YBN UNIVERSITY

Established by the Act of Government of Jharkhand Act 15, 2017
Gazette Notification No. 505, Dated 17th July 2017
As per Section 2(f) of UGC Act. 1956

DIPLOMA ENGINEERING
ELECTRONICS & COMMUNICATION ENGINEERING

RAJAULATU, NAMKUM, RANCHI, JHARKHAND

VISION

YBN University envisions to be a global university for Center of Excellence with set standards ineducation, research, creativity, entrepreneurship and ethical values, overcoming challenges in the serviceof mankindencompassingequityandproductivity.

MISSION

With strong beliefintheastoundingfutureofourstudents,YBNUniversitylooksforwardforthesetgoals andthe actions it undertakes.The followingareits keyprepositions:

- Todisseminateknowledgethattransformstudentsintoleaderswhopossesstheintellect,aptitude,skillandconfidencetosucceedinallpursuitsoflife.
- Developacademicprogramsthatmeettheneedsofregional,state,nationalandglobalcommunities.
- Tocreateacollaborativeenvironmentopentofreeexchangeofideas,whereeducation,research,creativity andentrepreneurshipcanflourish.
- Collaboratewithothereducationalandnon-educationalinstitutionstoachievemutualgoalsandexpandstudentopportunitiesthroughinternshipandplacements.
- Providestudents/facultieswiththerichestpossiblejourneyofeducationaldevelopmentinasupportive andcongenialenvironment.

Values

- **Excellence:**Weaimtoachieveexcellenceinallourwork,alwaysbeingprincipled,considerateandrespectful.
- **Diversity:**Wevaluetheopportunitytowork,learnanddevelopinacommunitythatembracesthediversity ofindividuals enhancingmulticulturallearningjunctures.
- **Integrity:**Havingastrongbelieftoactwithhonesty,courageandtrustworthiness,wesupportanenvironmentofrespect amongstudents/faculties/staffs.
- **Ethical:**Havingcommitmentto ethicalandresponsiblebehaviorinourownactions,welookforwardtodevelopthesameinourstudents.
- **Innovation:**Webuildstrengththroughinnovationintoourcurriculum,culture,workplaceandcampuscreatinganenvironmentwithopportunitiesfor growthandchange.
- **Resilience:**Wechange,adaptandtransform,alsoarecreativetomeettheever-changingneedsoftheUniversity andtheSociety.
- **Commitment:**Wesustainadeepallegianceandcommitmenttotheinterestsoftheregionandstateinwhich weare based,alongside our nationalandinternationalefforts,ensuringrelevance toall.

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENTOFELECTRONICSANDCOMMUNICATIONENGINEERINGABOUTTHE DEPARTMENT:

Electronics and Communication Engineering (ECE) is a swiftly advancing field, with new ideas emerging every otherseconds.Graduateengmeersinthisdisciplinewillbeequippedtodesignandfabricate,install,operateandmaintaincomplex electronic circuits, equipments and systems. The course also covers designing security in communications,besides all the DESINGNED SECTOR ,COAL SECTOR & TELECOM SECTOR ,software and hardware required in thecommunication domain. The course also covers designing security in communications, besides all the software andhardwarerequired inthecommunicationdomain.

VISION OF THE DEPARTMENT:

ThevisionOfECEdepartmentistobecomepioneerinhigherlearningandresearchandtoproducecreativesolutionto societal needs.

- TO prepare engineers, proficient to meet the needs Of current technological advancements in the field OfElectronicsandCommunicationEngineeringbyestablishingalearningenvironmentconsistentwithindustrystandardsinacademicsandresearch.
- Tocreateapassionamongststudentsforcontributingtoresearchbyprovidingindustryorientedlearning.

- The Department endeavors to facilitate state Of the art technical education in the field Of Electronics andCommunication Engineering by infusing scientific temper in the students leading towards research and to grow ascentre of excellence in the field. The vision of the department is to provide education to studentsthatisdirectlyapplicabletoproblemsandsituationsencounteredinreallifeandthusfosterasuccessful career.Thedepartmentaimstoprovide thebest platformtostudentsandstafffortheirgrowth.

