

## Annexure-II

Details of the scheme and syllabus proposed for B.Sc. (Computer Science). – Even (II) Semester and  
BCA- Even (II) Semester:

B.Sc. (Computer Science)- Even (II) Semester (Scheme and Syllabus):

<b>Semester-Even (II)</b>						
Sr. No.	Course Code	Courses	Periods Per Week			Credits
			L	T	P	
1	BC3CO05	Problem Solving and Programming-II	3	1	4	6
2	BC3CO06	Digital Electronics and Computer Architecture	3	1	4	6
3	BC3CO07	Mathematics -II	3	1	0	4
4	BC3CO08	Physics-II	4	0	2	5
5	BC3AE02	Environmental Science	3	0	0	3
6	BC3SS02	Self study	1	0	0	1
		Total	17	3	10	<b>25</b>
				<b>30</b>		

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3CO05	Problem Solving and Programming-II	3	1	4	8	6

### Unit-I

**Functions:** Function Definition, Function declaration (function prototype), Function call, benefits of function, different ways to define a function, Call by value, call by reference, return keyword, types of functions, scope rule of function. macro verses function, Recursive functions.

### Unit-II

**Pointers:** Basic of pointers, address of operator, indirection operator, pointer's arithmetic. Application of pointers: Actual and formal arguments, concept of call by reference using pointer, pointer and arrays, pointer and strings, Pointer to structures. Meaning of static and dynamic memory allocation, memory allocation function: malloc() and calloc(). Command line arguments, typedef, Enumerators, Bit fields.

### Unit-III

**Input Output (I/O):** Formatted console I/O function, sprintf(), sscanf() function, unformatted consol I/O functions. Escape sequence.

**File Handling:** File opening modes and differences among them, writing and reading a character in a file, closing files, a file copy program, fgets(), fputs(), fscanf(), fprintf(), text verses binary mode, fread(), fwrite().

### Unit-IV

**Components of Visual Display Unit (VDU):** Display Adapters, Display Screens (monitor), Video Display modes, resolution Text or Graphics: Color in text mode, color in graphic mode, video pages, writing to VDU memory in text mode.

### Unit-V

**Graphic Programming:** Lines, stylish lines, drawing and filling images, patterns with differences, bar () Filling regular and non-regular shapes of palettes and colors, outputting text, justifying text, a bit of animation, system matrices.

## **Text Books**

1. B.W. Kernighan and D. M. Ritchie, “The C Programming Language”, Pearson Education, Second Edition.
2. B. Gottfried, “Programming with C” , TMH, Second Edition (Indian Adapted Edition) .
3. Y. Kanetkar, “Let us C”, BPB Publications, New Delhi, Fourth Edition.

## **Reference Books**

1. H. Schildt, “C The Complete Reference”, Tata McGraw Hill, Fourth Edition.
2. E. Balaguruswamy, “Programming in ANSI C”, Tata McGraw Hill, Fourth Edition.
3. S. Oualline, “Practical C Programming”, A Nutshell Handbook, O’Reilly Publications, Third Edition.
4. A. N. Kamthane and Raj Kamal, “Computer Programming and IT”, Pearson Education, First Edition.
5. Y. Kanetkar, “Graphics under C”, BPB Publications, New Delhi, First Edition.

## **List of Practical’s**

1. To find square root of nos. without using built in function
2. To find factorial of a no. using recursion
3. To exchange the value of two variable using function
4. To add two number using pointer
5. To create a file character
6. To read a file
7. To create a file of integer
8. To create file of a record
9. To copy a file
10. To merge two file
11. To read character from one text file convert into upper case and length into other file
12. Write a mark sheet program using file
13. Write a payroll program using file
14. Write the following recursive C Function
  - a. Factorial of a given number
  - b. Nth Fibonacci number
  - c. Reverse of a given String

- d. Reverse of a give Number
  - e. Sin(x)
15. Write a c program to create a new data type Date with the help of structure and typedef. Also write following user defined function for date manipulation.
- a. To return next Date,
  - b. To return next Month,
  - c. To return next Year,
  - d. To add few Days in a date
  - e. To add few Months in a date
  - f. To add few Years in a date
  - g. To return the date of the week of a given date.
  - h. To return Month name from the date.
16. To Display the Date in various format as: Date Display(Date d1, char \*format)  
Here Date is the newly created data type. The format string can hold the following values: “DDMMYYYY”, “MMDDYY”, “MON, DD, YYYY”
17. Write a C program to implement myprintf and myscanf functions using Concept of variable number of arguments. (using getch, putch, gets and puts function)
18. Write a C program that creates an Employee text file? Records Are empid, empname, designation, qualification, salary, experience, Research work, address, city phone?
19. Write a C program that manipulates the above text file. The program must implements the operation to modify a record, delete a record and append new records.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3CO06	Digital Electronics and Computer Architecture	3	1	4	8	6

### Unit-I

**Number System** : Binary, Octal, Hexadecimal, Conversions from one base to another base, Binary Arithmetic, Addition, Subtraction, Unsigned binary number, signed magnitude number, 2's complement representation, 2's complement arithmetic, ASCII(American Standard Code for Information Interchange) Code, BCD(Binary coded decimal) Code, EBCDIC(Extended Binary Coded Decimal Interchange Code) Code, Excess3 Code and Gray Code.

