Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: BSC101
Course Title: Physics

Programme: B.Tech.	**L:** 3 **T:** 1 **P:** 2	**Credits:** 5
Semester: 1/2	**Theory/Practical:** Theory	**Teaching Hours:** 45(L)+15(T)+30(P) = 90 hrs
Total Max. Marks: 150	**Continuous Assessment (CA) Marks:** 90	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: 30%		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites (if any): NIL

Additional Material Allowed in ESE: Scientific Calculator

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Apply the knowledge of vector calculus and operators to solve complex problems in the field of Electromagnetism, Superconductivity and Quantum Mechanics.
2	Understand the physical principles involved in the working of various devices viz., Lasers, Optical fibers, Semiconductors, Superconductors etc.
3	Interpret the effect of various physical parameters and addition of impurities on the behaviour of different materials and devices.
4	Predict and conclude about the possible outcomes of physical processes.
5	Identify the most suitable devices for different applications in the field of Science and Technology.
6	Verify underlying concepts and laws of Physics responsible for various phenomenon and processes.

Contents

Part-A

Unit-1 Basics of electromagnetic theory **8(L) hrs**

Concept of Gradient, Divergence and Curl. Relation between Electric Field and Potential. Statements of Gauss divergence theorem and Stoke's theorem. Maxwell's equations in integral form (without derivation). Derivation of Maxwell's equations in differential form. Physical significance of Maxwell's equations. Electromagnetic wave equation in vacuum and conducting media. Applications of Electromagnetism in Engineering.

Unit-2 Laser **7(L)hrs**

Characteristics of Lasers. Absorption, Spontaneous and Stimulated Emission. Einstein's coefficients and relation between them. Population inversion. Metastable state. Types of pumping. Construction and working of: Ruby Laser, He-Ne Laser and CO2 Laser. Applications of Lasers.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Unit-3 Fiber optics **8(L) hrs**

Introduction to fiber optics. Construction of optical fiber. Propagation mechanism. Types of optical fibe. Acceptance angle. Numerical aperture. V-number. Attenuation and dispersion losses in optical fiber, (Qualitative idea). Applications of optical fibers in the field of Engineering and Technology.

Part-B

Unit-4 Quantum Mechanics **8(L)hrs**

Need of quantum mechanics. Wave-particle duality. de-Broglie hypothesis. Phase velocity and group velocity. Wave Function-Properties: Physical significance, normalization, Eigen functions and eigen values. Time independent and time dependent Schrodinger wave equations. Energy and momentum operators. Expectation values of physical quantities (Position, momentum and energy). Particle in a one-dimensional box. Introduction to Quantum Computing (Qualitative Idea).

Unit-5 Semiconductors **7(L)hrs**

Formation of bands in solids. Classification of solids as Conductors, Insulators and Semiconductors using band theory. Fermi level (Qualitative Idea), Position of Fermi level in intrinsic and extrinsic semiconductors. Conductivity of intrinsic and extrinsic semiconductors. Diffusion and drift current. Introduction to LED & Solar cell and their applications in the field of Engineering and Technology.

Unit-6 Superconductivity **7(L) hrs**

Introduction to superconductivity. Critical magnetic field. Silsbee's rule. Meissner effect. Isotopic effect. Type-I and type-II superconductors. Cooper pairs. Electrodynamics of superconductors. penetration depth. Specific heat. BCS theory. Coherence length. high temperature superconductors. Applications of superconducting materials.

Tutorial hours will be used for practice sessions for design/numerical problems/programming/case-studies etc. (as the case may be).

Laboratory Work

Experiment No.	Experiment Title
1	To find the frequency of A.C. supply using an electrical vibrator.
2	To measure (a) Voltage, and (b) Time period of a periodic waveform using CRO.
3	To determine the dielectric constant of solid samples.
4	To determine the angle of divergence of laser beam using He-Ne laser.
5	To study diffraction using laser beam and determine the grating element.
6	To determine the wavelength of a laser beam using the Michelson Interferometer.
7	To measure the propagation loss in optical fiber.
8	To determine the numerical aperture (NA) of an optical fiber.
9	To determine the value of Planck's constant by using photoelectric effect.
10	To verify the inverse square law of light using photo electric effect.

11	To determine the resistivity and band gap of a semiconductor by four probe method.
12	To determine the energy band gap in a semiconductor using a p-n junction diode.
13	To determine the angle of prism by using spectrometer. (Open ended experiment)
14	To determine the velocity of ultrasonic waves in water and the compressibility of the water. (Open ended experiment)
15	To Trace B-H curve for different ferromagnetic materials using CRO and find out the coercivity and hysteresis loss. (Open ended experiment)
16	To determine the mass susceptibility of paramagnetic solution (FeCl3) by Quincke's method. (Open ended experiment)

Text Books

1. M. N. Avadhanulu, "A Text Book of Engineering Physics", 11th edition, S. Chand Publishers, 2019.
2. M. N. Khan, S. Panigrahi, "Principles of Engineering Physics" (Vol. I & II), 1st edition, Cambridge University Press, 2016.
3. D. R. Joshi, "Engineering Physics", 1st edition, second reprint, McGraw Hill, 2014.
4. C. L. Arora, "Practical Physics", S. Chand & Co., 2010.
5. R.S Sirohi, "A course of Experiments with He –Ne Laser", 2nd Edition, Wiley Eastern Ltd.
6. Dr. D. Zarena, "Engineering Physics - Laboratory Manual", Nitya Publications, 2023.
7. Laboratory Manuals.

Reference Books

1. D. J. Griffiths, "Introduction to Electrodynamics", 4th edition, Prentice Hall of India, 2012.
2. B. B. Laud, "Lasers & Non-Linear Optics", 3rd edition, New Age International Ltd., 2015.
3. K. Thyagarajan, A. K. Ghatak, "Lasers: Fundamentals & Applications",2nd edition, Springer, 2010.
4. J. C. Palais, "Fibre Optic Communication", 5th edition, Pearson India, 2011.
5. S. M. Sze, "Semiconductor Devices: Physics & Technology", Wiley, 1985.
6. D. J. Griffiths, "Quantum Mechanics", Pearson Education, 2008.
7. Richard Robinett, "Quantum Mechanics", OUP, 2006.
8. B. S. Rajput, "Advanced Quantum mechanics", Pragati Parkashan, 2013.
9. W. D. Callister, "Material Science & Engineering", 7th edition, John Wiley & Sons, 2007.
10. D. Wei, "Solid State Physics", 1st edition, Cengage Learning, 2008.
11. M. Tinkham, "Introduction to Superconductivity", 2nd edition, Dover Publications, 1996.

