Dr. A.P.J. Abdul Kalam University, Indore (M.P)

Scheme of Examination
B.Sc.
Semester-V
(w.e.f. July 2016 Onwards)

(Non Grading)

Course Name	Subject	Theory Max. Marks				Practical Max Marks		Total
		Internal		External		Max Marks	Min Marks	
		Max	Min	Max	Min			
Foundation Courses	HINDI+ ENGLISH **FCS 501 HE**	10+05=15	06	50+35=85	28	-	-	100
	Basics of Computer & Information Technology - I **FCS 502 EP**	15	06	35	12	-	-	50
Computer Science	COMPUTER SCIENCE **BSS 501 T**	15	06	85	28	50	17	100
	COMPUTER SCIENCE **BSS 501 P**	-	-	-	-	50	17	50
	PHYSICS **BSP503 T**	15	06	85	28	50	17	100
	PHYSICS **BSP503 P**	-	-	-	-	50	17	50
	MATHEMATICS **BSM 501 T**	25	08	125	42			150
Total								600

Dr. A.P.J. Abdul Kalam University, Indore (M.P)

B.Sc. Under Graduate Semester wise Syllabus

(W.e.f. session 2016 onwards)

Class: - B.Sc.

Semester: - V Semester

Subject: - Computer (BSS 501T)

Paper: - Object Oriented Programming using C++

Marks 85+15 CCE

To introduce the concept of object oriented programming through C++.

UNIT I

Introduction, OOPS languages, characteristics of OOP's languages, application of OOP's, OOP's paradigm, concepts: object, class, data abstraction, data encapsulation,inheritance, and polymorphism. Static and dynamic binding, message passing, benefits of OOP's, disadvantage of OOP's. Application of OOP's.

UNIT II

C++ programming basics, basic program structure, preprocessor directive, data types, operators, manipulator, type conversions, C++ stream class.Control statement: for, do, while, do-while Decision statement if, if-else, switch-Case. Jump statement: break, continue, go to, exit.

UNIT III

Function and arrays. Classes and instances, defining classes in object oriented language, building and destroying instances (constructors and destructors), modifiers, friend and inline functions, string handling function.

UNIT IV

Data encapsulation, polymorphism, operator overloading, function overloading, virtual functions.

UNIT V

Inheritance, reusability of code through inheritance, type of inheritance, data abstraction, abstract classes.

Templates and exception handling.

TEXT BOOK:

1.Object oriented programming with C++ by Balaguruswamy, TMH Publishing.

REFERENCE BOOKS:

1. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
2. C++ Primer, 3rd Edition, S. B. Lippman and J. Lajoie, Pearson Education.
3. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.

4. OOP in C++, 3rd Edition, T.Gaddis, J.Walters and G. Muganda, Wiley Dream Tech Press.
5. Object Oriented Programming in C++, 3rd Edition, R.Lafore, Galgotia Publications Pvt. Ltd.
6. Computer Science, A Structured Programming Approach Using C++, B. A .Forouzan and R. F. Gilberg, Thomson

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B.Sc. Under Graduate Semester wise Syllabus

(W.e.f. session 2016 onwards)

Class: - B.Sc.

Semester: - V Semester

Subject: - Computer (BSS 501 P)

Paper: - (OBJECT ORIENTED PROGRAMMING THROUGH C++)

1. Write a program to find the maximum of three using conditional operator.
2. Write a program to find the largest, second largest and third largest in a given array.
3. Write a program to generate Armstrong series.
4. Write a program to find the factorial of a given number.
5. Write a program to generate the Fibonacci series.
6. Write a program to check whether the given number is palindrome or not.
7. Write a program to find the GCD and LCM of two no's.
8. Write a program to print the diagonal elements of matrix.
9. Write a Program to demonstrate use of array of objects.
10. Program to demonstrate use of function overloading.
11. Write a function which accept object as a parameter and returns object.
12. Write a Program to demonstrate the virtual base class.
13. Write a Program to demonstrate use of polymorphism (virtual function).
14. Write a program to overload ++ operator to increment age of person by one month.
15. Write a program to illustrate the use of scope resolution operator.
16. Write a program to find the square root using inline function.
17. Write a program to illustrate the use of friend function.
18. Create two employee objects and display each object's yearly salary.
19. Give each employee a 10% raise and display each Employee's yearly salary again..
20. Write C++ program to create five object of book, get information of book using getdata() function including name, price, publication and author.

Dr. A.P.J. Abdul Kalam University, Indore (M.P)

B.Sc. Under Graduate Semester wise Syllabus

(w.e.f. session 2018 onwards)

Class: - B.Sc.

Semester: - V Semester

Subject: - Physics (BSP 503T)

Paper: - Quantum Mechanics and Spectroscopy

Marks 85+15 CCE

Unit-I: QUANTUM MECHANICS-1

Particles and Waves: Photoelectric effect. Black body radiation. Compton effect. De Broglie hypothesis. Wave particle duality. Davisson-Germer experiment. Wave packets. Concept of phase and group velocity. Two slit experiment with electrons. Probability. Wave amplitude and wave functions. Heisenberg's uncertainty principle with illustrations. Basic postulates and formalism of Schrodinger's equation. Eigenvalues. Probabilistic interpretation of wave function. Equation of continuity. Probability current density. Boundary conditions on the wave function. Normalization of wave function.

Unit-II: QUANTUM MECHANICS-2

Time independent Schrodinger equation: One dimensional potential well and barrier. Boundary conditions. Bound and unbound states. Reflection and transmission coefficients for a rectangular barrier in one dimension. Explanation of alpha decay. Quantum phenomenon of tunneling. Free particle in one-dimensional box, eigen functions and eigen values of a free particle. One-dimensional simple harmonic oscillator, energy eigenvalues from Hermite differential equation, wave function for ground state. Particle in a spherically symmetric potential. Rigid rotator. Orbital angular momentum, azimuthal quantum numbers and space quantization. Radial solutions and principle quantum number. Hydrogen atom.