### Unit –II

**Logic gates:** NOT, AND, OR, Universal gates- NAND, NOR.EX-OR and EX-NOR gates,

**Boolean algebra:** Laws of Boolean Algebra.

Arithmetic Circuits, Combinational Circuits, Encoders, Decoders.

### Unit-III

**Flip Flops:** S-R, J-K, T, D, Clocked Flip-flop, Race around condition, Master slave Flip-Flop.

**Shift Registers:** Serial-in-serial-out, serial-in-parallel-out, parallel-in-serial-out and parallel-in-parallel-out, Bi-directional shift register. **Counters:** Asynchronous and Synchronous Ring counters and Johnson Counter.

### Unit-IV

**Computer Architecture:** Basic structure of computers functional units, Basic operational concepts, Bus structures, Software performance, Memory locations and addresses, Memory operations, Instruction and instruction. Register Transfer Language and Micro-operations, Architecture of a simple processor.

### Unit-V

**Input Output organization:** Synchronous & Asynchronous data transfer, Data Transfer Mode  
Assembly Language programming: loops and Comparisons, conditions and procedures, arithmetic operations in assembly language. Simple assembly language programs.

### Text Book

1. M. Morris Mano, "Digital Design", Prentice Hall of India Pvt. Ltd, 3<sup>rd</sup> edition.
2. M. Morris Mano, "Computer System Architecture", PHI, 3<sup>rd</sup> edition.

3. AP. Godse, DA Godse, “Computer Architecture & Organisation”, Technical publication, 1<sup>st</sup> edition 2005.
4. MV Subramanyam , “Basic Digital Electronics”, Laxmi publication, 1<sup>st</sup> edition 2009.

### Reference books

1. Malovino and Brown , “Digital Computer Electronics”, by McGraw Hill, 3<sup>rd</sup> edition.
2. B. Basavraj, “Basic Electronics”, Vikas Publishing House (New Delhi), 2<sup>nd</sup> edition.
3. Thomas C Bartee , “Digital computer Fundamental”, Mc Graw Hill 1986, 6th edition.
4. Dr. Raj Kamal, “Digital Systems- Principles and Design”, Pearson Education, 3<sup>rd</sup> edition.

### List of Experiments

1. Write a program to convert binary to decimal in c or c++ language.
2. Write a program to convert decimal to binary in c or c++ language.
3. Write a program to convert binary to octal in c or c++ language.
4. Write a program to convert binary to hexa–decimal in c or c++ language.
5. Write a program to convert octal to binary in c or c++ language.
6. Write a program to convert hexa-decimal to binary in c or c++ language.
7. Write a program to print “hello world!” in assembly language.
8. Write a program for arithmetic operations in assembly language.
9. Write a program to print 9 star with a message in assembly language.
10. Write a program to read a number from a keyboard and display it on the screen in assembly language.
11. Write a program to display a largest number among 3 numbers in assembly language.
12. Write a program to print 1 to 9 on the screen in assembly language.
13. Write a program to add two 5 digit decimal number in assembly language.
14. Write a program to insert 3 integers element in a array and perform addition operation on them in assembly language.
15. Write a program to create procedure in assembly language in assembly language.
16. Write a program to check whether the number inputted is prime or not in Assembly Language.
17. Write a Program to read a letter in Lower case and print it after converting it in to Upper case letter in Assembly Language
18. Write a Program to Convert Decimal number to Hexadecimal number in Assembly Language.
19. Write a Program that prompts the user to type a hex number of four hex digits or less, and outputs it in binary on the next line.
20. Write a program that calculates and prints terms of the Fibonacci series.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3CO07	Mathematics-II	3	1	0	5	4

### Unit-I

#### Advanced Calculus – I

Limit and continuity of functions of two variables, Introduction of Partial differentiation, Euler's theorem for homogeneous function, differentiability of real-valued functions of two variables, concept of Taylor's theorem for functions of two variables, maxima and minima of functions of two variables.

### Unit-II

#### Advanced Calculus – II:

Tracing of curves in Cartesian co-ordinates, double and triple integrals, change of order of integration, area and volume using multiple integrals.

### Unit-III

#### Ordinary Differential Equations – I :

Linear differential equations and equations reducible to the linear form, exact differential equation, first order and higher degree equations solvable for  $x$ ,  $y$  and  $p$ , Clairaut's form and singular solutions, linear differential equations with constant coefficients, simultaneous differential equations.

