विश्वेश्वरय्या राष्ट्रीय प्रौद्योगिकी संस्थान, नागपूर

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR

Course Book
First Year B.Tech.

2015-2016

CONTENTS

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Courses to Register in First Year B.Tech.
(*Sections R, S, T, U, L*)

I Semester			
Code	**Course**	**L-T-P**	**Credits**
AML151	Engineering Mechanics	3-1-0	4
AMP151	Engineering Mechanics Laboratory	0-0-2	1
HUL101	Communication Skills	2-0-2	3
MAL101	Mathematics – I	3-1-0	4
MEL101	Engineering Drawing	3-0-0	3
MEP101	Engineering Drawing Practical	0-0-2	1
PHL101	Physics	3-1-0	4
PHP101	Physics Laboratory	0-0-2	1
SAP101	Health Information and Sports –Part 1	0-0-2	0
		Total Credits	21
II Semester			
Code	**Course**	**L-T-P**	**Credits**
CHL101	Chemistry	3-1-0	4
CHP101	Chemistry Laboratory	0-0-2	1
CSL101	Computer Programming	3-0-2	4
EEL101	Electrical Engineering	3-1-0	4
EEP101	Electrical Engineering Laboratory	0-0-2	1
HUL102	Social Science	2-0-0	2
MAL102	Mathematics – II	3-1-0	4
MEP102	Workshop	0-0-4	2
SAP102	Health Information and Sports –Part 2	0-0-2	0
		Total Credits	22

Courses to Register in First Year B.Tech.
(*Sections W, X, Y, Z, N*)

I Semester			
Code	**Course**	**L-T-P**	**Credits**
CHL101	Chemistry	3-1-0	4
CHP101	Chemistry Laboratory	0-0-2	1
CSL101	Computer Programming	3-0-2	4
EEL101	Electrical Engineering	3-1-0	4
EEP101	Electrical Engineering Laboratory	0-0-2	1
HUL102	Social Science	2-0-0	2
MAL101	Mathematics – I	3-1-0	4
MEP102	Workshop	0-0-4	2
SAP102	Health Information and Sports –Part II	0-0-2	0
		Total Credits	22
II Semester			
Code	**Course**	**L-T-P**	**Credits**
AML151	Engineering Mechanics	3-1-0	4
AMP151	Engineering Mechanics Laboratory	0-0-2	1
HUL101	Communication Skills	2-0-2	3
MAL102	Mathematics – II	3-1-0	4
MEL101	Engineering Drawing	3-0-0	3
MEP101	Engineering Drawing Practical	0-0-2	1
PHL101	Physics	3-1-0	4
PHP101	Physics Laboratory	0-0-2	1
SAP101	Health Information and Sports –Part I	0-0-2	0
		Total Credits	21

Details of Course Contents

AML151 – ENGINEERING MECHANICS   3-1-0   Cr. 4

Objectives: To enable the students understand the basic concepts of mechanics such as force, equilibrium, moment etc and to analyze simple determinate structures like beam, truss and frame.

Content:

Force systems: Vector representation of force system, Moment of a force about a point and about an axis; couple moment; reduction of a force system to a force – a couple Wrench

Equilibrium: Free Body Diagram, Reactions at supports, Equilibrium of Planar (including friction) and Spatial force system, Analysis of statically determinate systems (Beam, Trusses etc.)

Centroid and Moment of inertia: First moment of area, Centroid of area, Moment of inertia, Polar moment of inertia, Parallel axis theorem, Radius of gyration, Section modulus.

Internal forces in member: Determination of variation of Axial force (Axial Force Diagram), Shear force (Shear Force Diagram), Bending moment (Bending Moment Diagram) and twisting moment (Torque diagram)

Concept of stress and strain: Normal and shear stress and strain, State of stress at a point, Stress strain curve, Hook's law, Modulus of elasticity, Poisson's ratio, Modulus of rigidity, Bulk modulus, Transformation of stress.

Determination of stress: Stress across a rectangular, T & I section, and circular section due to bending moment Stress across a rectangular, T & I section, and circular section due to shear force. Stress across a circular section due to torsion.

Reference Books:
1. Hibbler, Engineering Mechanics, Pearson Education, Asia Pvt Ltd.
2. Beer F.P. and Johnston E.R., Vector Mechanics for Engineers: Statics and Dynamics, Tata McGraw-Hill
3. Irving H. Shames, Engineering Mechanics: Static and Dynamics, Pearson Education, Asia Pvt Ltd.
4. Meriam J.L. and Kraige L.G., Engineering Mechanics, John Wiley and Sons.
5. Stephen Timoshenko, Strength of Materaials, Part -1, CBS Publishers and Distributors, New Delhi.
6. Singer F.L. and Andrew Pytel, Strength of Material, Harper and Row Publishers, New York.
7. Popov E.P., Mechanics of deformable bodies, Prentice-Hall
8. Beer F.P. and Johnston E.R., Mechanics of materials, McGraw-Hill International

AMP151 – ENGINEERING MECHANICS LABORATORY   0-0-2   Cr. 1

Objectives: To develop capabilities in the students to perform simple practical experiments based on fundamental concept of mechanics.

Experiments:

1. Verification of equilibrium equation for coplanar forces.
2. Verification of Lami's theorem.
3. Verification of Law of parallelogram of forces.
4. Verification of Law of polygon of forces.
5. Verification of equilibrium equation for spatial forces.
6. Determination of coefficient of friction.
7. Analysis of truss (Analytical / Graphical method).
8. Determination of modulus of elasticity for copper wire.
9. Determination of modus of rigidity of material.
10. Flexural test on beam.
11. Tension Test on Mild Steel Specimen

CHL101 – CHEMISTRY   3-1-0   Cr. 4

Objective: To present sound knowledge of chemistry fundamentals, enriching students to understand the role of Applied Chemistry in the field of science and engineering. To inculcate habit of scientific reasoning to do the task rationally.

