I B.TECH II SEMESTER SYLLABUS

ADVANCED CALCULUS

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A5BS04	BSC	3	1	-	4	30	70	100
Contact Classes: 44	Tutorial Classes: 08	Practical Classes: Nil				Total Classes: 52		

COURSE OBJECTIVES

To learn

1. Evaluation of improper integrals using Beta and Gamma functions.
2. The partial derivatives of several variable functions.
3. Concept and application of Laplace transforms.
4. Fourier series for periodic functions.
5. Numerical techniques.

COURSE OUTCOMES

At the end of the course, student will be able to:

1. Evaluate the improper integrals using beta and gamma functions.
2. Find the Maxima and Minima of several variable functions.
3. Solve the differential equations using Laplace transform techniques.
4. Find the Fourier series of the periodic functions.
5. Apply various numerical techniques to solve differential equations.

UNIT - I	BETA GAMMA FUNCTIONS AND MULTIPLE INTEGRALS	CLASSES: 11

Beta- Gamma Functions and their Properties-Relation between them- Evaluation of improper integrals using Gamma and Beta functions.
Double and triple integrals (Cartesian and polar), Change of order of integration in double integrals.

UNIT - II	CALCULUS OF SEVERAL VARIABLES	CLASSES: 11

Limit, Continuity - Partial derivative- Partial derivatives of higher order -Total derivative - Chain rule,Jacobians-functional dependence & independence. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints)

UNIT - III	LAPLACE TRANSFORMS	CLASSES: 12

Laplace transforms of elementary functions- First shifting theorem - Change of scale property – Multiplication by t^n- Division by t – Laplace transforms of derivatives and integrals – Unit step function – Second shifting theorem – Periodic function – Evaluation of integrals by Laplace transforms – Inverse Laplace transforms- Method of partial fractions – Other methods of finding inverse transforms – Convolution theorem – Applications of Laplace transforms to ordinary differential equations.

UNIT - IV	FOURIER SERIES	CLASSES:10

Periodic function-Determination of Fourier Coefficients-Fourier Series-Even and Odd functions-Fourier series in arbitrary interval-Even Odd periodic continuation-Half range Fourier sine and cosine expansions.

UNIT - V	NUMERICAL TECHNIQUES	CLASSES: 08

ROOT FINDING TECHNIQUES :
Bisection method-Regulafalsimethod,Iteration method and Newton Raphson method.
NUMERICAL INTEGRATION :
Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth rule.
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: Taylor's series method – Euler's - modified Euler's Method – Runge-Kutta method.

TEXT BOOKS:

1. Ervin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna publishers, 36th Edition, 2010.

REFERENCE BOOKS:

1. G.B.Thomas, calculus and analytical geometry,9th Edition, Pearson Reprint 2006.
2. N.P Bali and Manish Goyal ,A Text of Engineering Mathematics,Laxmi publications,2008.
3. E.L.Ince, Ordinary differential Equations,Dover publications,1958.

WEB REFERENCES:

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS:

1. https://www.e-booksdirectory.com/details.php?ebook=10166

MOOCS COURSE:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/

APPLIED PHYSICS

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5BS08	BSC	3	1	-	4	30	70	100
Contact Classes:44	Tutorial Classes:8	Practical Classes: 0				Total Classes: 52		

COURSE OBJECTIVES

The course should enable the students to:

1. Learn the behavior of matter waves and applications of Schrödinger wave equations
2. Understand the formation of energy bands in solids
3. Acquire the fundamental knowledge of semiconductor devices and their applications
4. Learn the basic principles of laser and optical fiber
5. Describe the fundamentals in quantum computations and explain how it can be used in cryptography

COURSE OUTCOMES:

At the end of the course students will be able to:

1. Apply principles of quantum mechanics to calculate observables on known wave functions.
2. Apply the concept of band theory to explain the behavior of different electronic materials.
3. Analyze the inner working of semiconductor p-n diodes, LED and new semiconductor devices.
4. Explain the basic principles of laser physics, working of lasers, principle of propagation of light in Optical fibers and Solve the numerical problems associated
5. Apply the basic tools and techniques of quantum computation and quantum information in a problem solving scenario

UNIT - I	INTRODUCTION TO QUANTUM PHYSICS	CLASSES: 10

Black body radiation, Planck's law, photoelectric effect, Compton effect, Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer's experiment, Heisenberg's Uncertainty Principle, Schrodinger's Time Independent Wave Equation-Physical Significance of the wave Function, Particle in One Dimensional Potential Box.

UNIT - II	BAND THEORY OF SOLIDS	CLASSES: 10

Band theory - Quantum theory of free electron, Bloch theorem, Kronig-Penny model, E-k diagram, effective mass of electron.

Energy bands in Solids: Origin of energy band formation in solids, Fermi energy level, Fermi-Dirac Statistics (Qualitative treatment), classification of materials as conductors, insulators and semiconductors.