Online Learning Materials

1. https://ocw.mit.edu/courses/6-013-electromagnetics-and-applications-spring-2009/pages/lecture-notes/ Accessed on June 11, 2024
2. https://ocw.mit.edu/courses/res-6-005-understanding-lasers-and-fiberoptics-spring-2008/resources/fiberoptics-fundamentals/ Accessed on June 11, 2024
3. https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016/pages/lecture-notes/ Accessed on June 11, 2024
4. https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/pages/lecture-notes/ Accessed on June 11, 2024
5. https://ocw.mit.edu/courses/6-763-applied-superconductivity-fall-2005/pages/lecture-notes/ Accessed on June 11, 2024
6. https://www.youtube.com/watch?v=gDFGj0Iodug Accessed on June 11, 2024

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

7. https://www.youtube.com/watch?v=mJsNXEiwRJs Accessed on June 11, 2024
8. https://www.youtube.com/watch?v=Lf2Kk9fP4s8 Accessed on June 11, 2024
9. https://www.youtube.com/watch?v=9ycQolopz6g Accessed on June 11, 2024
10. https://www.youtube.com/watch?v=0WLjrKdw79U Accessed on June 11, 2024
11. https://youtu.be/I8sn4LmmwOI Accessed on June 11, 2024
12. https://youtu.be/ZzDhpPG-QKkm Accessed on June 11, 2024
13. https://youtu.be/zYkuAuQizGI Accessed on June 11, 2024
14. https://youtu.be/OffBBSCNYTU Accessed on June 11, 2024
15. https://youtu.be/5m7r9fx_7Ns Accessed on June 11, 2024
16. https://youtu.be/YYt2NGFtFOc Accessed on June 11, 2024
17. https://youtu.be/B-eTE7jl5mE Accessed on June 11, 2024
18. https://youtu.be/0WLjrKdw79U Accessed on June 11, 2024
19. https://youtu.be/PiQYNeLQPos Accessed on June 11, 2024
20. https://www.youtube.com/watch?v=a4Fxjw-ZHG4 Accessed on June 11, 2024

Supplementary SWAYAM Course

Sr. No.	Course Name	Instructor	Host Institute	URL
1	Introduction to Electromagnetic Theory (Hindi)	Prof. Manoj Harbola	IIT Kanpur	https://onlinecourses.nptel.ac.in/noc24_ph37/preview
2	Electromagnetic Theory	Prof. Pradeep Kumar K	IIT Kanpur	https://onlinecourses.nptel.ac.in/noc24_ee137/preview
3	Introduction to LASER	Prof. M. R. Shenoy	IIT Delhi	https://onlinecourses.nptel.ac.in/noc24_ph45/preview
4	Fiber Optic Communication Technology	Prof. Deepa Venkitesh	IIT Madras	https://onlinecourses.nptel.ac.in/noc24_ee131/preview
5	Foundations of Quantum Theory: Non-Relativistic Approach	Prof. Sandep K. Goyal	IISER Mohali	https://onlinecourses.nptel.ac.in/noc24_ph38/preview
6	Introduction to Semiconductor Devices	Prof. Naresh Kumar Emani	IIT Hyderabad	https://onlinecourses.nptel.ac.in/noc24_ee99/preview
7	Concepts in Magnetism and Superconductivity	Prof. Arghya Taraphder	IIT Kharagpur	https://onlinecourses.nptel.ac.in/noc24_ph28/preview

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Experiments to be performed through Virtual Labs

Sr. No.	Experiment Name	Experiment Link(s)
1	To determine the value of Planck's constant by using photoelectric effect.	https://mpv-au.vlabs.ac.in/modern-physics/Determination_of_Plancks_Constant/
2	To study diffraction using laser beam and determine the grating element.	https://ov-au.vlabs.ac.in/optics/Diffraction_Grating/
3	To determine the wavelength of a laser beam using the Michelson Interferometer.	https://lo-au.vlabs.ac.in/laser-optics/Michelsons_Interferometer_Wavelength_of_Laser_Beam/
4	To determine the numerical aperture (NA) of an optical fiber.	https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement/
5	To determine the angle of prism by using spectrometer.	https://ov-au.vlabs.ac.in/optics/Angle_of_Prism/
6	To determine the angle of divergence of laser beam using He-Ne laser.	https://lo-au.vlabs.ac.in/laser-optics/Laser_Beam_Divergence_and_Spot_Size/
7	Determination of resistivity and band gap of a semiconductor by four probe method.	https://mpv-au.vlabs.ac.in/modern-physics/Resistivity_by_Four_Probe_Method/
8	To determine the energy band gap in a semiconductor using a p-n junction diode.	https://bop-iitk.vlabs.ac.in/exp/energy-band-gap/pretest.html
9	To determine the velocity of ultrasonic waves in water and the compressibility of the water.	https://hmw-au.vlabs.ac.in/harmonic-motion-waves/Ultrasonic_Interferometer/
10	To determine the mass susceptibility of paramagnetic solution ($FeCl_3$) by Quincke's method.	https://hmw-au.vlabs.ac.in/harmonic-motion-waves/Quinckes_Method/
11	To measure (a) Voltage, and (b) Time period of a periodic waveform using CRO.	https://shorturl.at/Acqtt

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: BSC102
Course Title: Mathematics-I

Programme: B.Tech.	**L:** 3 **T:** 1 **P:** 0	**Credits:**4
Semester: 1	**Theory/Practical:** Theory	**Teaching Hours:** 45(L)+15(T)= 60 hrs
Total Max. Marks: 100	**Continuous Assessment (CA) Marks:** 40	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: 95%		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites (if any): NIL

Additional Material Allowed in ESE: NIL

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Implement the concepts of the Taylor series to tackle advanced mathematical and engineering problems and identify indeterminate forms to compute limits.
2	Understand and explain the concepts of differentiability and continuity in the context of multivariable functions.
3	Develop critical thinking and problem-solving skills by applying partial differentiation techniques to complex engineering problems.
4	Understand and explain the basic concepts, terminology, classifications and solutions of ordinary differential equations.
5	Analyze and solve engineering problems involving ODEs to demonstrate the practical application of differential equations in various fields.
6	Study and analyze elementary functions of complex variables to solve trigonometric series and applications of De-Moivre's theorem.

Contents

Part-A

Unit-1 Differential Calculus **8(L) hrs**

Indeterminate Forms, Taylor and Maclaurin series.

Unit-2 Partial Differentiation and Its Applications **14(L) hrs**

Functions of several variables: Limit and Continuity, Partial differentiation, variable treated as constant, Total derivative, Partial derivatives of composite functions, Change of variables, Partial differentiation of Implicit functions, Euler's theorem, Jacobian.

Applications of partial differentiation in engineering: Errors and approximation, Taylor's theorem for functions of two variables, Maxima and minima of functions of two variables, Lagrange's Method of undetermined multipliers.

Part-B

Unit-3 Ordinary Differential Equations and Its Applications **14(L) hrs**

First-order first-degree differential equations: Formation of ordinary differential equations by elimination of arbitrary constants, Exact differential equations, Reduction of non-exact differential

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

equations using integrating factors. Applications of first-order first-degree differential equations in engineering: Law of natural growth, Law of natural decay, Newton's law of cooling and Simple electric circuits. Linear differential equations of second and higher order: Second and higher-order linear ordinary differential equations with constant coefficients (Homogeneous and non-homogeneous), Differential equations with variable coefficients reducible to equations with constant coefficients (Euler-Cauchy and Legendre equations), Method of variation of parameter. Applications of higher order linear ordinary differential equations in engineering: Simple harmonic motion, RLC-Circuits.