Content:

Chemical kinematics and catalysis: Introduction to rate equation and reaction order, reaction mechanism, relation between rate equation and reaction mechanism, First order & Second order. Dependence of temperature on reaction rates. Arrhenius theory, collision theory, Transition – state theory, Physical adsorption, chemisorption, Freundlich's expression, Langmuir adsorption isotherm, Heterogeneous catalysis, examples of heterogeneously catalysed reactions.

Features of Coordination Chemistry & Organic Reaction Mechanism: Coordination chemistry, coordination number, chelate effect, coordination complexes and their applications. Electrophilic substitution reactions in aromatic systems. Some Name reactions viz. Hoffman's rearrangement, Beckman's reaction, Riemer-Tiemann reaction, Skraup synthesis, etc.

Thermodynamics and electrochemical Phenomenon: Heat, work and energy, reversible and irreversible processes, work done in an isothermal reversible expansion of ideal gas. Enthalpy, Entropy, Electrochemical and galvanic series, polarization, decomposition potential, over voltage.   Theories of corrosion,

Differential aeration theory. Factors influencing corrosion. Types of corrosion Control of corrosion : Design and material selection, anodic and cathodic protection, protective coatings, corrosion inhibitors, Fuel Cells.

Analytical aspects of water: Sources, conservation of water, impurities in water and their effects. WHO guidelines and BIS guidelines for drinking water. Chemistry involved in sedimentation, coagulation and sterilization. Softening of water, lime-soda, ion-exchange process and numerical problem. Boiler troubles, causes and effects, methods of prevention.

Engineering Materials: Glass, ceramics, refractory, composites, magnetic materials, Polymers & structure property relationship. Thermoplastic & thermosetting plastics. Preparation, properties & applications of some commodity and engineering polymers. Conducting polymers.

Interaction of radiation with matter: Molecular spectroscopy, vibrational, rotational, absorption, emission and light scattering phenomenon.

Reference Books:
1. Dara, S.S., Umare S.S.; A Text Book of Engineering Chemistry (Twelfth edition); S. Chand. Co. 2010.
2. Shashi Chawla ; A Text Book of Engineering Chemistry (Third edition); Dhanpat Rai & Co. Ltd., 2006.
3. Kuriacose, J.C., Rajaram, J.; Chemistry in Engineering and Technology (Vol. 1&2); McGraw Hill, 1984.
4. Barrow, M. Gordon; Physical Chemistry (Fifth edition); McGraw-Hill, 1992.
5. March, Jerry.; Advance Organic Chemistry Reaction Mechanism and Structure (Fourth edition); John Wiley & Sons New York, 2004.
6. W. Kemp; Organic spectroscopy (III Edition) PALGRAVE, 2002.
7. Puri B.R., Sharma L.R., Pathania M.S; Principles of Physical Chemistry; Vishal Publishing Co. (42nd Edition)

CHP101 - CHEMISTRY LABORATORY   0-0-2   Cr. 1

Objective: To develop skills and capabilities of students in solving problem using knowledge of Chemistry.

Experiments:
1. Water and waste water analysis: Determination of (i) Hardness and alkalinity, (ii) Dissolved oxygen and free chlorine, (iii) Chlorides, fluorides and COD, (iv) Trace metal determination in water using Ion-selective electrodes, (a) Arsenic (b) Lead (c) Mercury.
2. Determination of capacity of Ion exchange resins.
3. Analysis of ores and alloys:

Determination of (i) Copper in brass, (ii) Calcium in limestone and dolomite.

4. Demonstration Experiments on Instrumental methods of analysis:
   a) pH-metric titration, b) Colorimetric determination c) Turbidity by Nephelometry.

5. Chemical Kinetics / Adsorption: i) Rate constant   ii) To study the adsorption of acetic acid on activated charcoal.

Reference Books:

1. Dara, S.S.; A text book on Experiments and Calculations in Engineering Chemistry (ninth edition); S. Chand, 2003.
2. Rattan, S.; Experiments in Applied Chemistry (second edition); S.K. Kataria & Sons, 2003.
3. Rani, S.; Laboratory Manual on Engineering Chemistry; Dhanpat Rai, 1998.
4. Vogel's Text book of Quantitative Inorganic Analysis (fifth edition); Pearson, 2000.

CSL101 - COMPUTER PROGRAMMING 　　　　　　3-0-2　　Cr. 4

Objectives: To introduce basics of programming and develop logical thinking of students. To help students understand how to model real world problems into the software and develop practical programming skills of students. To implement mathematical statistical, applications into programming.

Content:

Introduction: Flow charts, data types and storage classes, scope of variables, arithmetic operators, assignment, conditional, arithmetic expressions, enumerated data types, decision making, branching, looping, Switch concept, function and parameter passing, recursive functions, macros.

Basic programming algorithms: Programs to illustrate basic language constructs in C like - Factorial, Sine/cosine and other mathematical series, Fibonacci series, calculating square-root of a number, calculating GCD of 2 integers (Euclid's method and otherwise), Calculating LCM of 2 integers and similar such programs.

Arrays and applications: Introduction to one dimensional and 2-D array with examples. Representing a polynomial using 1-D array and polynomial operations, Use of 2-D array to represent a matrix and matrix operations. Character arrays (strings): String related functions (strlen, strcpy, strcat, strcmp, atoi, itoa, reverse, strstr etc) and their function definitions. Searching and Sorting methods: Selection sort, Bubble sort, Insertion sort, Linear and binary search, partitioning an array, merging of 2 sorted arrays. Introduction to "Divide and Conquer" via Mergesort and Quicksort.

Structures and Unions: Basic concept, array of structures and its applications.

Pointers: Introduction (declaration and initialization), pointers and arrays, concept of dynamic memory allocation, use of pointers to represent variable-sized 1-D and 2-D arrays, pointers to structures.

File Management in C: Open, close, read and write operations, Sequential and text files.

