DR APJ ABDUL KALAM UNIVERSITY, INDORE

Scheme of Examination
B.Sc.
Semester-I
(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 101 HE**	10+05=15	05	50+35=85	28	-	-	100
	E-SHIP **FCS 102 EP**	15	05	35	12	-	-	50
B.Sc. Mathematics	MATHEMATICS **BSM 101 T**	25	08	125	42			150
	CHEMISTRY **BSC102 T**	15	05	85	28	50	17	150
	CHEMISTRY **BSC102 P**	-	-	-	-	50	17	50
	PHYSICS **BSP103 T**	15	05	85	28	50	17	100
	PHYSICS **BSP103 P**	-	-	-	-	50	17	50
Total								**600**

DR APJ ABDUL KALAM UNIVERSITY, INDORE

B.Sc. Under Graduate Semester wise Syllabus

(W.e.f. session 2016 Onwards)

Class: - B.Sc.

Semester: - I Semester

Subject: - Physics (BSP103T)

Marks 85+15 CCE

Unit-I: Mathematical Physics

Addition, subtraction and product of two vectors; Polar and axial vectors and their examples from physics; Triple and quadruple product (without geometrical applications); Scalar and vector fields; Differentiation of a vector; Repeated integral of a function of more than one variable; Unit tangent vector and unit normal vector; Gradient, Divergence and Curl; Laplacian operator; Idea of line, surface and volume integrals; Gauss', Stokes' and Green's Theorems, Jacobian Application.

Unit-II: Mechanics

Kinematics: Displacement, Time and Average Velocity (x-t graph illustrations to be included); Instantaneous Velocity (Finding of velocity on an x-t graph), Average and Instantaneous Acceleration (Illustration with v–t and a–t graph), Motion with Constant Acceleration (Illustration with a–t and v–t graph), Freely Falling Bodies (Up and down motion in fall with y-t and vy-t graph), Velocity and Position by Integration, Position and Velocity Vectors, Acceleration Vector, Components of velocity and acceleration in different coordinate systems.

Newton's Laws of motion and its explanation with problems, various types of forces in nature (explanation), Pseudo Forces (e.g. Centrifugal Force), Coriolis force and its applications. Motion under a central force, Derivation of Kepler's laws. Gravitational law and field, Potential due to a spherical body. Gauss & Poisson's equation of Gravitational self-energy. System of particles, Centre of mass and reduced Mass. Elastic and inelastic collisions.

Unit-III: General Properties of Matter

Elasticity: Hook's law and coefficient of elasticity; Young's modulus, Bulk modulus and Modulus of rigidity; Work done during longitudinal strain, volume strain, and shearing strain; Poisson's ratio; Relation between three elastic moduli (Y, η, K); Determination of Y of rectangular thin bar loaded at the centre; Torsional oscillations, Torsional rigidity of a wire, to determine η by torsional oscillations.

Surface Tension: Surface Tension, Angle of Contact, Capillary Rise Method; Energy required to raise a liquid in capillary tube; Factors affecting surface tension; Jeager's method for Determination of surface tension; Applications of Surface Tension.

Viscosity and Fluid Mechanics: Concept of Viscous Forces and Viscosity; Steady and Turbulent Flow, Reynolds's number; Equation of Continuity; Bernoulli's Principle; Application of Bernoulli's equation - (i) Speed of Efflux (ii) Venturimeter (iii) Aspirator Pump(iv) Change of plane of motion of a spinning ball.

Unit-IV: Oscillations Concept of Simple, Periodic & Harmonic Oscillation with illustrations; Differential equation of harmonic oscillator; Kinetic and potential energy of Harmonic Oscillator; Oscillations of two masses connected by a spring; Translational and Rotational motion, Moment of Inertia and their Product,Principal moments and axes, Motion of Rigid Body, Euler's equation.

Unit-V:

Relativistic Mechanics: Michelson-Morley experiment and its outcome; Postulates of Special Theory of Relativity; Lorentz Transformations. Simultaneity and order of events; Lorentz contraction; Time dilation; Relativistic transformation of velocity, frequency and wave number; Relativistic addition of velocities; Variation of mass with velocity.

Earlier Developments in Physics up to 18th Century: Contributions of Aryabhatt, Archimedes, Nicolus Copernicus, Galileo Galilei, Huygens, Robert Hooke, Torricelli,Vernier, Pascal, Kepler, Newton, Boyle, Young, Thompson, Coulomb, Amperes, Gauss, Biot-Savarts, Cavendish, Galvani, Franklin and Bernoulli.