Unit-4 Complex Numbers and Elementary Functions of Complex Variables **9(L) hrs**

Complex Numbers (Cartesian/Polar form), De-Moivre's theorem and its applications, the root of a complex number, elementary functions: exponential, logarithmic, circular, hyperbolic functions of complex variables, summation of trigonometric series.

Tutorial hours will be used for practice sessions for design/numerical problems/programming/case-studies etc. (as the case may be).

Text Books

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", 9th Edition, Pearson Education, 2007.
2. B.V. Ramana, "Higher Engineering Mathematics", 11th Reprint, Tata McGraw Hill, New Delhi, 2010.
3. B.S. Grewal, "Higher Engineering Mathematics", 36th Edition, Khanna Publishers, 2010.

Reference Books

1. E. Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
2. R.K. Jain and S.R.K Iyenger, "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 2008.
3. T. Veerarajan, "Engineering Mathematics for first year", Tata McGraw Hill, New Delhi, 2008.
4. R. Babu, "Engineering Mathematics", Pearson Education, 2009.

Online Learning Materials

1. https://theengineeringmaths.com/wp-content/uploads/2017/11/ordinary-diff-equations.pdf Accessed on June 11, 2024
2. https://theengineeringmaths.com/wp-content/uploads/2017/11/chapter11diff-eq.pdf Accessed on June 11, 2024
3. https://www.jntua.ac.in/gate-online-classes/registration/downloads/material/a159358203998.pdf Accessed on June 11, 2024

Supplementary SWAYAM Course

Sr. No.	Course Name	Instructor	Host Institute	URL
1	Differential equations for engineers	Prof. Srinivasa Manam	IIT Madras	https://nptel.ac.in/courses/111106100
2	Complex Analysis	Dr. A. Swaminathan, Dr. V. K. Katiyar	IIT Roorkee	https://nptel.ac.in/courses/111107056

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: BSC103
Course Title: Chemistry

Programme: B.Tech.	**L:** 3 **T:** 0 **P:** 2	**Credits:** 4
Semester: 1/2	**Theory/Practical:** Theory	**Teaching Hours:** 45(L)+30(P) = 75 hrs
Total Max. Marks: 150	**Continuous Assessment (CA) Marks:** 90	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: 25%		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites (if any): NIL

Additional Material Allowed in ESE: Scientific Calculator

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Select and use the different treatment methods on waste water for domestic and industrial application.
2	Understand the principle of different analytical techniques and identification of structure of different molecules.
3	Attain essential analytical skills for designing of materials for electrical and electronic application.
4	Use the fundamental of chemistry towards developing new technologies based on novel materials.
5	Identify the chemical composition required for design of high-performance materials.

Contents

Part-A

Unit-1 Water chemistry **10(L) hrs**

Introduction, hardness of water (its units, its types, its determination by EDTA method using normality equation). Softening of water by lime-soda method, ion-exchange method and zeolite method. Boiler feed water:- causes, disadvantages, prevention and removal of -scale and sludge formation, priming, foaming, caustic embrittlement and boiler corrosion. Different steps for water purification to make it fit for drinking: -sedimentation, filtration, flocculation, sterilization (using chlorine, bleaching powder, chloramines, ozone & uv rays). Desalination of brackish water by electro dialysis and reverse osmosis. Applications of water chemistry in engineering.

Unit- 2 Spectroscopic techniques and applications **12(L) hrs**

UV-Visible spectroscopy:- Instrumentation (flow diagram only of single and double beam spectrophotometer and its working) ,principle (electronic transitions), auxochrome, chromophore, effect of presence of auxochrome on chromophore, bathochromic shift & hypsochromic shift (explanation by using the concept of auxochrome), hyperchromic shift, hypochromic shift, applications of UV-VIS spectroscopy (detection of functional group, distinction between conjugated

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

and non-conjugated dienes, detection of unknown concentration, detection of molecular weight, Fluorescence, phosphorescence and isobestic points).

IR spectroscopy: IR range, finger print and functional group region, Instrumentation (flow diagram only of single and double beam spectrophotometer and difference between these), principle (vibrations in diatomic and polyatomic molecules), Hook's law & applications of IR spectroscopy (Peak positions of some common functional groups of organic molecules, detection of conjugation & electronic effect).

Nuclear Magnetic Resonance spectroscopy: -Introduction (magnetic nucleus, processional frequency, equivalent and non-equivalent protons), principle and instrumentation, discussion of ^{1}HNMR of simple organic molecules (ethane, ethyl chloride and phenol) &applicationsof^{1}HNMR. (detection of aromaticity, detection of cis and trans isomers, detection of structural isomers and detection of electronegative atom). Significance of spectroscopic techniques in engineering.

Part-B

Unit-3 Electrochemistry **11(L) hrs**

Fundamentals of electrochemistry: -electrode, electrode potential, electrochemical series, electrochemical cell, its representation. Nernst equation and applications, numerical based on Nernst equation. Different type of electrodes: - gas, calomel, quinhydrone electrode. Fuel cell. Solar cell. Li ion battery and EV battery. Use of electrochemistry in engineering.

Unit-4 Important engineering materials **12(L) hrs**

Polymers: - Introduction (nomenclature, functionality, type of polymerization: addition, condensation and copolymerization). Type of polymers: -thermo plastic resins (cellulose derivatives only), thermo setting resins (detail of phenolic Resin), inorganic (one example each of polyphosphazines, Sulphur based polymer & silicones.) & conducting polymer. Effect of the polymer structure on its properties. Effect of heat on the polymers. The mechanical properties of polymer. Polymer blends and alloys. Engineering plastics. Nanoparticles–Introduction and properties. Graphene- introduction, fullerenes, nanotubes. Optical materials (OLED). Open source software in chemical applications. Importance of engineering materials.

Laboratory Work

Experiment No.	Experiment Title
1	Introduction to glass apparatus in chemistry laboratory, its handling, use,cleaning and precautions to be taken in laboratory
2	A demo experiment to explain the solar cell, Li ion battery and EV battery.
3	Determination of total hardness in water.
4	Determination of chloride content in water.
5	Determination of alkalinity in water.
6	Preparation of a polymer.
7	Synthesis of silver nanoparticles.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

8	Determination of absolute viscosity of a lubricant.
9	Determination of relative viscosity of a lubricant.
10	Determination of concentration of solution conductometrically.
11	Determination of concentration of solution pH metrically.
12	Determination of wavelength absorbed and unknown concentration of solution.
13	Application of open source software in chemistry.

Text Books

1. P. C. Jain and M. Jain, "Engineering Chemistry", 14th Edition, Dhanpat Rai Publication, 2002.
2. B. R. Puri, L. R. Sharma and M. D. Pathania, "Principles of Physical Chemistry", 46th Edition, Vishal Publishing Co.,2013.
3. D. Sud, "Comprehensive Engineering Chemistry", Kataria Publishers, 2000.
4. D. Sud, "Applied Chemistry", Kataria Publishers, 1999.