Reference Books:
1. Kerninghan; Ritchie, "C programming Language", PHI
2. Balguruswamy, "Programming in ANSI C", Tata Mcgraw Hill Publishing
3. Kakde and Deshpande, "C and data Structure", Charles River Media Publisher
4. Dromey R G, "How to Solve it by Computer", PHI

EEL101 - ELECTRICAL ENGINEERING   3-0-0   Cr. 3

Objectives: To enable the students understand the basic ideas and principles of Electrical Engineering. To impart knowledge for understanding the details of electrical power systems, transformers, generators, motors etc.

Content:

Electrical Circuit: Circuit Elements Resistance, Inductance & Capacitance, Kirchhoff's Laws, Voltage Source (Definition, Characteristics of Practical Source, and Equivalent Current Source), and Star-Delta Transformation.

Magnetic Circuit, Flux, MMF, Reluctance, Analogy with Electric Circuits. Simple Calculations for Composite Magnetic Circuits

AC Circuits: Periodic Function, Average & R.M.S., Values, Steady State Behavior With Sinusoidal Excitation, Phasor Representation, Reactance & Impedance, Series & Parallel Circuit, Power Factor, Principle of Generation of Single Phase & Three Phase Voltages, Power in Balanced Three Phase AC System

Electrical Measurements : Definition, Indicating, Integrating & Recording Instruments, Deflecting Controlling & Damping Mechanisms, Ammeter & Voltmeters, P.M.M.C.

Type & Moving Iron Type, Electrodynamometer Type Wattmeters, Induction Type Single Phase Energy Meter

Transformers : Introduction, Basic Principles, Construction, Phasor Diagram for Transformer under No Load Condition Transformer On Load, Balance of MMF on Sides, Phasor Diagram, Equivalent Circuit, Open Circuit & Short Circuit Test, Voltage Regulation and Efficiency

Power Systems : Elementary Idea about Power Generation, Transmission and Distribution

Electric Machines :DC Shunt and Series Motor – Construction, Principle of Working, Characteristics, Speed Control and Applications

Induction Motors – Construction, Principle of Working of Single Phase and 3-Phase Motors. Torque Slip Characteristics

Reference Books:
1. Hughes, Electrical Technology, Pearson Publishers
2. Theraja B.L., Electrical Technology, S. Chand Publishers
3. Kothari D.P. and Nagrath I.J.,Theory And Problems Of Basic Electrical Engineering, Prentice Hall India
4. Kulshresta D.C., Basic Electrical Engineering, TMH India
5. Mittle and Mittal, Basic Electrical Engineering, TMH, 2005

EEP101 - ELECTRICAL ENGINEERING LABORATORY   0-0-2   Cr. 1

Objectives: To develop understanding of various methods of analysis of electrical circuits under varying conditions. To provide a solid foundation for later learning as well as for future professional activities.

Experiments:
1. Study and verification of Kirchhoff's laws applied to DC circuits
2. Study of AC series R-L-C circuits
3. Determination of B-H curve of a magnetic material
4. Study of AC parallel R-L-C circuits
5. Study of balanced 3-phase circuits
6. Determination of voltage regulation and efficiency of a single-phase transformer by direct loading
7. Study of speed control of a DC motor by field current control and by armature voltage control
8. Study of reversal of direction of rotation of a 3-phase induction motor

Reference Books
1. Tarnekar S.G., and Kharbanda P.K., 'A Textbook Of Laboratory Course In Electrical Engineering', Chand S., 2006

HUL101 - COMMUNICATION SKILLS   2-0-2   Cr. 3

Objectives: To impart to the students the skills that they need in their academic, and later in their professional pursuit. To train the students to adopt an innovative approach to English language teaching and learning.

Content:
ENERGY: Oil, Nuclear Preparation, Alternative Sources
COMPUTERS: Introducing Computers, New Frontiers, Computers in India
TECHNOLOGY: Appropriate Technology, Printing, Evaluating Technology
ENVIRONMENT: Pollution, Ecology, Our living Environment
INDUSTRY: Personnel and Production, Safety and Training, Selling Produc

Reference Books:
1. Orient Longman , A Textbook of English for Engineers and Technologists.
2. Quirk R.and Greenbaum S., A University Grammar of English.
3. Krishnaswamy N., English Grammar (Longman Publication) (Macmillan India Ltd)

HUL102 - SOCIAL SCIENCE   2-0-0   Cr. 2

Objectives: To inculcate the ethics, human values, norms and healthy habits among the students. To make the students aware of the society and social problems. To provide the knowledge of social concepts like culture, civilization, socialization and social stratification and also update the knowledge of globalization, modernization and westernization in current scenario.

Content:
Applied Humanities and Human Engineering: Introduction: Meaning, scope and general utility of social sciences to engineers. Different subject in social sciences. Society, its type, characteristics and problems.

Fundamental concept in social science: Culture-Types, Characteristics, Merit, demerit and some related terms of culture. Social structure and social system. Socialization and social stratification.Family and marriage institutions in India.
Social control and social change

Industrialization and society: Industrial psychology and industrial democracy. Environment in industry.Fatigue of workers. Motivation, selection and training of workers.

The study of political orientation: Indian constitution and federal system. Fundamental rights and directive principles. Legislative measures for labor welfare. Beaurocracy in India.

Major social problem in India: Over population, Poverty, Slums, Family Disorganization (divorce)**,** Corruption.

Reference Books
1. Sheikh Sabir, Shiekh A M and Jaya Dwadshiwar, A New Look into Social Sciences, Sage Publication New Delhi.
2. Ahuja Ram, Social Problems in India, Rawat Publication New Delhi.
3. Saxsena R.C., Labour Problems and Social Welfare, Prakashan Kendra, Lucknow

MAL101 – MATHEMATICS- I   3-1-0   Cr. 4

Objectives: To expose student to understand the basic importance of Differential calculus, Integral calculus, Infinite series and Matrix theory in science and engineering.

Content:

Differential Calculus: Functions of single variable: Limit, continuity and differentiability. Mean value theorems: Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's theorem with remainders, indeterminate forms, curvature, curve tracing.

