published by Tata McGraw Hill

CA5OPT02 - Computer Fundamentals, Internet & MS Office (Open Course)

Theory:4 hrs. per week

Credits:4

Unit I (12 hrs.)

Computer Fundamentals: History, Generations, Classifications, Operating Systems, Types of Networks

Unit II (12 hrs.)

The Internet, TCP/IP, IP Addressing, Client Server Communication, Intranet, WWW, Web Browser and Web Server, Hyperlinks, URLs, Electronic Email

Unit III (14 hrs.)

Word processing: Introduction, Microsoft Word, Basic Menus, Formatting the text & paragraph, Working with Index

Unit IV (18 hrs.)

Spread Sheet: Introduction, Microsoft Excel, Basic Menus, Formulas, Basic functions, Charts and Graphs.

Unit V (16 hrs.)

Microsoft PowerPoint: Introduction, Basic Menus, Template, Slide Basics, Charts, Adding Multimedia & Animation.

Book of Study:

1. Dinesh Maidasani, Firewall Media - "Learning Computer Fundamentals, MS Office and Internet &

   WebTechnology", , Lakshmi Publications.

References:

1. Harley Hahn - "Internet Complete Reference", , Second Edition, Tata McGraw Hill Education

2. Gary B. Shelly, Misty E. Vermaat - "Microsoft Office 2010: Advanced" , CENGAGE Learning 2010

B.Sc. Computer Application - SEMESTER VI

CA6CRT11- Operating Systems

Unit 1:
Introduction: OS Definition, Functions, Evolution of OS,OS Structure Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

Unit 2:
Process: Basic Concepts, Process Scheduling, Operations on Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Unit 3:
Process Coordination: Synchronization - The Critical Section problem, Semaphores, Classic Problems of Synchronization, Monitors. Deadlocks: System Model, Deadlock Characterization, Methods of handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit 4:
Memory Management: Memory Management Strategies - Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement.

Unit 5:
Storage Management: File System: - File Concept, Access Methods, Directory structure. Implementing File Systems:-File System Structure, Allocation Methods, Free Space Management, Disk Scheduling.

Book of study:
1. Abraham Silberschatz, Peter Galvin and Greg Gagne - Operating System Principles, Seventh Edition, John Wiley

2. William Stallings - Operating Systems, Sixth Edition, Prentice Hall of India, Pearson

Reference:
1. Milan Kovic - Operating Systems, 2ndEdition, (TMH)

PROGRAMME ELECTIVES

CA6PET01- DATA MINING   (Core)

Theory:4 hrs. per week

Credits:4

Unit 1: (12 hrs.)

 Introduction Data Mining, Data Ware House, Transactional Databases, Data Mining Functionalities Characterization and Discrimination, Mining frequent patterns, Association and correlation, Classification and Prediction, Cluster Analysis, Classification of Data Mining Systems, Data Mining Task Primitive, Integration of Data Mining systems, Major issues in Data Mining, Data integration and transformation, Data reduction, Data discretization.

Unit 2: (12 hrs.)

 Data Warehouse and OLAP technology Data Warehouse, Multidimensional data Model, Data warehouse architecture, Data Warehouse implementation, OLAP, Data Warehouse and data mining

 Unit 3: (18 hrs.)

 Association Rules and Classification Concepts Efficient and Scalable Frequent item set Mining methods, Mining various kind of association rules, from association mining to Co-relation analysis, Classification and prediction, Issues, Classification by Decision tree induction, Bayesian Classification, Rule-based classification, Support Vector Machines, Learning from your neighbors, Prediction

 Unit 4: (18 hrs.)

 Cluster Analysis Definition, Types of data in cluster analysis, A categorization major Clustering methods- Partitioning methods, K-means and k-medoids, from k-medoids to CLARANS, Hierarchical methods, Density based methods

Unit 5: (12 hrs.)

Mining Complex Data Spatial Data Mining, Multimedia Data Mining, Text Mining and Mining WWW.

Book of study:

1. Jiawei Han and Micheline Kamber - Data Mining - Concepts and Techniques,Second Edition, Elsevier, 2006

Reference:

1. Witten and Frank - Data Mining Practical Machine Learning Tools and Techniques, Second Edition, Elsevier, 2005

2. Soman, Divakar and Ajay, Data Mining Theory and Practice, PHI, 2006

3. Margaret H Dunham- Data Mining –Introductory and Advanced Topics, Fourth Edition, Person

   2006

CA6PET02 -Digital Image Processing

Theory:4 hrs. per week

Credits:4

Unit 1: (10 hrs.)

Digital Image Fundamentals

Image, Digital Image, Digital image processing-definitions, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Image processing system.