UNIT - III	SEMI-CONDUCTORS	CLASSES:12

Semiconductor Physics: Intrinsic and Extrinsic Semiconductors – formation of p-type and n-type, Fermi Level. Direct and Indirect Band gap semiconductors, Hall Effect and applications.

Physics of Semiconductor Devices: PN Junction Diode, V-I characteristics and applications. LED - Construction, working and applications. Solar cells- working and its applications. Efficiency issues of Solar cell.

UNIT - IV	LASER & FIBER OPTICS	CLASSES: 10

Lasers: Characteristics of Laser, Basic processes between two energy levels. Pumping mechanism, Meta stable state and Population inversion. Working of Nd-YAG laser, applications of lasers in different fields.

Fiber Optics: Structure of fibers, Principle of fiber (TIR), Acceptance angle and NA. Types of fibers- SI and GI fibers- R.I profiles. Single and Multimode fibers-SMSI, MMSI, MMGI. OFC System with block diagram. Fiber optic sensors – Basic principle, working of Pressure and Temperature Sensors. Applications of fibers in different fields.

UNIT - V	QUANTUM COMPUTATION AND CRYPTOGRAPHY	CLASSES: 10

Quantum computation: Idea of classical bits and qubits, Bloch vector representation of state of qubit. Single qubit logic gates- Pauli X, Y, Z and Hadmard gate in matrix form. Two level gates: CNOT and SWAP gates. Comments on No cloning theorem. Quantum Teleportation – Basic Idea.

Cryptography Methods: Introduction to cryptography, Classical and Public key cryptosystems, Verman cipher, The RSA protocol; Quantum Key distribution protocol - BB84 protocol.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learing
2. R. Robinett, “Quantum Mechanics”, OUP Oxford, 2006.IIndEdn.
3. P.K Palanisamy, Engineering Physics, Sitech Publications, 2013, IVthEd
4. Nielsen M. A., I. L Chung, Quantum Computation & Quantum Information, Cambridge Univ. Press

REFERENCE BOOKS:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Grew-Hill inc.(1995)
2. O. 1Svelto, “Principles of Lasers”, Springer Science & Business Media, 2010
3. D. A. Neamen, “Semiconductor Physics and Devices”, Times Mirror High Education Group, Chicago, 1997
4. Principles of Quantum computation and Information – By G. Benenti, G. Casati, G. Strini, World Scientific

WEB REFERENCES:

1. https://www.edx.org/course?search_query=semiconductor+physics
2. https://www.edx.org/course/nanotechnology-fundamentals-purduex-nano530x

E-TEXT BOOKS:

1. http://www.phys.sinica.edu.tw/TIGP-ANO/Course/2010_Fall/classnotes/NanoB_week14.pdf
2. https://www.scribd.com/document/70908178/Semiconductor-Devices-Basic-Principles-Jasprit-Singh
3. https://www.scribd.com/doc/105174065/Fundamentals-of-Photonics
4. ftp://nozdr.ru/biblio/kolxo3/P/PE/PEo/Thyagarajan%20K.,%20Ghatak%20A.%20Lasers..%20Fundamentals%20and%20Applications%20(2ed.,%20GTP,%20Springer,%202010)(ISBN%20144196441X)(O)(674s)_PEo_.pdf
5. https://subodhtripathi.files.wordpress.com/2012/01/optical-fiber-communications-by-gerd-keiser_2.pdf

MOOCS COURSE

1. http://nptel.ac.in/courses/115102025/ (Fundamental concepts of semiconductors)
2. http://nptel.ac.in/courses/104104085/2(Lasers and its applications)
3. https://nptel.ac.in/courses/115/101/115101092/(Quantum computing)

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5EE70	ESC	3	1	-	4	30	70	100

COURSE OBJECTIVES

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors.

COURSE OUTCOMES:

Upon successful completion of this course, student will be able to :

1. Analyze and solve for current values in resistive circuits with independent sources.
2. Analyze the working of DC machines and solve the numerical problems..
3. Analyze the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation of rectifiers.
5. Analyze the different configurations of Transistors and obtain its characteristics.

UNIT - I	ELECTRICAL CIRCUITS	CLASSES: 12

Basic definitions-Ohm's Law, types of elements, types of sources , Kirchhoff's Laws – simple problems., series & parallel resistive networks with DC excitation, star to delta and delta to star transformations.

UNIT - II	DC MACHINES	CLASSES: 12

Principle of Operation of DC Motor, types of DC motor, Torque equation & Losses and problems. DC Generator construction and working Principle, EMF Equation types of generators and problems.

UNIT - III	AC MACHINES	CLASSES:12

Working principle and Construction of transformer, Emf Equation & problems, Principle operation of 3-phase induction motor, slip and torque Equation, Torque –slip characteristics & problems, principle operation of 3-phase Alternator, Emf Equation of Alternator & problems.