Integral Calculus: Fundamental theorem of Integral calculus, mean value theorems, evaluation of definite integrals, Applications in Area, length, volumes and surface of solids of revolutions, Improper integrals: Beta and Gamma functions, differentiation under integral sign.

Infinite series: Sequences, Infinite series of real and complex numbers, Cauchy criterion, tests of convergence, absolute and conditional convergence, improper integrals, improper integrals depending on a parameter, uniform convergence, power series, radius of convergence.

Matrices: Rank of matrix, consistency of a system of equations, linear dependence and independence, linear and orthogonal transformations, Eigen values and eigen vectors, Cayley – Hamilton theorem, reduction to diagonal form, Hermitian and skew Hermitian matrices, Quadratic forms.

Reference Books:
1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley & Sons
2. Piskunov, N., Differential and Integral calculus, Mir publishers Moscow (Vol. 1, Vol. 2)
3. Thomas, G.B. and Finney, R.L, Calculus and Analytic Geometry, Addison Wesley Longman
4. Michael D. Greenberg, Advanced Engineering Mathematics, Pearson Education Pvt. Ltd
5. Jain R.K., Iyengar S.R.K, Advanced Engineering Mathematics, Narosa Publishers

MAL102 – MATHEMATICS-II   3-1-0   Cr. 4

Objectives: To make students understand the basic importance of multi variable calculus (Differential calculus & Integral calculus), Vector calculus and ordinary differential equations in engineering.

Content:

Calculus of Functions of Several Variables: Limit, continuity and differentiability of functions of several variables, partial derivatives and their geometrical interpretation, Tangent plane and normal line. Euler's theorem on homogeneous

functions, Total differentiation, chain rules, Jacobian, Taylor's formula, maxima and minima, Lagrange's method of undetermined multipliers.

Multiple Integrals: Double and triple integrals, change of order of integration, change of variables, application to area, volumes, Mass, Centre of gravity.

Vector Calculus: Scalar and vector fields, gradient of scalar point function, directional derivatives, divergence and curl of vector point function, solenoidal and irrotational motion. Vector integration: line, surface and volume integrals, Green's theorem, Stoke's theorem and Gauss divergence theorem (without proof).

Ordinary Differential Equations: First order differential equations: Exact equation, Integrating factors, Reducible to exact differential equations, Linear and Bernoulli's form, orthogonal trajectories, Existence and Uniqueness of solutions. Picard's theorem, Picard's iteration method of

solution (Statements only). Solutions of second and higher order linear equation with constant coefficients, Linear independence and dependence, Method of variation of parameters, Solution of Cauchy's equation, simultaneous linear equations.

Reference Books:
1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley & Sons
2. Piskunov, N., Differential and Integral calculus, Mir publishers Moscow (Vol. 1, Vol. 2)
3. Thomas, G.B. and Finney, R.L, Calculus and Analytic Geometry, Addison Wesley Longman.
4. Michael D. Greenberg, Advanced Engineering Mathematics, Pearson Education Pvt. Ltd
5. Jain R.K., Iyengar S.R.K, Advanced Engineering Mathematics, Narosa Publishers.

MEL101 – ENGINEERING DRAWING   3-0-0   Cr. 3

Objectives: To impart and include proper understanding of the theory of projection. Improve the visualization skills. To enable the students with various concepts like dimensioning, conventions and standards related to working drawing in order to become professionally efficient. To impart the knowledge on understanding and drawing of simple residential/ office building.

Content:

Introduction to BIS SP-46-1988, Use of various drawing instruments , Concept of scales, Representative factor and dimensioning, Conversation of Pictorial views to orthographic/ profile views, orthographic projections of points , lines, plane on principle planes/ Profile plane/ Auxiliary planes. Projection of right regular solids inclined to both the planes. Projection of right regular solids inclined to both the planes. Section and development of surfaces of solids. (Preferably in normal position/ Inclined to one plane). Intersection of combination of regular solid (Preferably in

normal position/ Inclined to one plane). Drawing isometric views from orthographic projection orthographic views.

Reference Books:

1. Bhatt N.D. and Panchal V.M., Elementary Engineering Drawing, Charotar Publishing House, 43rd edition.
2. Jolhe Dhananjay ,Engineering Drawing with an introduction to AutoCAD, Tata McGraw Hill Publishing Co.Ltd., 1st edition.
3. BIS-SP-46-1988, Handbook BIS SP -46-1988, BIS

MEP 101- ENGINEERING DRAWING PRACTICAL   0-0-2   Cr. 1

Objectives: To impart and include proper understanding of the theory of projection. Improve the visualization skills. To enable the students with various concepts like dimensioning, conventions and standards related to working drawing in order to become professionally efficient. To impart the knowledge on understanding and drawing of simple residential/ office building.

Content:

Introduction to BIS SP – 46 – 1988
Explanation of various drawing instruments, symbols, RF, Dimensioning, etc.
Practice of scales, Representative Factor and dimensioning on some practical exemplary figure.
Conversion of pictorial views to orthographic / profile views
Projection of points and lines
Projections of planes
Projections of lines and planes using Auxiliary planes
REVIEW – I of sheets
Projections of solids
Section and development of solids
Intersection of solids
Isometric views
REVIEW II of sheets

Reference Books:

1. Bhatt N.D. and Panchal V.M., Elementary Engineering Drawing, Charotar Publishing House, 43rd Edition.
2. Jolhe Dhananjay, Engineering Drawing with an introduction to AutoCAD, Tata McGraw Hill Publishing Co.Ltd, 1st edition.
3. BIS-SP-46-1988, Handbook BIS SP -46-1988, BIS.

PHL101 - PHYSICS   3-1-0   Cr. 4

Objectives: To equip the students with an understanding of the "Scientific Methods" so that they can use the training beneficially in their higher pursuits. This course gives a balance account of the fundamentals of Physics as well as some of recent developments in this area best suited to the Engineering applications in different branches. The course comprises five units, broadly divided as Quantum Physics, Crystallography, Semiconductor Physics, Electron ballistics and Optics.