### Unit-IV

#### Ordinary Differential Equations – II :

Homogenous linear differential equations with constant coefficient, equation reducible to homogeneous, homogenous linear differential equations with variable coefficient: by known integral, removal of the first derivative, change of independent variable and variation of parameters.

### Unit-V

#### Laplace Transform:

Introduction of Laplace transform, existence theorem, transforms of elementary functions, properties of Laplace transform, inverse Laplace transform and its properties, convolution theorem, applications to solve the ordinary differential equation.

#### Texts Books / References:

1. Gorakh Prasad, Differential Calculus, Pothishala pvt. Ltd. Allahabad.
2. Gorakh Prasad, Integral Calculus, Pothishala pvt. Ltd. Allahabad.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4. D.A. Murray, Introductory Course in Differential Equations, Orient Long man, India 1967.
5. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & sons, 1999.
6. G. F. Simmons, Differential Equations, Tata Mcgraw Hill, 1972.
7. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.

Course Code	Course Name	Hours per Week			Total Hrs.	Total Credits
		L	T	P		
BC3C008	Physics-II	4	-	2	6	5

### Unit I

#### Thermodynamic Description of System:

Thermodynamic system and Thermodynamical coordinates, Thermal equilibrium, Zeroth law of thermodynamics, Work done by and on the thermodynamic system for different processes, Internal energy as state function, First law of thermodynamics, Applications of first law: cyclic process, isothermal process, adiabatic process isochoric process and isobaric process, Reversible and irreversible process, Heat engines, Carnot's cycle and its efficiency.

### Unit II

#### Entropy:

Various statements of Second law of thermodynamics, Entropy as a state function, Change in entropy in different reversible process of a perfect gas (isothermal expansion, isobaric process, isochoric process and adiabatic expansion). Change in entropy of universe in a reversible and an irreversible process, Principle of increase of entropy, Physical significance of Entropy, T-S diagram, Third law of thermodynamics, Zero point energy.

### Unit III

#### Thermodynamic Relationships:

Thermodynamic variables, Extensive and intensive, Thermodynamic potentials: Internal energy (U), Helmholtz free energy (F), Enthalpy (H) and Gibbs free energy (G). Maxwell's first, second, third and fourth relation from different thermodynamic variables, Physical significance of thermodynamic potentials: condition of Equilibrium, Gibbs-Helmholtz Equations, Clausius-Clapeyron Latent Heat Equation.

### Unit IV

#### Statistical Physics-I:

System, Ensemble, Microstate, Macrostate and calculation of probabilities: tossing a coin and tossing of two coins, Concept of Phase space, division of phase space into phase cells, Number of accessible microstates of a macroscopic system in small energy  $E$ . Application of phase space and number of accessible microstates for a single particle moving in one dimension, Fundamental postulates of statistical mechanics, Equilibrium between two systems in thermal contact, Boltzmann's entropy probability relation  $S = k \log_e W$ , Statistical interpretation of second law of thermodynamics.

### Unit V

#### Statistical Physics-II:



Boltzmann's canonical distribution law, Application of Boltzmann's distribution law: one dimension harmonic oscillator, Boltzmann's Partition Function, Relation between Partition Function and Entropy, Classical and quantum analysis, Qualitative analysis of Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac statistics and their comparison, Spectral distribution of Black-body radiation.

### **Text Books**

1. M.W. Zemansky, Richard Dittman, "Heat and Thermal Physics", McGraw-Hill, Vol. 2, 1981.
2. S. Garg, R. Bansal and Ghosh, "Thermal Physics", Tata McGraw-Hill, 2<sup>nd</sup> Edition, 1993.
3. Carl S. Helrich, "Modern Thermodynamics with Statistical Mechanics", Springer, Vol. 2, 2009.
4. Sears & Salinger, "Thermodynamics, Kinetic Theory & Statistical Thermodynamics", Narosa Publications, Vol. 3, 1988.
5. S.J. Blundell and K.M. Blundell, "Concepts in Thermal Physics", Oxford University Press, 2nd Ed., 2012.
6. I. Prakash & Ramakrishna, "A Text Book of Practical Physics", Kitab Mahal, 11th Ed., 2011.
7. Michael Nelson and Jon M. Ogborn, "Advanced level Physics Practicals", Heinemann Educational Publishers, 4th Edition, reprinted 1985.
8. D.P. Khandelwal, "A Laboratory Manual of Physics for undergraduate classes", Vani Pub., Vol. 2., 1985.

### **References**

1. R.P. Goyal, "Unified Physics III Semester", Shival Agrawal and Company Publishers.
2. A.B. Gupta, H.P. Roy, "Thermal Physics and Statistical Physics", Books and Allied (P) Ltd, Calcutta.
3. Brijlal and N. Subrahmanyam, "Heat and Thermodynamics", S. Chand & Company Ltd, New Delhi.

