DR APJ ABDUL KALAM UNIVERSITY, INDORE

Scheme of Examination

B.Sc.

Semester-II

(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 201 HE**	10+05=15	05	50+35=85	28	-	-	100
	E-SHIP **FCS 202 EP**	15	05	35	12	-	-	50
B.Sc Mathematics	MATHEMATICS **BSM 201 T**	25	08	125	42			150
	CHEMISTRY **BSC202 T**	15	05	85	28	50	17	150
	CHEMISTRY **BSC202 P**	-	-	-	-	50	17	50
	PHYSICS **BSP203 T**	15	05	85	28	50	17	100
	PHYSICS **BSP203 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: - II Semester

Subject: - Physics (BSP203T)

Marks 85+15 CCE

Unit-I: Thermodynamics-I

Reversible and irreversible process, Heat engines, Definition of efficiency, Carnot's ideal heat engine, Carnot's cycle, Effective way to increase efficiency, Carnot's engines and refrigerator,

Coefficient of performance, Second law of thermodynamics, Various statements of Second law of thermodynamics, Carnot's theorem, Clapeyron's latent heat equation, Carnot's cycle and its applications.Steam engine, Otto engine, Petrol engine, Diesel engine.उत्क्रमणीय एवं अन

Unit II: Thermodynamics-II

Concept of entropy, Change in entropy in adiabatic process, Change in entropy in reversible cycle. Principle of increase of entropy, Change in entropy in irreversible process.

T-S diagram, Physical significance of Entropy, Entropy of a perfect gas, Kelvin's thermodynamic scale of temperature, The size of a degree, Zero of absolute scale, Identity of a perfect gas scale and absolute scale.

Third law of thermodynamics, Zero point energy, Negative temperatures (not possible), Heat death of the universe.

Relation between thermodynamic variables (Maxwell's relations).

Unit-III: Statistical Physics- -I

Description of a system: Significance of statistical approach, Particle-states, System-states, Microstates and Macro-states of a system, Equilibrium states, Fluctuations, Classical & Statistical Probability, The equi-probability postulate, Statistical ensemble, Number of states accessible to a system, Phase space.

Micro Canonical Ensemble, Canonical Ensemble, Helmholtz free energy, Enthalpy, First law of thermodynamics, Gibbs free energy, Grand Canonical Ensemble.

Unit-IV: Statistical Physics- -II

Statistical Mechanics: Phase space, The probability of a distribution, The most probable distribution and its narrowing with increase in number of particles, Maxwell-Boltzmann statistics, Molecular speeds, Distribution and mean, r.m.s. and most probable velocity, Constraints of accessible and inaccessible states.

Quantum Statistics: Partition Function, Relation between Partition Function and Entropy, Bose-Einstein statistics, Black-body radiation, The Rayleigh-Jeans formula, ThePlanck radiation formula, Fermi-Dirac statistics, Comparison of results, Concept of Phase transitions.

Unit-V: Life and Contributions of Physicists

S.N. Bose, M.N. Saha, Maxwell, Clausius, Boltzmann, Joule, Wien, Einstein, Planck, Bohr, Heisenberg, Fermi, Dirac, Max Born, Bardeen.

Useful links for

Unit-V:

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

Text and Reference Books:

1. **Heat and Thermodynamics:** Mark W. Zemansky, Richard H. Dittman, Seventh Edition, McGraw-Hill International Editions.
2. **Thermal Physics (Heat & Thermodynamics)**: A.B. Gupta, H.P. Roy, Books and Allied (P) Ltd, Calcutta.
3. **Heat and Thermodynamics:** Brijlal and N. Subrahmanyam, S. Chand & Company Ltd, New Delhi.
4. **Thermal and Statistical Physics:** K.M. Jain, South Asian Publication.
5. **Concept of Physics:** H.C. Verma, Bharati Bhavan Publishers.