Content:

Black Body Radiations, Photoelectric effect, Compton effect, Concept of matter waves, Davisson and Germer's experiment, Heisenberg's Uncertainty principle, Schrodinger's Wave equation and its application. Quantization of energy.

Crystal Structure: Unit cell and its characteristics in SC, BCC, FCC crystal structure, Miller indices, Bragg's Law, interplaner spacing.

Free electron theory, Formation of energy bands in solid, Fermi level in an intrinsic and extrinsic semiconductor, Hall effect, p-n junction diode, transistors.

Motion of charged particles in electric and magnetic field. Electrostatic and magnetostatic focussing, CRO, Cyclotron. Interference, diffraction and their applications.

Reference Books:

1. Resnick, Walker and Halliday, Fundamental of Physics, John Willey and Sons. Inc, 6th Edition, 2005.
2. Streetman B. G., Solid State Electronics, Prentice Hall India (2nd Edition) 1986.
3. Avadhanulu M. N. and P.G. Kshirsagar, A text Book of Engineering Physics, (7th Edition) 2004.
4. Dekkar A.J.; Electrical Engineering Materials; Prentice Hall og India Publication, 1992.
5. Kenneth Krane; Modern Physics; (2nd Edition); John Wiley Eastern, 1998.
6. Pillai S. O., Solid State Physics, New Age International Publishers, 3rd edition, 1999.

PHP101 - PHYSICS LABORATORY   0-0-2   Cr. 1

Objectives: To impart experimental skills which are useful in various branches of Engineering and Technology. The practical course is based on experiments linked with the theory course and hence provides thorough understanding of the subject. This course is also aimed at enhancing the analytical capability of the engineering students.

Experiments:

1. To study the characteristics of Photocell and to determine the work function of the cathode material.
2. To calibrate an electromagnet and to study the dependence of Hall voltage on magnetic field and current through the sample.
3. To study the I/P, O/P and transfer characteristics and to determine 'α' of transistor in common base mode.
4. To study the forward and reverse characteristics of semiconductor diode.
5. To determine the band-gap in a semiconductor using reverse biased p-n junction diode.
6. To determine e/m for an electron by Thomson's method.
7. To calibrate an audio frequency oscillator and to determine the unknown frequency and phase of RC network by using single trace CRO.
8. To determine the radius of curvature of a plano- convex lens using Newton's Rings.
9. To determine the wavelength of sodium vapour lamp by plane transmission grating.

MEP102-WORKSHOP   0-0-4   Cr. 2

Objectives: To develop the technical skills of creating entities from raw materials. To give "hands on" training and practice to students for use of various tools, devices, equipment and machines. To develop ability to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.

Content

Fitting :-

Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling, tapping.

Term work to include one job involving following operations : filing to size, drilling and tapping .

Carpentry :-

Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood tuning and modern wood turning methods.

Term work to include one carpentry job involving a joint and report on demonstration of a job involving wood tuning.

Smithy:-

Use and setting of smithy tools At least one job is to be demonstrated.

Welding:-

Use and setting of tools and equipments for edge preparation for welding jobs and Arc welding for different job like, Lap welding of two plates, butt welding of plates.

Machining :-

At least one metal tuning job is to be demonstrated.

CNC Machines:-

One job on CNC Lathe and CNC Milling machine to be demonstrated.

Foundry:-

At least one demonstration of mould making.

Reference Books:

1. S K Hajra, CHoudhury, A K Hajra, CHoudhury, & Nirjhar Roy, Elements of Workshop Technology, Vol. I & II.
2. B S Raghuwanshi, A Course in Workshop Technology, Vol. 1 & II.
3. W A .l Chapman, Workshop Technology, Part I, ll & III

SAP101- HEALTH INFORMATION AND SPORTS-PART 1   0-0-2   Cr. 0

Objective: To provide physical fitness and good health. Create awareness among the students about their health status by conducting various tests and measurements and suggest them suitable remedial physical fitness program so that they can improve physical and physiological health status. To improve productivity, foster social harmony, inculcate sense of discipline and dedication in general life, develop the spirit of team work, through various sports activities.

Content:

Development of components of fitness through conditioning exercises:

Strength: (Strength Endurance, Maximum Strength, explosive strength), Endurance: (aerobic endurance, anaerobic endurance, speed endurance and strength endurance), Speed, Co-coordinative ability, Flexibility

Physical Efficiency Test Level 1(Testing and Evaluation of Physical Fitness):

Cooper Test 12 minute run or walk test, Sit and reach test, 100 meter run, one minute sit up test, Push up/Bent knee push up test,

Teaching and development of sports skills: Cognitive, Perceptual, Motor, Perceptual motor.

First Aid training:

Intramural phase 1: Identification of sports talent through exposing students to inter-section tournament. Football, Volleyball, throw ball, table tennis & Chess.

SAP102- HEALTH INFORMATION AND SPORTS-PART 2   0-0-2   Cr. 0

Objective: Achieving higher level of physical activity in engineering population will contribute indirectly to gains in other sectors, vital to human development and economic progress. To improve productivity, foster social harmony, inculcate sense of discipline and dedication in general life, develop the spirit of team work, through various sports activities.

Content:

Physical Efficiency Test Level 2(Testing and Evaluation of Physical Fitness):1500 meter run, shuttle run, standing broad jump, one minute sit up test, flexibility test

Testing and assessment of selected Physiological parameters through Sports Medicine Research Lab: Total body fat analysis, Harvard step test, BMI, WHR, Back strength, Leg strength, grip strength, resting pulse rate, and resting respiratory rate. **Intramural phase 2:** Badminton, Basketball, Cricket, Kho-Kho.

CREDITS SYSTEM

Education at the Institute is organized around semester-based credit system of study. The prominent feature of the credit system is a process of continuous evaluation of a student's performance and flexibility to allow a student to progress at an optimum pace suited to his/her ability, subject to fulfilling minimum requirement for continuation. A student's performance is measured by number of credits he/she has earned (i.e. completed satisfactorily). Based on the course credits and grades obtained by the student, Semester Grade Point Average (SGPA) or Cumulative Grade Point Average (CGPA) is calculated. A minimum number of earned credits and minimum grade point average should be acquired in order to qualify for the award of graduate degree. Details are given in Rules and Ordinances Book.