Reference Books

1. G. Odian, "Principle of Polymerization", 4th Edition, John Wiley &Sons, 2003.
2. J. D. Lee, "Concise Inorganic Chemistry", 5th Edition, Chapman & Hall, 2003.
3. P. Atkins and J.de Paula. "Atkin's Physical Chemistry", 10th Edition, Oxford University Press, 2014.
4. P. C. Jain and M. Jain, "Engineering Chemistry", 14th Edition, Dhanpat Rai Publication, 2002.
5. S Rattan, "Experiments in Applied Chemistry", 1st Edition, S K Kataria & Sons, 2002.
6. D. Sud, "Comprehensive Engineering Chemistry", Kataria Publishers, 2000.
7. D. Sud, "Applied Chemistry", Kataria Publishers, 1999.
8. S. Chawla, "Theory and Practicals of Engineering Chemistry", Dhanpat Rai & Co., 2006.
9. B.S. Furniss, "Vogel's Textbook of Practical Organic Chemistry", 5th Edition, Pearson Education, 2006.
10. Laboratory Manuals.

Online Learning Materials

1. https://nptel.ac.in/courses/104104011 Accessed on August 22, 2024
2. https://nptel.ac.in/courses/104101130 Accessed on August 22, 2024
3. https://nptel.ac.in/courses/104103019 Accessed on August 22, 2024
4. https://www.youtube.com/watch?v=8SVHLzs35lI&list=PL0KRvN5Kp6y99cNss5fakomw7rrgdVg1k&index=4 Accessed on August 22, 2024
5. https://www.youtube.com/watch?v=pxC6F7bK8CU Accessed on August 22, 2024
6. https://www.youtube.com/watch?v=WjsCFPrQzkU Accessed on August 22, 2024
7. https://www.youtube.com/watch?v=k_vR0Eqb5gY Accessed on August 22, 2024
8. https://www.youtube.com/watch?v=f1wu56aLkEQ Accessed on August 22, 2024
9. https://www.youtube.com/watch?v=d75GP5M5Tb8&list=PLAOKTXws9mMBuJLbInoUh98e9m_wGTK7F Accessed on August 15, 2024
10. https://www.youtube.com/watch?v=6BJlmA0M4Jo Accessed on August 15, 2024
11. https://www.youtube.com/watch?v=Kg40ze9torw Accessed on August 15, 2024

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

12. https://www.youtube.com/watch?v=E21v6_XxWIw Accessed on August 15, 2024
13. https://www.youtube.com/watch?v=7ANZLU9rsfM Accessed on August 15, 2024
14. https://www.youtube.com/watch?v=d75GP5M5Tb8&list=PLAOKTXws9mMBuJLbInoUh98e9m_wGTK7F

Supplementary SWAYAM Course

Sr. No.	Course Name	Instructor	Host Institute	URL
1	Elementary Electrochemistry	Prof. Angshuman Roy Choudhury	IISER Mohali	https://nptel.ac.in/courses/104106137

Experiments to be performed through Virtual Labs

Sr. No.	Experiment Name	Experiment Link(s)
1	Determination of hardness of water	https://vlab.amrita.edu/index.php?sub=2&brch=193&sim=1548&cnt=1
2	Determination of alkalinity of water	https://vlab.amrita.edu/index.php?sub=2&brch=193&sim=1548&cnt=1
3	Determination of wavelength absorbed and unknown concentration of solution	https://vlab.amrita.edu/index.php?sub=2&brch=190&sim=338&cnt=4

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College
Ludhiana-141006

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: HSMC101
Course Title: Professional English Communication

Programme: B.Tech.	**L:** 3 **T:** 0 **P:** 2	**Credits:** 4
Semester: 1/2	**Theory/Practical:** Theory	**Teaching Hours:** 45(L)+30(P)=75
Total Max. Marks: 150	**Continuous Assessment (CA) Marks:** 90	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: NIL		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites (if any): NIL

Additional Material Allowed in ESE: NIL

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Listen, comprehend and correspond effectively in various communicative contexts.
2	Speak clearly and fluently with proper kinesics and voice dynamics under various academic and professional settings in proper accent, intonation and rhythm.
3	Read, analyze and evaluate variety of written texts by focusing on different dimensions of meaning and language.
4	Apply clear and effective writing skills in variety of styles in coherent manner.
5	Utilise appropriate vocabulary and grammatical competence for effective communication.
6	Grasp the concept of organizational communication and compose certain business documents including employment seeking documents in precise and efficient manner.

Contents

Part-A

Unit-1 Principles of Communication **9(L) hrs**

Importance of communication. Importance of communication in English for Engineers. Concept of effective communication: assertive communication, communication and self-concept, role of emotions in communication. Process of communication. Knowing the purpose and audience. Types of communication: formal and informal communication, verbal and non-verbal communication, interpersonal and intrapersonal communication, cross cultural communication. Organisational communication: formal channels-upward communication, downward communication, horizontal communication and diagonal communication; informal channel-grapevine. Barriers to communication. Tips for effective communication. Activity: Power point presentations in lab.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Unit-2 Listening Skills **6(L) hrs**

Listening vs. hearing. Role of effective listening in communication. Types of listening. Poor listening habits. Active listening-an effective listening skill for engineers. Traits of an effective listener. Barriers to effective listening. Activity: Power point presentations in lab.

Unit-3 Vocabulary Skills **7(L) hrs**

Idioms and Phrases, One-word substitution, Antonym and Synonyms, Homophone and Homonyms

Part-B

Unit-4 Kinesics and Voice Dynamics **5(L) hrs**

Kinesics: definition and importance. Features of body language: personal appearance, gestures, postures, facial expression, eye contact, silences. Voice modulation: Quality and pitch. Activity: Submission of one-minute video talk in proper tone and body language.

Unit-5 Reading Skills
9(L)hrs

Inferring meaning: lexical and contextual meaning. Reading techniques. Intensive and extensive reading skills. Activities: Reading comprehension passages/News article/Essay/Short story- Reading for specific points using any kind of resources (Ex. Dictionary), Drawing inferences, Understanding denotative and connotative meaning. To reflect upon how language is being used by writer/are they persuaded to accept particular view point? /How language is being used to do this?

Unit-6 Grammar and Basic Writing Skills **9(L)hrs**

Sentence structure. Subject-verb concord. Misplaced modifiers. Concept of technical writing:7 c's of effective technical writing, framing topic sentence, creating unity and coherence. Argumentative essay. Writing an email. Business letter writing: complaint letter, collection letter, inquiry letter. Preparing cover letter and resume. Activities: Exercises on tenses: sentence completion/correction of sentences.

Laboratory Work

Experiment No.	Experiment Title
1	Listening to a recorded talk/interview and participation in peer conversation.
2	Listening to Conversation (formal and informal) such as making statements, asking questions, giving commands, expressing opinions etc. Learning how to engage in everyday conversation/Developing situational awareness/ Adapting language use/tone of voice to different situations during dialogue presentation.
3	The students will deliver power point presentations.
4	The students will be demonstrated various micro skills involved in group discussion and they will be engaged in mock group discussion sessions.
5	The students will be demonstrated the skill of appearing in selection interview and they will be engaged in mock interview sessions.
6	Pronunciation, Articulation, Word stress. International Phonetic Alphabet (IPA) Symbols: Vowels & Consonants. Rules of Pronunciation.