DR APJ ABDUL KALAM UNIVERSITY, INDORE

B.Sc. Under Graduate Semester wise Syllabus

(w.e.f. session 2016 onwards)

Class: - B.Sc.

Semester: - II Semester

Subject: - Mathematics (BSM 201T)

Paper: - Advanced Calculus, Differential Equations, Vector Calculus

Unit-1 Successive differentiation, Leibnitz theorem, Maclaurin and Taylor series expansions, Asymptotes, Curvature, Tests for concavity and convexity, Points of inflexion, Multiple points, Tracing of curves in Cartesian co-ordinates.

Unit-2 Limit and continuity of functions of two variables, Introduction of Partial differentiation, Euler's Theorem on homogeneous function, Jacobians, Differentiability of real-valued functions of two variables, Taylor's theorem for functions of two variables, Double and triple integrals, Dirichlet's integrals.

Unit-3 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.

Unit-4 Homogenous linear ordinary differential equations, linear differential equations of Second order, Transformation of the equation by changing the dependent variable and the independent variable, Method of variation of parameters, Ordinary simultaneous differential equations.

Unit-5 Vector differentiation, Gradient, Divergence and Curl, Vector integration, Theorem of Gauss (without proof) and problems based on it, Theorem of Green (without proof) and problems based on it, Stoke's theorem (without proof) and problems based on it.

Texts Books:

1. Gorakh Prasad – Differential Calculus, Pothishala pvt. Ltd. Allahabad
2. Gorakh Prasad – Integral Calculus, Pothishala pvt. Ltd. Allahabad
3. D.A. Murray: Introductory Course in Differential Equations, Orient Long man, India 1967.
4. N. Saran & S.N. Nigam – Introduction to Vector Analyss, Pothishala Pvt. Ltd., Allahabad.
5. Murray R. Spiegel, Theory & problems of Advanced Calculus.Schaum's outline series, Schaum Publishing Co. NewYark.

Reference Books:

1. P.K. Jain and S. K. Kaushik, An introduction of Real Analysis, S.Chand & Co. New Delhi 2000.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons 1999.
3. G. F. Simmons, Differential Equations, Tata Mcgraw Hill, 1972.
4. E.A. Codington, An introduction to ordinary differential equations, Prentice Hall of India, 1961.
5. H.T.H. Piaggio, Elementary Treatise on Differential equations and their applications, C.B.S. Publisher and Distributors, Delhi 1985.
6. W.E. Boyce and P.C. Diprima, Elementary Differential equations & Boundary Value problems, John Wiley 1986.
7. Murray R. Spiegel, Vector Analysis, Schaum Publishing Co. New York.
8. Shanti Narayan, A text book of Vector Calculus, S. Chand & Co., New

DR APJ ABDUL KALAM UNIVERSITY, INDORE

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

Class: - B.Sc.

Semester: - II Semester

Subject: - Chemistry (BSC202T)

Marks 85+15 CCE

UNIT –I

Chemical Kinetics : Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction- concentration, temperature, pressure, solvent, light and catalyst. Dependence of rate on concentration, mathematical characteristics of simple chemical reactions- zero order, first order, second and pseudo order, half life and mean life.

Determination of the order of reaction- differential method, integration method, method of half life period and isolation method. Study of chemical kinetics by polarimetry and spectrometry.

Theories of Chemical Kinetics : effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory, transition state theory (equilibrium hypothesis).

UNIT –II

A. Thermodynamics

Definition of thermodynamics terms : system, surrounding, Types of systems, intensive and extensive properties State and path functions and their differential. Thermodynamic process. Concept of heat and work.

B. Molecular Orbital Theory

Homonuclear and heteronuclear (CO and NO) diatomic molecules. Multicenter bonding in electron deficient molecules, bond strength and bond energy, Calculation of percentage ionic character from character from dipole moment and electronegativity difference.

C. Ionic solids

Semiconductors, lattice energy and Born- Haber cycle, salvation energy and solubility of ionic solids, polarizing power and polarizablity of ions. Fazan's rule, Metallic bond, free electron, Valance bond and Band theories.