Credit requirement

A student is required to earn minimum of 320 credits in eight semesters. These credits are to be earned form different category of courses like, Basic Sciences (BS), Departmental Core (DC), Departmental Elective (DE), Humanities & Management (HM), Open Course (OC) and Audit Course (AU).

Calculations of   SGPA & CGPA

Semester Grade Point Average (SGPA) or Cumulative Grade Point Average (CGPA) is calculated as follows,

$$SGPA = \frac{\sum_{semester} (Course\ credits \times Grade\ points)\ for\ all\ courses\ except\ audit}{\sum_{semester} (Course\ credits)\ for\ all\ courses\ except\ audit}$$

$$CGPA = \frac{\sum_{semester} (Course\ credits \times Grade\ points)\ for\ all\ courses\ with\ pass\ grade\ except\ audit}{\sum_{semester} (Course\ credits)\ for\ all\ courses\ except\ audit}$$

GRADING SYSTEM

Continuous evaluation process, based on student's performance in uniformly placed I & II Sessional Examinations, Teachers Assessment (TA) and End-Semester Examination for each course. At the end of semester, grades shall be awarded by course coordinator or concerned faculty as a performance indicator. Details of these grades are as given below.

Grades	Grade Points	Description of performance
AA	10	Outstanding
AB	09	Excellent
BB	08	Very Good
BC	07	Good
CC	06	Average
CD	05	Below Average
DD	04	Marginal
FF	00	Very-poor/ Unsatisfactory / Absence in End-Sem Examination
W		Attendance Less than 75 % . Not Eligible for End-Sem Examination. Shall repeat the Course
SS		Satisfactory Completion of Audit Course
ZZ		Un-satisfactory / Audit Course continuation

ATTENDANCE

100 % attendance in the class of each course is expected. However, in consideration of constrains / unavoidable circumstances, the attendance can be relaxed only to the extent not more than 25 %.

Any student having attendance less than 75 % will not be eligible to appear in End-semester Examination.

ACADEMIC CALANDER 2015-16

विश्वेश्वरय्या राष्ट्रीय प्रौद्योगिकी संस्थान, नागपूर
VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR
ACADEMIC CALENDER (2015-2016)

AUTUMN (ODD SEM)

Date	Event
27 Jul, 2015	Commencement of classes
15 Sep, 2015	Last date for display of Sessional-I marks & attendance
16 Oct, 2015	Last date for display of Sessional-II marks & attendance
12 Nov, 2015	Last date of formal teaching & display of attendance & internal marks
1 Dec, 2015	Last date for display of final grades
3 Dec, 2015	Submission of marks
26 Nov-1Dec	Registration for next semester
18 Dec -1 Jan	Winter/Summer Vacation (for teachers)
01 – 31 Dec	Ph.D. Progress seminar
14 – 17 Dec	Re-examination
21 Dec, 2015	Last date for display of Re-exam marks
4 Jan, 2016	M. Tech. Project Submission/Examination
17-18 Oct, 2015	Commencement of classes for next semester — AXIS STUDENTS EVENTS
26-27 Dec, 2015	Alumni Meet — AROHI

These Saturdays will be Instruction days: 1/8 Thursday; 8/8 Friday; 9/1 Monday; 20/2 Friday; 05/3 Tuesday; 12/3 Wednesday

SPRING (EVEN SEM)

Date	Event
4 Jan, 2016	Commencement of classes
16 Feb, 2016	Last date for display of Sessional-I marks & attendance
24 Mar, 2016	Last date for display of Sessional-II marks & attendance
22 Apr, 2016	Last date of formal teaching & display of attendance & internal marks
10 May, 2016	Last date for display of final grades
11 May, 2016	Submission of marks
05-09 May	Registration for next semester
30 May -14 Jul	Winter/Summer Vacation (for teachers)
1 Jul – 31 Jul	Ph.D. Progress seminar
23-27 May	Re-examination
30 May, 2016	Last date for display of Re-exam marks
15/30 Jun,2016	M. Tech. Project Submission/Examination
25 July, 2016	Commencement of classes for next semester
27-28 Feb,2016	Alumni Meet — AROHI

HOLIDAY (Autumn)

Date	Holiday
18 Jul	Id-ul-Fitr
15 Aug	Independence Day
17 Sept	Ganesh Chaturthi
25 Sept	Id-ul-Zuha
02 Oct	Mahatma Gandhi's Birthday
22 Oct	Vijaya Dashami
24 Oct	Muharram
11 Nov	Deepavali
13 Nov	Bhai Duj
25 Nov	Gurunanak Jayanti
24 Dec	Id E Milad
25 Dec	Christmas Day

HOLIDAY (Spring)

Date	Holiday
26 Jan	Republic Day
7 Mar	Mahashivratri
23 Mar	Holi
25 Mar	Good Friday
8 Apr	Gudi Padwa
19 Apr	Mahavir Jayanti
25 May	Buddha Purnima

SUMMER TERM

Date	Event
31 May, 2016	Registration for Summer Term
01 Jun, 2016	Commencement of classes
13 Jun, 2016	Sessional I
15 Jun, 2016	Display of Sessional I Marks
30 Jun, 2016	Sessional II
2 Jul, 2016	Display of Sessional II Marks
19 July, 2016	Display of Attendance & Internal marks
20-21 Jul,2016	End Semester Examination
23 Jul, 2016	Last date for display of grades

EXAMINATIONS (Autumn)

Examination-Time

	First Year B Tech	Higher Sem
First Slot in the day	9.00 – 10.00 am	10.30 – 11.30 am
Second Slot in the day	2.30 – 3.30 pm	4.00 – 5.00 pm