Mini Project: (Group Activity) Preparing a 5-minute video documentary along with narration in proper accent on any social evil/societal concern etc. The students will make presentations and submit reports in the lab.

Text Books

1. M. Raman and S. Sharma, "Technical Communication–Principles and Practices", 3rd Edition, Oxford University Press, 2015.
2. N. Bhatnagar and M. Bhatnagar, "Communicative English for Engineers and Professionals", 1st Edition, Pearson education,2010.

Reference Books

1. S. Sharma and P. Lata, "Communication skills",2nd Edition, Oxford University Press, 2011.
2. M. Swan, "Practical English Usage", 4th Edition, OUP, 2016.
3. F.T. Wood, "Remedial English Grammar", Macmillan, 2016.
4. J. Sethi, Kamlesh Sadanand and D. V. Jindal, "A Practical Course in English Pronunciation", Prentice Hall of India Pvt. Ltd., New Delhi.
5. T. Balasubramaniam, "A Text book of English Phonetics for Indian Students", Macmillan.
6. Daniel Jones, "English Pronouncing Dictionary", Current Edition with CD.
7. Laboratory Manuals.

Online Learning Materials

1. https://lingua.com/english/reading/ Accessed on August 23, 2024
2. https://lingua.com/english/grammar/ Accessed on August 24, 2024
3. https://lingua.com/businessenglish/reading/ Accessed on August 24, 2024
4. https://lingua.com/english/listening/ Accessed on July 21, 2024
5. https://learnenglishteens.britishcouncil.org/skills Accessed on July 21, 2024

Supplementary SWAYAM Course

Sr. No.	Course Name	Instructor	Host Institute	URL
1	Technical English for Engineers	Prof.Viswa Mohan	IIT Madras	https://onlinecourses.nptel.ac.in/noc24_hs175/preview

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: HSMC102
Course Title: Economics

Programme: B.Tech.	**L:** 2 **T:** 1 **P:** 0	**Credits:** 3
Semester: 1/2	**Theory/Practical:** Theory	**Teaching Hours:** 30(L)+15(T)= 45 hrs
Total Max. Marks: 100	**Continuous Assessment (CA) Marks:** 40	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: 40%		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites (if any): NIL

Additional Material Allowed in ESE: Scientific Calculator

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Understand basic economic principles.
2	Understand consumer behavior analysis.
3	Evaluate cost of various factors of production.
4	Compare different market structures.
5	Analyze basic concepts of Macroeconomics.
6	Understand National Income and Inflation

Contents

Part-A

Unit-1 Introduction to Economics **3(L) hrs**

Why study Economics, Scope of Economics, Types of Economics, Concepts of Economics: Wealth, Welfare and Scarcity. Economic Problem: Scarcity and Choice. Concept of Opportunity Cost. The Question of What to Produce, How to produce and for Whom to Produce. Economic Activities: Consumption, Production, Exchange, Distribution and Public Finance. Relationship of Economics with other Social Sciences and Engineering. Non-Economic Activities.

Unit-2 Theory of Consumer Behaviour **6(L) hrs**

Demand-Types of Demand, Determinants of Demand, Change in Demand: Movement and Shift of Demand, Estimation of Demand, Law of Demand, Elasticity of Demand and its Application in Engineering. Utility Analysis: Assumptions, Consumption Decision: Budget Constraint, Changes in Consumption Pattern, Laws of Consumption: Concept and Applicability of Law of Diminishing Marginal Utility and Law of Equi- Marginal Utility.

Unit-3 Cost and Production Analysis **6(L) hrs**

Cost Concept. Production and Cost. Cost in the Short and Long Run, Short Run Cost and Output Decision, Cost and Output in the Long Run. Relationship between TC, AC and MC. Production: Scale

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

of Production, Short Run Production Function, Long Run Production Function, Stages, Significance and Practical Application of Law of Variable Proportion and Law of Return to scale. Economies and Diseconomies of Scale: Concept and Types. Relevance of Production and Cost Concept in Real Situation.

Part-B

Unit-4 Market Structure **3(L) hrs**

Perfect Competition. Monopoly. Oligopoly and Monopolistic Competition. Comparison Between Different Forms of Market Structure with Real Life Examples. Government Policies towards Different Forms, Nature and Relevance of different Markets in Present Scenario.

Unit-5 Basic Macroeconomic Concepts **4(L) hrs**

Importance of studying Macroeconomics in Engineering, Interest Rates Determination, Sources of Interest Rate Differentials, Unemployment and Full Employment, Profit Concept: Functions of Profit; Economic Profit and Accounting Profit.

Unit-6 National Income, Inflation & Taxes **4(L) hrs**

National Income Concepts: GDP, GNP, NNP. Measurement of National Income: Income, Expenditure and Value Added Methods. Types of Inflation, Role of Inflation in Economic Development. Introduction to Taxes and its Types.

Unit-7 Economic Policies **4(L) hrs**

Monetary and Fiscal Policy: Instruments of Monetary and Fiscal Policy. Role of Monetary and Fiscal Policy in a Developing Country. Money: Functions; Determination of Money supply.

Tutorial hours will be used for practice sessions for design/numerical problems/programming/case-studies etc. (as the case may be).

Text Books

1. J.E.Stiglitz and C.E.Walsh, "Principles of Microeconomics", W.W. Norton & Company, 2016
2. J.E.Stiglitz and C.E.Walsh, "Principles of Macroeconomics", Pubs: W.W. Norton & Company, 2016.

Reference Books

1. C.R.Thomas and S.C. Maurice, "Managerial Economics: Foundations of Business Analysis and Strategy", McGraw Hill, 2017.
2. S. A. Greenlaw, D. Shapiro, T. Taylor, "Principles of Economics", Pubs: OpenStax, 2017.
3. D. Miles and A. Scott, "Macroeconomics: Understanding the wealth of Nations", John Wiley and Sons, 2002.
4. Hal R. Varian, "Intermediate Microeconomics: A Modern Approach", 8th Edition, W. W. Norton & Co., 2010.