Useful links:

1. http://en.wikipedia.org/wiki/History of Physics

2. http://en.wikipedia.org/wiki/Nobel Prizes in Physics

Reference Books:

1. University Physics: Sears and Zeemansky, XIth edition, Pearson Education

2. Concepts of Physics: H.C. Varma, Bharati Bhavan Publishers

3. Problems in Physics: P.K. Srivastava, Wiley Eastern Ltd.

4. Applied Fluid Mechanics: Mott Robert, Pearson Benjamin Cummir, VIth Edition,

Pearson Education/Prentice Hall International, New Delhi

5. Properties of Matter: D.S. Mathur, Shamlal Chritable Trust, New Delhi

6. Mechanics: D.S. Mathur, S Chand and Company, New Delhi-5.

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B.Sc. Under Graduate Semester wise Syllabus

(W.e.f. session 2016 Onwards)

Class: - B.Sc.

Semester: - I Semester

Subject: - Mathematics (BSM 101T)

Paper: - Matrix Theory, Calculus and Geometry

Unit-1 Rank of a matrix, Eigen values, eigen vectors, Characteristic equation of a matrix, Cayley Hamilton theorem and its use in finding inverse of matrix, Application of matrix to a system of linear (both homogenous and non - homogenous) equations, Theorems on consistency and inconsistency of a system of linear equations, Solving the linear equations with three unknowns.

Unit-2 Relation between the roots and coefficients of a general polynomial equation in one variable, Transformation of equations, Descarte's rule of signs, De Moivre's theorem and its applications, Direct and inverse circular and hyperbolic functions, Expansion of trignometrical function.

Unit-3 Continuity of function of one variable, Properties of continuous function, Uniform continuity, Chain Rule of differentiability, Mean value theorems and their geometrical interpretations, Darboux's Intermediate Value Theorem for derivatives.

Unit-4 Integration of irrational algebraic functions and transcendental functions, Reduction formulae, Definite Integrals.

Unit-5 Equation of cone with given base, generators of cone, condition for three mutually perpendicular generators, Right circular cone, Equation of Cylinder and its properties, Right circular cylinder, enveloping cylinder and their properties.

Texts Books:

1. S.L. Loney – Plane Trigonometry Part II
2. K.B. Datta – Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi 2000
3. Chandrika Prasad – A Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd. Allahabad

4. N. Saran & R.S. Gupta : Analytical Geometry of Three dimensions. Pothishala Pvt. Ltd.Allahabad

5. S.L. Loney, Elements of Coordinate Geometry, Macmillan and Co. London.

6. Gorakh Prasad – Differential Calculus, Pothishala pvt. Ltd. Allahabad

7. Gorakh Prasad – Integral Calculus, Pothishala pvt. Ltd. Allahabad

8. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & sons, 1999.

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B.Sc. Under Graduate Semester wise Syllabus
(W.e.f. session 2016 onwards)

Class: - B.Sc.
Semester: - I Semester
Subject: - Chemistry (BSC102T)

Marks 85+15 CCE

Unit- 1

A. Mathematical Concepts: Logarithmic relations, (rules and types), use of log table and antilog table in calculations, curves sketching, straight line and linear graphs, calculation of slopes, Differentiation of functions like Kx, ex, xn, sinx, logx; multiplication and division in differentiation, maxima and minima, partial differentiation and reciprocity relations. Integration of
some useful/relevant functions; Factorials, Probability.

B. Gaseous States and Molecular Velocities: Critical phenomenon : PV isotherms of ideal gases, Andrew's experiment, continuity of states, the isotherms of van der Waals equations, relationship between critical constants and Vander Waals constants, Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision numbers, mean free path and collision diameter.

Unit-2

A. Liquid State: Intermolecular forces, structure of Liquids (a qualitative description) Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.

B. Solid State: Definition of space lattice, Unit cell, Laws of crystallography - (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Laws of symmetry, Symmetry elements in crystals. Ionic solid structures, radius ratio, radius ratio effect and coordination number, limitations of radius rule, lattice defects.

Unit-3

A. Elementary Quantum Mechanics: Schrodinger wave equation, significance of _ and _2, radial and angular wave functions and probability distribution curves, effective nuclear charge.

B. Periodic Properties : Definition, application and periodicity of Atomic and ionic radii, ionization energy, electron affinity and electronegativity

C. Chemical Bonding: Covalent bonding as applied to valence bond theory and its limitations, directional characteristic of covalent bond. Hybridization and shapes of simple molecules and ions, Valence Shell Electron Pair Repulsion (VSEPR) theory to NH3, SF4, CIF3, ICI2, H2O.

Unit-4

A. s-Block Elements: Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their, function in bio systems an introduction to alkyls and aryl complexes.