	Sessional	End Sem	Re-Exam
	9.00 – 10.00 am	9.00 – 12.00 noon	9.00 – 12.00 noon
	10.30 – 11.30 am	2.00 – 5.00 pm	2.00 – 5.00 pm

Slot	I Sess	II Sess	End Sem	Re Exam
A	2 Sept	7 Oct	16 Nov	14 Dec
B			17 Nov	
C	3 Sept	8 Oct	18 Nov	15 Dec
D			19 Nov	
E	4 Sept	9 Oct	20 Nov	16 Dec
F			23 Nov	
G	5 Sept	10 Oct	24 Nov	17 Dec
H			26 Nov	
I	I & J Slot are for Project Final Evaluation		27 Nov	
J			28 Nov	

EXAMINATIONS (Spring)

Slot	I Sess	II Sess	End Sem	Re Exam
A	8 Feb	16 Mar	23 Apr	23 May
B			26 Apr	
C	9 Feb	17 Mar	27 Apr	24 May
D			28 Apr	
E	10 Feb	18 Mar	29 Apr	26 May
F			2 May	
G	11 Feb	19 Mar	3 May	27 May
H			4 May	
I	I & J Slot are for Project Final Evaluation		5 May	
J			6 May	

Calendar 2016

JAN

SUN	MON	TUE	WED	THU	FRI	SAT
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEB

SUN	MON	TUE	WED	THU	FRI	SAT
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MAR

SUN	MON	TUE	WED	THU	FRI	SAT
28	29	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2

APR

SUN	MON	TUE	WED	THU	FRI	SAT
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4

JUNE

SUN	MON	TUE	WED	THU	FRI	SAT
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2

JUL

SUN	MON	TUE	WED	THU	FRI	SAT
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Calendar 2015

JULY

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

AUG

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

SEPT

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

OCT

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

NOV

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

DEC

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JAN 2016

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

TIME TABLE

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR – 440 010 (INDIA)

First Year B.Tech (2015-16)

Time Table for 1st Semester Physics Stream (R, S, T, U & L Sections)

Student shall attend classes as per their section/Roll No

(Lunch Break between period 5 (12.00–12.55 pm) and period 6 (2.00–2.55 pm).)

Day	Section	1 (8.00-8.55 am)	2 (9.00-9.55 am)	3 (10.00-10.55 am)	4 (11.00-11.55 am)	5 (12.00-12.55 pm)	6 (2.00-2.55 pm)	7 (3.00-3.55 pm)	8 (4.00-4.55 pm)	9 (5.00-5.55 pm)
Monday	R	PH	EM	MA	CS	ED	EM_T1, PH_T3	EM_T2, PH_T4	SP	
	S	EM	MA	PH_P1, EM_P2, ED_P3, CS_P4			MA_T1	MA_T2		
	T		PH		PH_T2, EM_T4		MA_T3	MA_T4	PH_T1, EM_T3	
	U			EM	MA	PH	MA_T1	MA_T2	PH_P1, EM_P2, ED_P3, CS_P4	
	L		PH	ED	MA_T1	MA_T2	PH_P1, EM_P2, ED_P3, CS_P4			
Tuesday	R	EM	PH	MA		PH	PH_T1, EM_T3	PH_T2, EM_T4		SP
	S	MA	EM		ED	CS	MA_T3	MA_T4	SP	
	T	PH	PH	ED	PH	MA	MA_T1	MA_T2		
	U		CS		PH	EM	PH_T1, EM_T3	PH_T2, EM_T4	EM_T1, PH_T3	
	L			ED	EM		PH_T1, EM_T3	PH_T2, EM_T4	SP	
Wednesday	R	ED	EM	MA	PH	EM	PH_P1, EM_P2, ED_P3, CS_P4		EM_P1, ED_P2, CS_P3, PH_P4	
	S		CS_P1, PH_P2, EM_P3, ED_P4			CS	PH_T1, EM_T3	CS_P1, PH_P2, EM_P3, ED_P4		
	T		PH	ED	PH	MA	PH_T1, EM_T3	PH_T2, EM_T4	EM_T1, PH_T3	
	U	ED		EM		EM	EM_T1, PH_T3	EM_T2, PH_T4	SP	
	L	CS	PH	ED	MA	EM	PH_T1, EM_T3	PH_T2, EM_T4	SP	
Thursday	R	MA	ED	CS	PH	PH				
	S		ED_P1, CS_P2, PH_P3, EM_P4		EM	ED				
	T	EM	CS	ED	CS	ED				
	U		PH	MA	CS	ED				
	L	ED	MA_T3	MA_T4		MA_T4				
Friday	R	MA	ED	MA	EM	MA_T4	ED_P1, CS_P2, PH_P3, EM_P4		ED_P1, CS_P2, PH_P3, EM_P4	
	S	PH	EM_P1, ED_P2, CS_P3, PH_P4			PH	EM_T1, PH_T3	EM_T2, PH_T4	EM_P1, ED_P2, CS_P3, PH_P4	
	T		CS	ED	MA	EM	EM_T1, PH_T3	EM_T2, PH_T4		SP
	U		PH	MA		SP				
	L	PH	PH	MA	EM	MA	EM_P1, ED_P2, CS_P3, PH_P4	MA_T4		

Abbreviation for Courses:
PH- Physics,
MA-Mathematics-I,
EM-Engineering Mechanics,
ED- Engineering Drawing,
CS- Communication Skills,
SP- Sports

Room Nos:
Section R: CHE 003
Section S: MH-0-1
Section T: P-0-5
Section U: P-1-6
Section L: CHE 004
CHE –Chemical Eng. Deptt.
MH–Mathematics Deptt.
P–Physics Dept.

Each section is divided into four batches for Lab/tutorial.
PH_P1 is Physics lab for 1st Batch
EM_T2 is Engg. Mechanics tutorial for Batch 2.

Room Numbers for Tutorials shall be displayed by the respective Department. Course coordinator/teacher will announce the Room No. in the class.