Online Learning Materials

1. https://egyankosh.ac.in/bitstream/123456789/53988/1/Block-2.pdf Accessed on August 19, 2024
2. https://ncert.nic.in/textbook/pdf/leec202.pdf Accessed on August 19, 2024

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

3. https://math.hawaii.edu/~mchyba/documents/syllabus/Math499/extracredit.pdf Accessed on August 19, 2024
4. https://www.vedantu.com/commerce/national-income-accounting Accessed on August 19, 2024
5. https://blog.ipleaders.in/taxation-and-its-effect-on-inflation/ Accessed on August 19, 2024

Supplementary SWAYAM Course

Sr. No.	Course Name	Instructor	Host Institute	URL
1	Principles of Economics	Prof. Sabuj Kumar Mandal	IIT Madras	https://onlinecourses.nptel.ac.in/noc23_ec06/preview
2	Managerial Economics	Prof. Trupti Mishra	IIT Bombay	https://archive.nptel.ac.in/noc/courses/noc20/SEM2/noc20-mg67/

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: ESC101
Course Title: Basic Electrical and Electronics Engineering

Programme: B.Tech.	**L:** 3 **T:** 1 **P:** 2	**Credits:** 5
Semester: 1/2	**Theory/Practical:** Theory	**Teaching Hours:** 45(L)+15(T) +30(P) = 90 hrs
Total Max. Marks: 150	**Continuous Assessment (CA) Marks:** 90	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: 30%		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites (if any): NIL

Additional Material Allowed in ESE: Scientific Calculator

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Understand the basic concepts of Electrical and Electronics Engineering.
2	Apply circuit analysis techniques to solve problems related to DC circuits and networks.
3	Apply knowledge of magnetic circuits to select electrical machines required for a particular application.
4	Demonstrate the behavior of electrical and electronic elements in circuits and analyze their characteristics.
5	Apply the knowledge of number systems and binary operations to analyze and design digital circuits.
6	Design simple electrical and electronic circuits by utilizing various components.

Contents

Part-A

Unit-1 DC Circuits **6 (L) hrs**

Circuit elements and connected terminology. Kirchhoff's Laws: Statement and Illustrations, Method of solving circuits by Kirchhoff's law. Star-Delta Conversion. Ohm's Law: Statement, Illustration and Limitation. Units: Work, Power and Energy (Electrical, Thermal and Mechanical).

Unit-2 AC Fundamentals **7 (L) hrs**

Principle of AC Voltage waveforms and basic definitions. Peak, Root Mean Square and Average value of AC. Phasor representation of alternating quantities. Ohm's Law in AC circuits. Resistive, Inductive & Capacitive circuits, and their series and parallel combinations. Concept of resonance in series and parallel circuits. Analysis of balanced three-phase system with star-delta connections.

Unit-3 Magnetic Circuits and Electrical Machines **8 (L) hrs**

Comparison between magnetic and electric circuits. Magnetic effects of electric current. Current carrying conductor in magnetic field. Laws of Electromagnetic Induction. Self and Mutual

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

H.O.D.
Deptt. of Electrical Engineering
G.N.D. Engineering College,
Ludhiana-141 006.

Scheme Code- 2024
Assistant Registrar (Academics)
Guru Nanak Dev Engg. College
Ludhiana-141006

Inductances. Coupling Coefficient between two magnetically coupled circuits. Construction, Working principle, Classification and Applications of: Single-phase Transformer, D.C. machines (motor and generator), Three-phase Induction motor, and Three-phase Synchronous machines (motor and generator).

Part-B

Unit-4 Digital Electronics **8 (L) hrs**

Number Systems: Binary, Decimal, Octal, Hexadecimal and their conversions. Logic gates: symbol and truth table - AND, OR, NOT, EX-OR, EX-NOR, Universal gates: NOR, NAND. Binary addition. Binary subtraction. 1's complement. 2's complement. Applications of logic gates: Half adder, full adder.

Unit-5 Semiconductor Diodes **7 (L) hrs**

Semiconductors: Intrinsic and Extrinsic. PN junction diode: working and V-I characteristics, Diode applications. Special Diodes: Light Emitting Diode as a circuit element, Photodiode, Zener diode as voltage regulator.

Unit-6 Transistors **9 (L) hrs**

Transistors: Introduction, construction, working and characteristics, npn and pnp transistors, Basic configurations: common emitter, common base, common collector. Transistor as an amplifier and switch. Operational amplifier: schematic symbol, block diagram, Ideal op-amp and ideal voltage transfer curve.

Tutorial hours will be used for practice sessions for design/numerical problems/programming/case-studies etc. (as the case may be).

Laboratory Work

Experiment No.	Experiment Title
1	To verify Ohm's Law.
2	To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.
3	To verify series and parallel resonance in AC circuit.
4	To connect, start and reverse the direction of rotation of a 3- phase induction motor.
5	To find out the line voltage, phase voltage relationship, line current and phase current relationship in case of star and delta connected 3- phase balanced load.
6	To study the use of a multimeter.
7	To find a voltage-current relationship in an R-L, R-C, and R-L-C series circuit and to determine the power factor of the circuit.
8	To examine the I-V characteristics of a PN junction diode.
9	To obtain the input and output characteristics of NPN and PNP transistors.
10	To measure and compare the output waveforms of half-wave and center-tap full- wave rectifier.
11	To design and analyze an AC to DC power supply using rectifier and capacitive filter.

H.O.D.
Department of Electrical Engineering
G.N.D. Engineering College,
Ludhiana-141006.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

12	To measure the output of an op-amp in the inverting and non-inverting configuration.
13	To design and verify the truth tables of logic gates: AND, OR, NOT, NAND, NOR.

Text Books

1. B.L. Theraja and A.K Theraja,"A Textbook of Electrical Technology", 23rd Edition, S Chand, 1959.
2. Vincent Del Toro, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall, 2015.
3. D. P. Kothari and I J Nagrath, "Basic Electrical Engineering", 4th Edition, Mc Graw Hill, 2019.
4. C. L. Wadhwa, "Basic Electrical Engineering", 5thEdition, New Age International Publishers, 2023
5. Robert L. Boylestad, "Introductory Circuit Analysis", 13th Edition, Pearson, 2015.
6. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata McGraw–Hill, 2009.
7. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuits Theory", 9th Edition, Prentice Hall, 2006.
8. R. P. Jain and K. Sarawadekar, "Modern Digital Electronics", 5th Edition, McGraw–Hill, 2022.

Reference Books

1. A. Malvino, D. J. Bates, "Electronic Principles", 7th Edition, McGraw Hill Education, 2017.
2. J. Millman, C., C. Halkias and S. Jit, "Electronic Devices and Circuits", 4th Edition, McGraw Hill Education, 2015.
3. S.K. Sahdev, "Basic Electrical Engineering (with Lab Manual)", First Edition, Khanna Publication, 2022.
4. Laboratory Manuals.