Unit 2 : (14 hrs.)

Elements of visual perception

Elements of visual perception- Image Formation, Brightness adaptation and Discrimination, Image sampling and quantization- basic concepts, spatial and Intensity resolution, Basic relationship among Pixels.

Unit 3: (16 hrs.)

Image Enhancement in Spatial and Frequency Domain

Intensity Transformation and spatial Filtering Basics, Intensity transformation functions- Image Negatives, Log Transformations, Power Law Transformations, Histogram Processing, Spatial filtering-correlation and convolution; Fourier transform and frequency domain.

Unit 4: (15 hrs.)

Morphological Image Processing

Introduction, basis of set theory, Dilation, Erosion, Structuring elements, Opening and Closing, Hit or miss transformation.

Unit 5: (17 hrs.)

Image Segmentation

Point, Line, Edge detection-detection of isolated points, Basic edge detection- Gradient operators; Pixel based approach-Basics of intensity thresholding, Basic global thresholding; Region based segmentation-region growing, region splitting and merging.

Book of Study:

1. Rafael C. Gonzalez, Richard E. Words- Digital Image Processing, Third Edition, Pearson.

References:

1.Anil K Jain- Fundamentals of Digital Image Processing , Pearson Education.
2.Er. Rishabh Anand, Digital Image Processing, MEDTEC Publications.

CA6PET03- Soft Computing Techniques

Theory:4 hrs. per week

Credits:4

Unit 1 (14 hrs.)

Soft Computing, Difference between soft computing and hard computing. **Neural Networks:** Basic concepts of Neural Networks, Human Brain, Artificial Neuron model, Activation functions,Neural network architecture,Single layer and multilayer feedforward networks, Recurrent networks, Neural network characteristics, Learning methods, Rosenblatt's perceptron,Perceptron and linearly separable tasks, XOR problem, Neural network applications.

Unit 2 : (14 hrs.)

Back Propagation Networks: Architecture- perceptron model, solution, single layer artificial neural network, multilayer perception model, back propagation learning- input layer computation, hidden layer computation, output layer computation, calculation of error, Training of neural network, effect of learning rate coefficient, Back propagation algorithm.

Unit 3: (15 hrs.)

Fuzzy Set Theory: Fuzzy versus crisp, Crisp sets, Operations on crisp sets, Properties of crisp sets, Partition and covering, Fuzzy sets, Membership functions, Basic fuzzy set operations, Properties of fuzzy sets, Crisp relations, Operations on crisp relations, Fuzzy relations, Fuzzy cartesian product, Operations on fuzzy relations.

Unit 4 : (15 hrs.)

Fuzzy Systems: Crisp logic, Laws of propositional logic, Inference in propositional logic, Predicate logic, Interpretations of predicate logic formula, Inference in predicate logic, Fuzzy logic, Fuzzy propositions, Fuzzy connectives, Fuzzy quantifiers, Fuzzy inference, Fuzzy rule based system, Defuzzification methods, Applications.

Unit 5: (14 hrs.)

Genetic Algorithm: History, Basic concepts, Biological background, Creation of offsprings, Encoding, Fitness function, Reproduction, **Genetic Modeling**:Crossover, Inversion and deletion,Mutation,Bit-wise operators used in geneticalgorithm, Generational cycle, Convergence of a genetic algorithm, Issues and benefits of GA, Application domains.

Book of study:

1. S. Rajasekaran and G.A VijayalakshmiPai- Neural Networks, Fuzzy Logic, and Genetic AlgorithmsSynthesis and Applications, Prentice-Hall of India Pvt.Ltd ,2004.

References:

1. S. N. Sivanandan and S. N. Deepa, Principles of Soft Computing, Wiley India 2nd Ed, 2011.
2. B K Tripathy, J. Anuradha, Soft computing Advances and Applications, Cengage Learning.
3. B Yegnanarayana, Prentice, Artificial Neural Network, Hall of India Pvt.Ltd ,2012.

CA6CRP08 : Software Development Lab (Main Project) (Core)

Software development lab: 7 hrs. per week

Credits: 3

Individual project.

The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms (Except the tools used in software development-I), so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

Scheme of Evaluation for Software Development Lab II external is as follows:

Division of Marks (Software Development Lab II)

Project demonstration and Presentation	**- 40 marks**
Viva related to project	**- 20 marks**
Project report with proper content and binding	**-20 marks**
Total Marks	**- 80marks**

CA6VVT01 –VIVA VOCE (Core)

Credit :1

Scheme of Evaluation of Viva voce (core) for External is as follows:

Each student should attend a course viva voce based on syllabus from semester I to semester IV.

Total Marks – 100 marks