TIME TABLE

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR – 440 010 (INDIA)

First Year B.Tech (2015-16)

Time Table for 1st Semester Chemistry Stream (W, X, Y, Z & N Sections)

(A LUNCH BREAK falls between period 5 and period 6.)

Day	Section	1 (8.00–8.55 am)	2 (9.00–9.55 am)	3 (10.00–10.55 am)	4 (11.00–11.55 am)	5 (12.00–12.55 pm)	6 (2.00–2.55 pm)	7 (3.00–3.55 pm)	8 (4.00–4.55 pm)	9 (5.00–5.55 pm)
Monday	W	MA	CP	EE	SS	CH				SP
	X		CH_P1, EE_P2, CP_P3, WS_P4		CH	CH_T2, EE_T4	WS_P1, EE_T2, CH_T4		EE_T1, CH_T3	
	Y		CH	MA	CH_P1, EE_P2, CP_P3, WS_P4	CH	WS_P1, WS_P2			SP
	Z	CP	EE_T2, CH_T4	CP	EE	CH	CH_T1, EE_T3	CH_T2, EE_T4	CH_P1, EE_P2, CP_P3, WS_P4	
	N	CP	EE		MA_T1, MA_T2, WS_P3, WS_P4		CP_P1, WS_P2, CH_P3, EE_P4	CH_T2, EE_T4		
Tuesday	W	CP	MA	MA	MA_T1, MA_T2, WS_P3, WS_P4		CP_P1, WS_P2, CH_P3, EE_P4			
	X	MA		CH_T1, EE_T3	CP	EE	WS_P2, WS_P3, WS_P4			
	Y	SS		MA	EE	EE	MA_T1, MA_T2, MA_T3, MA_T4			EE_P1, CP_P2, WS_P3, CH_P4
	Z	MA	EE_T1, CH_T3	CP	CP	CP	WS_P2, WS_P3, WS_P4			
	N	MA	WS_P1, CH_P2, EE_P3, CP_P4	EE	CH	SS	CH_T1, EE_T3			
Wednesday	W	EE	CP	EE	EE_P1, CP_P2, WS_P3, CH_P4	EE_T2, CH_T4	CP_P1, WS_P2, CH_P3, EE_P4		WS_P1, CH_P2, EE_P3, CP_P4	SP
	X		MA	MA	CP	EE	WS_P2, WS_P3, WS_P4			SP
	Y	SS	CH	MA	EE	CP	CH_T1, EE_T3			
	Z	MA		CH	CH	CH_T2, EE_T4	MA_T1, MA_T2, MA_T3, MA_T4			
	N	CP	CH	EE	CH	SS	CH_T1, EE_T3	CH_T2, EE_T4		
Thursday	W	EE	CH	SS	MA					
	X	MA	SS	CH	SS	EE_T2, CH_T4				
	Y	MA			SS	MA				
	Z	CP		EE	CP	MA				
	N				CP	MA				
Friday	W		CH	EE	WS_P1, WS_P2, MA_P3, MA_P4		EE_P1, CP_P2, WS_P3, CH_P4		CH_P1, EE_P2, CP_P3, WS_P4	
	X	MA	SS	CH	EE	CP	CH_P1, EE_P2, CP_P3, WS_P4		EE_P1, CP_P2, WS_P3, CH_P4	
	Y	CH	CH	EE	CP	EE	MA_T1, MA_T2, MA_T3, MA_T4			
	Z		CH	CP	EE_P1, CP_P2, WS_P3, CH_P4		WS_P3, WS_P4			SP
	N	EE	WS_P1, WS_P2, MA_P3, MA_P4	EE	SS	CH	WS_P1	EE_T1, CH_T3	SP	

Student shall attend classes as per their section/Roll No

Abbreviation for Courses:
- CH- Chemistry,
- MA-Mathematics-I,
- EE- Electrical Engineering
- CP- Computer Programming
- SS- Social Science,
- SP-Sports

Room Nos:
- Section W: CH-1-6
- Section X: WR-1-0-3
- Section Y: CHE 203
- Section Z: CHE 204
- Section N: MH-1-1
- CH–Chemistry Dept :
- WR–Water Resource Building:
- CHE–Chemical Eng. Dept:
- MH–Mathematics Dept

Each section is divided into 4 batches for Lab/tutorial.

CH_P1 is Chemistry lab for 1st Batch.

EE_T2 is Electrical Engg tutorial for Batch2

Room Numbers for Tutorials shall be displayed by the respective Department. Course coordinator/teacher will announce the Room No. in the class.

OTHER INFORMATION

The Director
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Associate Dean (Hostel Affairs)
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Asstt. Registrar (Hostel)
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Medical Officer
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Warden HB-8
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9422390841

Warden HB-8/9
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0712 2801435/1622
9373045542

Warden HB-9
Dr. R. P. Vijaykumar
0712 2801782/1679
9970335592

Warden GH
Dr. Ashwini Mirajkar
0712 2801804
9850837937

Warden GH
Dr. Pallavi Mahale
0712 2801406/1288
9665232769

Matron (GH)
Mrs. S. V. Joshi
0712 280 13471113/1115

Account Section	0712 2801242
Academic Section	0712 2801241
Examination Cell	0712 2801278
T & P	0712 2801258
Security Section	0712 2801222
Hostel Section	0712 2801233
Guest House	0712 2801221
Health Center	0712 2801342
Physical Education	0712 2801232

For Student's Medical Emergency
Ambulance: 862 305 6246

CIIMS HOSPITAL, Bajaj Nagar , NAGPUR,
Phone No: - 2236441/2237662
WOCKHARDT HOSPITAL
27, Corporation Colony, Near Shankar Nagar Square,
 North Ambhazari Road, NAGPUR.
Phone No: - 224844/6534444
 KRIMS HOSPITAL
275, Central Bazar Road , Ramdaspeth
NAGPUR. Phone No: - 6614564-65
 CARE HOSPITAL
Farmland, Panchasheel Square,
NAGPUR. Phone No: - 3982444/3982222
 RATHI NURSING HOME Plot No. 40, Balraj Marg,
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