Online Learning Materials

1. https://www.youtube.com/watch?v=J4oO7PT_nzQ Accessed on July 08, 2024
2. https://www.youtube.com/watch?v=INEtYZqtjTo Accessed on July 08, 2024
3. https://www.youtube.com/watch?v=WKHKy89QaV0 Accessed on July 08, 2024
4. https://www.youtube.com/watch?v=fdqnYttEzPU&list=PLTntHiTOym6Cp7sufUtj_4CUJ9ALWudh Accessed on August 20, 2024
5. https://youtu.be/qnumeyHBQ6w?list=PL2Q_0aXptwl1foD9eKFGXo3iQfOriDmp5 Accessed on August 20, 2024

Supplementary SWAYAM Course

Sr. No.	Course Name	Instructor	Host Institute	URL
1	Basic Electrical Circuits	Prof. Gajendranath Chowdary	IIT Hyderabad	https://onlinecourses.nptel.ac.in/noc24_ee112/preview
2	A Basic Course on Electric and Magnetic Circuits	Prof. Ashok Kumar Pradhan	IIT Kharagpur	https://onlinecourses.nptel.ac.in/noc24_ee125/preview

H.O.D.
Deptt. of Electrical Engineering
G.N.D. Engineering College,
Ludhiana-141 006.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Experiments to be performed through Virtual Labs

Sr. No.	Experiment Name	Experiment Link(s)
1	To verify Ohm's Law.	https://be-iitkgp.vlabs.ac.in/exp/ohm-law/
2	Extraction of diode SPICE parameters related to forward Current-Voltage (I-V) characteristics	https://be-iitkgp.vlabs.ac.in/exp/characteristics-diode/
3	To measure and compare the output waveforms of half-wave and center-tap full-wave rectifier.	https://be-iitkgp.vlabs.ac.in/exp/half-wave-rectification/ https://be-iitkgp.vlabs.ac.in/exp/full-wave-rectification/
4	To measure the output of an op-amp in the inverting and non-inverting configuration.	https://be-iitkgp.vlabs.ac.in/exp/non-inverting-amplifiers/

H.O.D.
Deptt. of Electrical Engineering
G.N.D. Engineering College,
Ludhiana-141 006.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: ESC102
Course Title: Engineering Drawing and Graphics

Programme: B.Tech.	**L:** 1 **T:** 0 **P:** 4	**Credits:** 3
Semester: 1/2	**Theory/Practical:** Theory	**Teaching Hours:** 15(L)+60(P) =75 hrs
Total Max. Marks: 100	**Continuous Assessment (CA) Marks:** 40	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: 80%		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites (if any): NIL

Additional Material Allowed in ESE: Scientific Calculator and Mini Drafter

NOTE:
End semester examination shall be set from Unit-1 to Unit-4 only, whereas Unit-5 and Unit-6 shall be evaluated through Continuous Assessment (CA) carrying 10% weightage.

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Understand various terms used in engineering drawing.
2	Interpret the drawing in terms of engineering requirements.
3	Apply rules and conventions as per international standards for engineering drawing.
4	Learn and apply orthographic as well as isometric projections as per engineering requirements.
5	Understand the concept of computer graphics and related aspects.
6	Use CAD software to draw 2D and 3D models by using different types of commands.

Contents

Part-A

Unit-1 Introduction to Engineering Drawing **3(L)+12(P) hrs**

Principles of Engineering Graphics and their significance as per international/national standards SP46:2003 and IS 962-1989. Usage of Drawing instruments. Conventional representation. Lettering. Scales: Plain and Diagonal scales.

Unit- 2 Orthographic Projections **4(L)+12(P) hrs**

Principles of Orthographic Projections. Projections of Points. Projection of lines, plane and solid covering inclined/perpendicular/parallel to one plane.

Unit-3 Sections and Sectional Views of Right Regular Solids **3(L)+12(P) hrs**

Prism, Cylinder, Pyramid, Cone: Draw the sectional views of geometrical solids. Development of surfaces of Right Regular Solids: Prism, Pyramid, Cylinder and Cone.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Unit-4 Isometric Projections **2(L)+12(P) hrs**

Principles of Isometric projections: Isometric Scale, Isometric Views and Conventions. Isometric Views of lines, Planes, Simple and compound Solids. Conversion of Isometric Views to Orthographic Views and Vice-versa.

Part-B

Unit-5 Overview of Computer Graphics and Customization of CAD Drawing **2(L)+6(P) hrs**

Demonstrating knowledge of the theory of CAD software such as: The Menu System, Toolbars, Drawing Area, Dialog boxes and windows, The Command Line, Different methods of zoom as used in CAD, Select and erase objects. Isometric Views of lines, Planes, Simple and compound Solids. Snap to objects manually and automatically. Producing drawings by using various coordinate input entry methods to draw straight lines. Applying various ways of drawing circles.

Unit-6 Annotations, layering & other functions **1(L)+6(P) hrs**

Apply dimensions to objects. Apply annotations to drawings. Setting up and use of Layers. Layers to create drawings. Create, edit and use customized layers. Orthographic projection techniques. Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids. Parametric and non-parametric solid, surface. Wireframe models.

Text Books

1. P. Jain, A. Maheshwari and A.P. Gautam, "Engineering Graphics & Design", Khanna Book Publishing, 2021.
2. N.D. Bhatt, V.M. Panchal and P.R. Ingle, "Engineering Drawing", Charotar Publishing, 2014.
3. M.B. Shah and B.C. Rana, "Engineering Drawing and Computer Graphics", Pearson, 2008.
4. B. Agrawal and C.M. Agrawal, "Engineering Graphics", TMH Publication, 2012.
5. K.L. Narayana and P. Kannaiah, "Textbook on Engineering Drawing", Scitech Publishers, 2008.

Reference Books

1. Johle A. Dhananjay, "Engineering Drawing with an Introduction to Auto CAD", Tata McGraw Hill Publishing Ltd., 2008.
2. T. Jeyapoovan, "Engineering Graphics using Auto CAD 2000", Vikas Publishing Pvt. Ltd., 2003.
3. P. S. Gill, "Engineering Drawing", Katson Publication, 2016.
4. H. Singh, "Engineering Drawing and Computer Graphics", Dhanpat Rai Publishing Company, 2023

Online Learning Materials

1. https://www.iitg.ac.in/rkbc/ME111/Lecture1%20Introduction.pdf Accessed on September 17, 2024
2. https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/#Cross-Sectional_Views Accessed on September 17, 2024
3. https://static.sdcpublications.com/pdfsample/978-1-58503-610-3-1.pdf Accessed on September 17, 2024

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

4. https://resources.saylor.org/wwwresources/archived/site/wp-content/uploads/2013/04/ME104-1.1.1-DesignHandbook.pdf Accessed on September 17, 2024

Supplementary SWAYAM Course

Sr. No.	Course Name	Instructor	Host Institute	URL
1	Engineering Drawing and Computer Graphics	Prof. Rajaram Lakkaraju	IIT Kharagpur	https://onlinecourses.nptel.ac.in/noc21_me125/preview

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: ESC103
Course Title: Programming for Problem Solving

Programme: B.Tech.	**L:** 2 **T:** 0 **P:** 2	**Credits:** 3
Semester: 1	**Theory/Practical:** Theory	**Teaching Hours:** 30(L)+ 30(P) = 60 hrs
Total Max. Marks: 150	**Continuous Assessment (CA) Marks:** 90	**End Semester Examination (ESE) Marks:** 60
Minimum Percentage of Numerical / Design / Programming Problems in ESE: 60%		
Duration of End Semester Examination (ESE): 3 hours		
Course Type: Core Course		

Prerequisites: NIL

Additional Material Allowed in ESE: NIL

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Design simple algorithms and flowcharts for problem solving.
2	Demonstrate modular programs involving input output operations, decision making and looping constructs by choosing the appropriate data types for writing programs.
3	Test and execute programs and correct syntax and logical errors.
4	Implement conditional branching, iteration and recursion.
5	Apply the concept of arrays and string handling in problem solving.
6	Use concept of structures and union in problem solving.