UNIT - IV	DIODE AND ITS CHARACTERISTICS	CLASSES: 12

PN JUNCTION DIODE: Operation of PN junction Diode: forward bias and reverse bias, Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics. Rectifiers, Half wave, Full wave and bridge Rectifiers –capacitor filters, inductor filters

UNIT - V	TRANSISTORS	CLASSES: 10

Bipolar Junction Transistor - NPN & PNP Transistor, CB, CE, CC Configurations and Characteristics – Transistor Amplifier.

TEXT BOOKS:

1. Basic Electrical Engineering by *M.S.Naidu and S.Kamakshaiah* TMH
2. Electronic Devices and circuits by *J.Millman, C.C.Halkias and Satyabrata Jit* 2ed.,

REFERENCE BOOKS:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”,Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press (2005).
3. Mehta V K, “Principles of Electronics”, S.Chand & Company Ltd, (1994).
4. Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill, (2002).

ENGINEERING GRAPHICS

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5ME02	ESC	1	-	4	3	30	70	100

COURSE OBJECTIVES:

The course should enable the students to:

1. Create awareness and emphasize the need for Engineering Drawing in various branches of engineering.
2. Enable the student with various concepts of dimensioning, conventions and standards related to engineering drawings.
3. Follow the basic drawing standards and conventions.
4. Develop skills in three-dimensional visualization of engineering component.

COURSE OUTCOMES

At the end of the course the student should be able to:

1. Sketch the various curves used in engineering and their applications
2. Apply the knowledge of quadrant system and say to which quadrant and angle of project the object belongs.

UNIT - I	**INTRODUCTION TO ENGINEERING DRAWING**	**CLASSES: 07**

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute.

UNIT - II	**DRAWING OF PROJECTIONS OR VIEWS: ORTHOGRAPHIC PROJECTION IN FIRST ANGLE PROJECTION ONLY**	**CLASSES: 10**

Principles of orthographic projections – conventions – first and third angle projections. Projections of points-Projection of lines inclined to both the planes.
PROJECTIONS OF PLANES: Projections of regular planes, inclined to both planes.

UNIT - III	**PROJECTION OF REGULAR SOLIDS**	**CLASSES: 08**

PROJECTION OF SOLIDS-Solids inclined to one plane and both planes (Auxiliary plane method)

Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone

UNIT - IV	**DEVELOPMENT OF SURFACES/SOLIDS**	**CLASSES: 04**

DEVELOPMENT OF SURFACE/SOLIDS: Theory of development, development of lateral surface along with base

UNIT - V	**ISOMETRIC DRAWINGS**	**CLASSES: 05**

Divisions of pictorial projection, theory of Isometric Drawing- Isometric view and Isometric projections; Drawing Isometric circles, Dimensioning, Isometric Objects; Conversion of Isometric view to Orthographic views and Orthographic to isometric views, Missing views.

TEXT BOOKS:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers .

REFERENCE BOOKS:

1. Johle (2009), Engineering Drawing, Tata Mc Graw Hill, New Delhi, India.

WEB REFERENCES:

1. nptel.ac.in/courses/112103019/
2. web.iitd.ac.in/~achawla/public_html/201/lectures/sp46.pdf

E-TEXT BOOKS:

1. https://www.researchgate.net/publication/305754529_A_Textbook_of_Engineering_Drawing_A_Textbook
2. https://www.researchgate.net/publication/305754529_A_Textbook_of_Engineering_Drawing

MOOC COURSE

1. https://onlinecourses.nptel.ac.in/noc20_me79/preview

APPLIED PHYSICS LAB

I B. TECH- II SEMESTER

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5BS15	BSC	-	-	3	1.5	30	70	100
Contact Classes: 0	Tutorial Classes: 0	Practical Classes: 39				Total Classes: 39		

COURSE OBJECTIVES:

The course should enable the students to:

1. To provide an experimental foundation for the theoretical concepts introduced in the lectures
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments
4. To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
5. To teach how to write a technical report this communicates scientific information in a clear and concise manner

COURSE OUTCOMES:

By the end of the course students will be able:

1. **Analyze** the electric properties of semiconductor materials by determining energy gap of semiconductors, threshold voltage of LEDs and efficiency issues of solar cell with careful experimental and draw conclusions from such data
2. **Evaluate** the mechanical properties of a given material using dynamic method in torsional pendulum
3. **Estimate** the optical properties of light such as diffraction by using grating material for calculation of the wavelength of Laser, and to determine acceptance angle, NA of optical fiber using OFC and determine the value off plank's constant
4. **Analyze** the electromagnetic properties by using Stewart Gee's experiment and determining the Quality factor, resonance frequency of a given LCR circuit