B. p-Block Elements : Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16. Hydrides of boron-diborane and higher boranes. Borazine, borohydrides.

Unit-5

A. Bond Parameters Bond lengths and bond angles, bond energy: Localized and delocalized chemical bond, Vander Waal interactions, with reference to supra molecular chemistry, resonance, hyperconjugation, inductive and field effects, hydrogen bonding.

B. Types of Reagents: Electrophiles and nucleophiles. Types of organic reactions. Energy consideration. Hemolytic and heterolytic cleavage Reactive intermediatescarbocations, carbanions, free radicals and carbenes\ benzynes.

C. Stereochemistry: Concept of Stereoisomerism, types of Stereoisomerism, elements of symmetry Chiral and achiral compounds. Fischer projection formulae; optical isomerism of lactic and tartaric acids, enantiomerism and diastereoisomerism; configuration (relative and absolute); conformations of ethane and n-butane and cyclohexane.

D, L-and R, S-notations of compounds containing chiral centers; projection formulae – Fischer, Newman and Sawhorse of compounds containing two adjacent chiral centers; meso and dl-isomers, erythro and threo isomers; racemization and resolution; geometrical isomers ; E and Z notations.

Suggested book

1. Physical Chemistry-Puri, Sharma and Pathania, Vikas Publications, New Delhi
2. Physical Chemistry -G.M. Barrow, International Student Edition, McGraw Hill.
3. The Elements of Physical Chemistry, P.W. Atkins, Oxford Un iv e r s i t y Press
4. Physical Chemistry, R.A. Alberty, Wiley Eastern Ltd.
5. Physical Chemistry Through problems, S.K. Dogra and S. Dogra, Wiley Eastern
6. Organic Chemistry, Morrison and Boyd, Prentice Hall.
7. Organic Chemistry, L.G. Wade Jr. Prentice Hall
8. Fundamentals of Organic Chemistry Solomons, John Wiley.
9. Organic Chemistry, Vol. I, IL IIL S.M. Mukherji, S.P. Singh and R.P. Kapoor,
10. Organic Chemistry, F.A. Carey, McGraw-Hill Inc.
11. Introduction to Organic Chemistry, Streitwiesser, Heathcock and Kosover, Macmillan.
12. Vogel's Qualitative & quantitative Analysis Vol- 1, 2, 3, ELBS.
13. Advanced Organic chemistry, I. L. Finar, ELBS.
14. Basic Concepts of Analytical chemistry, S M Khopker, New Age International Publishers.
15. Analytical Chemistry, R.M. Verma, CBS Publication.
16. Analytical Chemistry, Skoog & West, Wiley International.
17. Essentials of Physical Chemistry, B.S. Bahl, Arun Bahl & G.D. Tuli, S. Chand & Company Ltd.
18. Atomic structure and Molecular spectroscopy, Manas Chanda, New Age International Publishers.
19. Molecular Spectroscopy, Sukumar, MJP Publishers.
20. Organic Chemistry, Mac Murrey, Pearson Education.
21. Inorganic Chemistry – J.D. Lee, John Wiley
22. Inorganic Chemistry – Cotton and Wilkinson, John Wiley

23. Inorganic Chemistry – Huheey, Harper Collins Pub. USA
24. Inorganic Polymer – G.R. Chhatwal, Himalaya Pub.House
25 मध्य प्रदेष हिन्दी ग्रन्थ अकादमी भोपाल द्वारा प्रकाषित रसायन विज्ञान की पाठ्यपुस्तक।
26 मध्य प्रदेष हिन्दी ग्रन्थ अकादमी भोपाल द्वारा प्रकाषित प्रायोगिक रसायन की पाठ्यपुस्तक

Class: - B.Sc.

Semester: - I Semester

Subject: - Chemistry (BSC102P)

Max Marks: 50

Duration of practical during the semester examination: 4 hours

Physical Chemistry

(A) Any one experiment **12 Marks**

1. Calibration of thermometer
2. Determination of melting point
3. Determination of boiling point
4. Preparation of solutions of various concentration, NaOH, HCl, H_2SO_4.

(B) Any one experiment **12 Marks**

1. Determination of surface tension/percentage composition of given organic mixture using surface tension method
2. Determination of viscosity / percentage composition of given organic mixture using viscosity method.

Organic chemistry **12 Marks**

1. Distillation
2. Crystallization
3. Decolourisation and crystallization using charcoal
4. Sublimation
5. Detection of elements and functional groups
6. Organic molecules through models with special reference to optical and Geometrical isomerism.

Viva : 6 marks

Records : 8 marks