Unit-III: ATOMIC SPECTROSCOPY

Atoms in electric and magnetic fields: Quantum numbers, Bohr model and selection rules. Stern-Gerlach experiment. Spin as an intrinsic quantum number. Incompatibility of spin with classical ideas. Orbital angular momentum. Fine structure. Total angular momentum. Pauli exclusion principle. Many particles in one dimensional box. Symmetric and anti-symmetric wave functions. Atomic shell model. Spectral notations for atomic states. Spin-orbit coupling, Vector model L-S and J-J coupling. Doublet structure of alkali spectra. Zeeman effect. Continuous and characteristic X-rays. Mossley's law.

Unit-IV: MOLECULAR SPECTROSCOPY

Spectra: Various types of spectra. Rotational spectra. Intensity of spectral lines and determination of bond distance of diatomic molecules. Isotope effect. Vibrational energies of diatomic molecules. Zero point energy. Anharmonicity. Morse potential. Raman effect, Rotational Raman spectra and Vibrational Raman spectra. Stokes and anti-Stokes lines and their intensity difference. Electronic spectra. Born-Oppenheimer approximation. Frank-Condon principle, singlet and triplet states. Fluorescence and phosphorescence.

Unit-V: NUCLEAR PHYSICS

Interaction of charged particles and neutrons with matter, working of nuclear detectors, G-M counter, proportional counter, Scintillation counter, Cloud chamber.
Basic properties of nucleus: Shape, Size, Mass and Charge of the nucleus. Stability of the nucleus and Binding energy. Alpha particle spectra – velocity and energy of alpha particles. Geiger-Nuttal law. Nature of beta ray spectra. The neutrino. Energy levels and decay schemes. Positron emission and electron capture. Selection rules. Beta absorption and range of beta particles. Kurie plot. Nuclear reactions, pair production. Q-values and threshold of nuclear reactions. Nuclear reaction cross-sections. Examples of different types of reactions and their characteristics. Compound nucleus, Bohr's postulate of compound nuclear reaction, Semi empirical mass formula, Shell model, Liquid drop model, Nuclear fission and fusion (concepts).

References:

1 Quantum Mechanics: V. Devanathan, Narosa Publishing House, New Delhi, 2005.

2 Quantum Mechanics: B. H. Bransden, Pearson Education, Singapore, 2005.

3 Quantum Mechanics: Concepts and Applications, Nouredine Zettili, Jacksonville State University, Jacksonville, USA, John Wiley and Sons, Ltd, 2009.

4 Introductory Quantum Mechanics & Spectroscopy: K.M. Jain, South Asian Publications.

5 Physics of Atoms & molecules: B.H. Bransden & C.J. Joachaim, Pearson Education, Singapore, 2003

6 Fundamentals of Molecular Spectroscopy: C.M. Banwell & M. McCash, McGraw Hill (U.K. edition)

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B.Sc. Under Graduate Semester wise Syllabus

(W.e.f. session 2018onwards)

Class: - B.Sc.

Semester: - V Semester

Subject: - Mathematics (BSM 501T)

Paper: - Linear Algebra Numerical Analysis

Unit-I

Definition and examples of vector spaces, subspaces, Sum and direct sum of subspaces, Linear span, Linear dependence, independence and their basic properties, Basis, Finite dimensional vector spaces, Existence theorem for basis, Invariance of the number of elements of a basis set, Dimension, Dimension of sums of vector subspaces.

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Unit- II

Linear transformations and their representation as matrices, The algebra of linear transformations, The rank- nullity theorem, Eigen values and eigen vectors of a linear transformation, Diagonalisation, Quotient space and its dimension.

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Unit-III

Approximations, Errors and its types, Solution of Equations: Bisection, Secant, Regula Falsi, Newton- Raphson Method and their order of convergence, Roots of second degree Polynomials, Interpolation: Lagrange interpolation, Divided Differences, Interpolation formulae using Differences and derivations of Interpolation formula.

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Unit-IV

Linear Equations: Direct Methods for Solving Systems of Linear Equations, Gauss elimination, Gauss Jordan Method, LU Decomposition, Cholesky

Decomposition, Iterative Methods: Jacobi Method , Gauss - Seidel Method, Relaxation Method, Methods Based on Numerical Differentiation.

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Ordinary Differential Equations: Euler Method, Eulers Modified Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods, Milne Method, Numerical Quadrature, Newton-Cote's Formulae, Gauss Quadrature Formulae, Methods Based on Numerical Integration with their derivation.

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Text Books :

1. K. Hoffman and R. Kunze, Linear Algebra, 2nd Edition. Prentice Hall Englewood Cliffs, New Jersey.1971.
2. C E Frooerg. Introduction to Numerical Analysis, (Second Edition L Addison-Wesley - 1979,
3. M K Jain, S.R.K. Iyengar, R. K. Jain. Numerical Methods Problems and Solutions, New Age International (P)Ltd. 1996.

Reference Book:-

1. E. Balaguruswamy- Numerical Method Tata Mc Graw_ Hill Pub.Com. New Yark
2. K.B. Datta. Matrix and Linear Algebra, Prentice hall of India Pvt Ltd., New Delhi, 2000.
3. S.K. Jain, A. Gunawardena & P.B. Bhattacharya. Basic Linear Algebra with MATLAB Key college Publishing (Springer-Verlag) 2001
4. S. Kumarsaran, Linear Algebra, A Geometric Approach Prentice – Hall of India, 2000