LIST OF EXPERIMENTS

Experiment - 1	**Energy gap of P-N junction diode:** To determine the energy gap of a semiconductor diode
Experiment - 2	**Solar Cell:** To study the V-I and P-I characteristics of solar cell
Experiment - 3	**Light Emitting Diode:** Plot V-I characteristics of light emitting diode Plot V-I characteristics of light emitting diode
Experiment - 4	**Hall effect:** To determine Hall co-efficient of a given semiconductor

Experiment - 5	**PIN Photo Diode** To study the V-I Characteristics of Photo Diode by calculating the photo current.
Experiment - 6	**Optical fiber:** To determine the numerical aperture and acceptance angle of an optical fiber
Experiment - 7	**LASER:** To determine the wavelength of a given laser source by using diffraction grating method
Experiment - 8	**LCR Circuit:** To determine the Resonance frequency and Quality factor of a LCR Circuit
Experiment - 9	**Thermistor:** To study the variation of resistance with respect to temperature using thermistor.
Experiment - 10	**Torsional Pendulum:** To determine the rigidity modulus of a given metal wire by using Torsional pendulum
Experiment - 11	**Plank's Constant:** To determine value of plank's constant using by measuring radiation in fixed spectral range
Experiment - 12	**Stewart Gee's experiment:** To study the variation of magnetic field along the axis of a circular coil

REFERENCE BOOKS:

1. "Semiconductor Physics and Devices: Basic Principles" by Donald A Neamen
2. "Optics, Principles and Applications" by K K Sharma.
3. "Principles of Optics" by M Born and E Wolf.
4. "Oscillations and Waves" by Satya Prakash and Vinay Dua
5. "Waves and Oscillations" by N Subrahmanyam and Brij Lal

WEB REFERENCES:

1. **http://www.arxiv.org/pdf/1510.00032**
2. http://www nptel.ac.in/courses/122103010/
3. **http://www.** researchgate.net/.../276417736_Video_Presentations_in_Engineering-Ph...
4. **http://www.** wileyindia.com/engineering-physics-theory-and-practical.html

INTRODUCTION TO INTERNET OF THINGS

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5EC01	ESC	-	-	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes:36		

COURSE OBJECTIVES:

1. To develop basic programming skills through graphical programming
2. To learn hardware interfacing and debugging techniques
3. To design and develop android apps

COURSE OUTCOMES:

At the end of the course, student will be able to the algorithms for simple problems

1. CO 1: Able to demonstrate various sensor interfacing using Visual Programming Language.
2. CO 2: Able to analyze various Physical Components.
3. CO 3: Able to demonstrate Wireless Control of Remote Devices.
4. CO 4: Able to design and develop Mobile Application which can interact with Sensors

INTRODUCTION TO IOT

1. Introduction to basic electronic components and digital electronic
2. Introduction to sensors and Actuators
3. Introduction to microcontroller
4. Introduction to Arduino IDE

LIST OF EXPERIMENTS

WEEK - 1	Blinking of LED with different delays
WEEK - 2	Digital I/O Interface [IR Sensor, PIR Sensor]
WEEK - 3	Analog Interface [ADC, Temperature Sensor]
WEEK - 4	Motor speed And Direction control
WEEK - 5	Serial Communication
WEEK - 6	Wireless Interface –Bluetooth & Wi-Fi Technologies
WEEK - 7	Wireless Control of wheeled robot
WEEK - 8	Smart Home Android App Development

REFERENCES

1. Sylvia Libow Martinez, Gary S Stager, Invent To Learn: Making, Tinkering, and Engineering in the Classroom, Constructing Modern Knowledge Press, 2016
2. Michael Margolis, Arduino Cookbook, Oreilly, 2011

ENGINEERING WORKSHOP

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5ME04	ESC	-	-	2	1	30	70	100
Contact Classes: 42	Tutorial Classes: Nil	Practical Classes: 28				Total Classes:70		

COURSE OBJECTIVES:

Student will

1. Get the hands on experience on various trades.
2. Capable to make useful products using one or more operations.

COURSE OUTCOMES:

Student should be able to:

1. Fabricate components with their own hands
2. Get practical knowledge of the dimensional accuracies and tolerances.
3. Produce small devices of their interest

WEEKS	BASIC TRADES
	Fitting
Week 1	Filing Four Sides of Work piece
Week 2	L- Fit
	Carpentry
Week 3	Half Lap Joint
Week 4	Dove Tail Joint
	Tin Smithy
Week 5	Tin Smithy- Prepare a Rectangular Tray
Week 6	Prepare A Square Tin
	Electrical
Week 7	House Wiring Parallel and Series Connection
Week 8	House Wiring Two Way Switch
	Electronics
Week 9	Soldering Parallel Connection
Week 10	Soldering Series Connection
Week 11	Useful product using 3 or more operations