Contents

Part-A

Unit-1 Introduction to Computer Fundamentals **4(L) + 2(P) hrs**

Computer System Components: Input and Output Devices, Memory and Storage Devices, Block diagram of Computer System, Types of Software, Operating System with its types, Compiler, Interpreter, Assembler, Linker, Loader.

Unit-2 Basics of Programming **4(L) + 4(P) hrs**

Idea of Algorithm: Steps to solve logical and numerical problems. Algorithms, Flowchart, Pseudocode with examples. Basic C++ Program, Compile and Execute C++ program, Character Set, Tokens-Identifiers, Keywords, Variables, Literals, Constants, Data Types, Different types of errors.

Unit-3 Operators **4(L) + 6(P) hrs**

Different types of Operators: Assignment Operators, Numeric operators, Prefix and postfix operators, Binary number system, Bitwise operators, Logical operators, Relational operators, Short-circuit operators, sizeof operator, Operator precedence and associativity. Type conversion.

Head
Deptt. of Computer Science & Engineering
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Segment Code: 3E24

Unit-4 Control Structures **5(L) + 4(P) hrs**

Conditional Statements: if, if-else, conditional operator (?:), switch and nested decision statements; Looping Statements: for, while, do-while, Nested Loops, and Controlling loop execution keywords: break, continue, goto keyword and labeled statements multiple-selection keywords: switch, case, default keywords

Part-B

Unit-5 Functions **5(L) + 6(P) hrs**

Functions: Need of functions, Components of Functions, Built-in and User Defined Functions, Parameter passing in function: Call by value, Call by reference, Scope rules, Default Arguments, Function Overloading, Recursion: Base case and recursive case, Recursion versus Iteration.

Unit-6 Arrays **4(L) + 4(P) hrs**

Arrays: Single-Dimensional and Multi-Dimensional arrays, Array operations, Character array and strings literals, string literals declaring, initializing, and using strings basic string operations, comparing strings; Pointers: declaring and initializing pointers.

Unit-7 Structures and Unions **4(L) + 4(P) hrs**

Structures: Need and syntax of structures, Structure Operations- Passing and returning structures from functions, Nested Structures, Array of Structures, typedef, Union, Structure versus Union.

Laboratory Work

To implement programs in C++ Language for various kinds of problems related to the above topics.

Text Books

1. D. Ravichandran, "Programming with C++", Third Edition, Tata McGraw-Hill Education.
2. Harvey M. Deitel and Paul J. Deitel, "C++ How to Program", Tenth Edition, Pearson Education.

Reference Books

1. H. Schildt, "C++: The Complete Reference", Fourth Edition, Mc-Graw Hill.
2. E. Balagurusamy, "Object Oriented Programming with C++", Eighth Edition, Mc-Graw Hill.
3. Y. Kanetkar, "Let Us C++", Third Edition, BPB Publication.

Online Learning Materials

1. https://www.udemy.com/course/c-plus-plus-programming-beginners/ Accessed on September 19, 2024
2. https://spoken-tutorial.org/watch/C+and+Cpp/Working+With+2D+Arrays/English/ Accessed on September 19, 2024
3. https://spoken-tutorial.org/watch/C+and+Cpp/Function+Call/English/ Accessed on September 19, 2024

Head
Deptt. of Computer Science & Engineering
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Guru Nanak Dev Engineering College, Ludhiana

An Autonomous College under UGC Act 1956

B.Tech. 1st Year (Common for all Branches)

Course Code: LESC104
Course Title: Manufacturing Practices

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 4	**Credits:** 2
Semester: 1/2	**Theory/Practical:** Practical	**Teaching Hours:** 60 hrs
Total Max. Marks: 50	**Continuous Assessment (CA) Marks:** 50	**End Semester Examination (ESE) Marks: NIL**
Duration of End Semester Examination (ESE): NA		
Course Type: Core Course		

Prerequisites (if any): NIL

On completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Make various carpentry utility items with the use of various joints.
2	Practice of various forging, welding, electric, sheet metal tools and equipments.
3	Make mould and cast products of different shapes.
4	Finish various jobs by using finishing tools.
5	Operate different machines and perform different operations.

Contents

Experiment No.	Experiment Title
1	**Carpentry and Pattern Making:** Various types of timber, defects in timber, seasoning of wood; tools, wood operations and various joints; exercises involving use of important carpentry tools to practice various operations and making joints.
2	**Foundry Shop:** Introduction to molding materials; moulds; cores; melting furnaces; tools and equipment used in foundry shops; exercises involving preparation of small sand moulds and castings. Introduction to Plastic Molding.
3	**Forging Practice:** Introduction to forging tools; equipments and operations; forgability of metals; exercises on simple smithy and forging.
4	**Machine Shop:** Introduction to various types of Machines; cutting tools and operations; exercises involving machining operations; Introduction to CNC machining and additive manufacturing.
5	**Welding Shop:** Introduction to different welding methods; sheet metal forming and joining methods; welding equipments; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc welding.
6	**Electrical Shop:** Introduction to electrical wiring and electrical machines; soldering practice for electrical and electronic applications; Demonstration of various electrical measuring instruments, wiring accessories, modern electrical tools; Introduction to safety devices and earthing; practice on domestic electrical wiring circuits.
7	**Fitting Shop:** Demonstration of measuring instruments; tools used in fitting shop; exercise involving marking, cutting, fitting practice (Right Angles), matching parts practice, trapping practice.

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006

Mini Project: The student must fabricate a model of their interest at the end of the course by taking the help of any of the workshops.

Reference Books

1. S.K.Hajra Choudhury, A.K. Hajra Choudhury and N. Roy, "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media Promoters and Publishers Private limited, Mumbai.
2. S. Kalpakjian and Steven R. Schmid, "Manufacturing Engineering and Technology",4th edition, Pearson Education India Edition, 2002.
3. P.N. Rao, "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill Education, 2017.
4. H.S. Shan, "Manufacturing Processes", Second Edition, Cambridge University Press, India, 2017.
5. Laboratory Manuals.

Online Learning Materials

1. https://rskr.irimee.in/sites/default/files/MET%2012%20-%20SMITHY%20%26%20FORGING.pdf Accessed on September 19, 2024
2. https://instrumentationtools.com/types-of-electrical-wiring/ Accessed on September 19, 2024
3. https://mtcopeland.com/blog/types-of-wood-joints/ Accessed on September 19, 2024
4. https://testbook.com/mechanical-engineering/gas-welding-process-types-and-applications Accessed on September 19, 2024
5. https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-unit-1-the-engine-lathe/ Accessed on September 19, 2024
6. https://www.reliance-foundry.com/blog/sand-casting Accessed on September 19, 2024

H.O.D.
Department of Applied Sciences
Guru Nanak Dev Engineering College,
Gill Road, Ludhiana-141006 (Pb.)

Assistant Registrar (Academics)
Guru Nanak Dev Engg. College,
Ludhiana-141006