UNIT –III

A. Acids and Bases

Arrhenius, Bronsted- Lowry, solvent system Lewis concepts.

B. Chromatography Techniques

Definition, classifications and principle. Seperation of inorganic ions, amino acids and carbohydrates (by paper chromatography and TLC methods).

UNIT – IV : Alkanes

Methods of preparation (with special reference of wurtz, Kolbe, Corey- House reactions and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes.

Cycloalkanes

Methods of preparations, chemical reactions. Bayer's strain theory and its limitations. Ring strain in cycloalkane and cyclobutanes. Theory of strainless ring.

UNIT V : Dienes

Methods of formation, classification of dienes- isolated, conjugated and cumulated dienes. Butadiene : method of formation , polymerization. Chemical reactions 1, 2 and 1,4 – addition, Diels –alder reaction.

Alkynes

Methods of formation, Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and necleophilic addition reactions, hydroboration, oxidation and polymerization.

Alkyl Halides

Nomenclature and classification of alkyl halides, methods of formation, chemical reaction. Mechanism of necleophilic substitution reaction of alkyl halides, SN1 and SN2 reaction with energy profile diagrams.

Books Suggested :

- Physical Chemistry , R.A. Alberty, Wiley Eastern Ltd.
- Physical Chemistry Through problems, S.K. Dogra and S. Dogra , Wiley Eastern
- Organic Chemistry , Morrison and Boyd, Prentice Hall.
- Organic Chemistry, L.G. Wade Jr. Prentice Hall.
- Fundamentals of Organic Chemistry Solomons, John Wiley.
- Organic Chemistry, Vol. I, IL IIL S.M. Mukherji, S.P. Singh and R.P. Kapoor.
- Organic Chemistry, F.A. Carey, McGraw – Hill Inc.
- Introduction to organic Chemistry, Streitwiesser, Healthcock and Kosover, Macmillan.
- Vogel's Qualitative & quantitative Analysis Vol-1,2,3, ELBS.
- Advanced organic Chemistry, I.L.Finar, ELBS.

- Basic concepts of Analytical chemistry, R.M.Verma, CBS Publication.
- Analytical Chemistry Skoog and West, Wiley International
- Essentials of Physical Chemistry, B.S. Bahl, Arun Bahl & G.D. Tuli, S. Chand & Company Ltd.
- Atomic structure and Molecular spectroscopy, Manas Chanca, New Age International Publishers.
- Molecular spectroscopy, Sukumar, MJP Publishers.
- Organic Chemistry, Mac Murrey, Pearson Education.
- Inorganic Chemistry – J.D. Lee, John Wiley.
- Inorganic Chemistry – Cotton and Wilkinson, John Wiley.
- Inorganic Chemistry – Huheey, Harper Collins Pub. USA.
- Inorganic Polymer - G.R. Chhatwal, Himalaya Pub. House.

DR APJ ABDUL KALAM UNIVERSITY, INDORE

Class: - B.Sc.

Semester: - II Semester

Subject: - Chemistry (BSC202P)

Practical

Max Marks: 50

Duration of practicals during the entire semester : 90 hours
Duration of practical during the semester examination : 4 hours

Inorganic Chemistry

Inorganic mixture analysis **8Marks**
Mixture Analysis for 2 Cations and 2 Anions

Separation of cations by paper chromatography. **4Marks**

Physical Chemistry (Any one) 12Marks

1. To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate / ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To study the effect of acid strength on the hydrolysis of an ester.
3. To compare the strength of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ester.
4. kinetic studies of decomposition of iodided by H_2O_2.(study of iodine clock reaction)

Organic Chemistry: (12 marks)

1. Detection of 2 elements (N, S and halogens) in same organic compound. 6 marks
2. Identification of 2 functional groups in multifunctional organic compound 6 marks

Viva 6 marks
Records : 8 marks