### **List of Practical Semester-II**

1. To study conversion of mechanical energy into heat using Joule's calorimeter.
2. To determine heating efficiency of electrical kettle with various voltages.
3. To determine thermo electromotive force by a thermocouple method.
4. To determine heat conductivity of bad conductors of different geometry by Lee's method.
5. To verify Newton's law of cooling.

6. To determine the specific heat of a liquid using cooling method.
7. Experimental study of probability distribution for a two option system using a coin.
8. To study of blackbody spectrum using “PhET” module.
9. To plot and study the significance of graphs of given data.
10. To study the variation of thermal current with temperature.
11. To determine temperature coefficient of resistance by Platinum Resistance Thermometer.
12. To determine mechanical equivalent of heat by Calorimeter.
13. To determine Mechanical Equivalent of Heat, J, by Callender and Barne’s constant flow method.
14. To determine the Coefficient of Thermal Conductivity of Cu by Searle’s Apparatus.
15. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom’s Method.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3AE02	Environmental Science	3	0	0	3	3

### **Unit I**

#### **Environmental Communication and Public Awareness**

Multidisciplinary nature of environmental studies: Scope and Significance of environmental education; Public awareness and rural outreach; Concept of sustainability and sustainable development – Principles, imperatives and threats; three E's to optimize sustainable development, Sustainable Agriculture and Organic Farming.

### **Unit II**

#### **Domestic and Global Environmental Concerns**

Domestic environmental concerns: Human population growth: Impacts on environment, Water conservation and Management;; Disaster management; Solid Waste management; Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan;; case studies.

Global environmental concerns: Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading; Ozone layer depletion,

### **Unit III**

#### **Natural resources and Biodiversity**

Natural Resources: Land resources and land use change; Land degradation, soil erosion, salinization and desertification. Water: Use and over exploitation of surface and ground water, floods, droughts, conflicts over water;. Use of alternate energy sources, case studies.

### **Unit IV**

#### **Ecosystem and Environmental Pollution**

Ecosystem: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

Environmental pollution: types, causes, effects and control of; Air, water, soil and noise pollution; nuclear hazards and human health risks, Acid rain and impacts on human communities and agriculture.

### **Unit V**

#### **Sustainable habitat and Green Technology**

Sustainable Habitat: Concept of Green Building and its rating systems, Heating Ventilation and Air Conditioning (HVAC) systems.

Green Technology: Hybrid Vehicle Technology, Industrial ecology, Green Technology, Green Business, Green Computing,

### **Field work (Equal to 5 lecture hours)**

- Visit to a local area for documentation of environmental assets- viz. river/forest/grassland/hill/mountain
- Visit to a local polluted site- Urban/Rural/Industrial/Agricultural
- Study of social/ environmental problem in a particular area
- Survey of simple ecosystems-pond, river, hill slopes, etc.

### **Recommended Books**

1. Environmental Science by Dr. Surinder Deswal, *Dhanpat Rai & Co. publication*
2. Environmental Studies by R. Rajgopalan, *Oxford IBH Publication 2011*
3. Environmental Studies by Dr. Preeti Jain.....*Manthan publication*
4. Environmental Science (8 th Edition) (2010): Daniel D. Chiras, Jones & Bartlett Ltd
5. Introduction to Environmental Science and Engineering (2<sup>nd</sup> Ed.) (2004): G. M. Masters, Pearson Education Pvt. Ltd.
6. Fundamentals of Environmental Science: G. S. Dhaliwal, G. S. Sangha and P. K. Raina, Kalyani Publication
7. Environmental Chemistry : A. K. De
8. Environmental Chemistry : B.K. Sharma, and H. Kaur
9. Environmental Science (6 th ed) (1997): Jr. G. T. Miller, Wadsworth Pub. C
10. Environmental Science –S.C. Santra
11. A text book of Environmental Studies.,2006. D.K.Asthana, Meera Asthana (S.Chand&Co.)
12. Handbook of Environmental Laws, Acts, Rules, Guidelines, Compliances and Standards, Vol. I and II, BS Publications, Hyderabad.
13. Introduction to Environmental Legislation, B.L.Chavan, A.R.Shahane and C.S. Rawandale, Asian Inst. Env. Law., Karmala.
14. Environmental Law Case Book Leelakrishnan. P, 2004, , Lexis Nexis, Butterworths
15. Environmental Law in India Singh Gurdip, 2004, , Mcmillan & Co.
16. G.J. Rau and C.D. Wee ten, "Environmental Impact Analysis Hand book, McGraw Hill, 1980.
17. Petts Judith, 1999, Handbook of environmental impact assessment. Vol. 1, Blackwell Science