- Tobecomeanationallyrecognizedcenterofexcellencethatproducesskilled,innovativeandethicalengineers relevant foracademicsandindustry.
- TOimpartlatestknowledgeandskillssoastokindleinnovation&creativityamongstudents,todevelopandsustaina culture of research while promoting values, ethics and professionalism, leading to a progressive career in industry &academiaglobally
- Create high-quality engineering professionals through research, innovation and teamwork for a lasting technologydevelopment inthearea OfElectronicsandCommunicationEngineering.

MISSION OF THE DEPARTMENT:

TheMissionoftheDepartmentofElectronicsandCommunicationEngineeringis:

- TObetheepitomeOfacademicrigour,flexibletoaccommodateeverystudentandfacultyforbasic,currentandfuture technologies in Electronics and Communication Engineering.
- Strengthening and providing support insustainingahealthysocietybyimprovingthequalityoflifethroughtheapplicationoftechnology.
- TOprovideexcellenceineducation&research.

➢TOprovidequalityeducationandtomakethestudentsentrepreneurandemployable.➢ Continuousupgradationoftechniquesforreachingheightsofexcellenceinaglobal.

TofferqualitativeElectronics&CommunicationengineeringeducationandprofessionalethicsOfglobalstandardsthrough innovative methods Of teaching and learning with practical orientation so as to prepare students forsuccessfulcareer/higherstudy.

➢Fosterculture ofinnovationandresearchinthefieldof Electronics&Communicationengmeermg.

➢TO provide best learning environment to the students, faculty and staff members conducive to creating excellenceintechnicaleducation.

➢To engage modern education aids, laboratories and competent faculty ensuring effective teaching learning processtomeettheevergrowingandchanging industrial andbusinessenvironment.

➢TO continuously challenge the young minds with ideas so as to carry out innovative research through interactionwiththeresearchorganizations&industryandtoprovidethemavenuesforrecognitionbyparticipationinchallengmgplatforms.

➢ Todeveloresponsiblecitizensandprofessionalleaderswithhighethicalandmoralvalues,whocontributeindissemination Ofuniversalscience andtechnology.

➢To offer a well-balanced programme of instruction, lab practices, research & development activities, productincubation.

➢ Developaccomplishedtechnicalpersonnelwithastrongbackgroundonfundamentalandadvancedconcepts,haveexcellent professionalconduct.

➢ Enhanceoverallpersonalitydevelopmentwhichincludesinnovativeandgroupworkexercises,entrepreneurskills,communicationskillsandemployability.

➢Ensuring effective teaching—learning process to provide in-depth knowledge of principles and its applicationspertainingtoElectronics&CommunicationEngineering andinterdisciplinaryareas.

➢Providingindustryanddepartmeninteractionsthroughconsultancyandsponsored research.

➢TOcreateapassionamongststudentsforcontributingtoresearchbyprovidingindustryorientedlearning.

➢ Toimpartindepthknowledgeinprinciplesandapplicationsrelatedtodesignanddevelopmentofvarioussystems forsocietalneeds.

➢ TObuildtheskillsets,attitudeandcorecompetenceOfstudentsandfacultybyprovidingthemwiththeOpportunityto Organizevarioustechnicaleventswhichwillbring Out theirinherent talents.

- Toproducegraduates withtechnicalexpertise,professionalattitudeandethicalvalues
- ➢Toinstilcreativethinkingthrough innovative and team based methods which develops the entrepreneur skills, employability and researchcapabilityamong professionals.

➢Toinculcateinthegraduates,thethirstforlife-longlearningandguidethemtoobtainthoroughknowledgeintheirchoseninterdisciplinaryfield.

- TheECEDepartment'smissionistocarryoutadvancedresearchanddevelopmentinvariousareasOfElectronics &Communication Engineering with different application domains,and to train and educate, at both undergraduate andpostgraduatelevels,engineersofoutstandingabilitywhocanbecomeinnovatorsandnewproduct creators.

ACADEMICS:

- Under Graduate Students pursuing DIPLOMA, B.Tech.& M.TECH in ECE have a fullandflexibleundergraduatecurriculum.Numerousstreamscanbe tailoredtofitevery

individual'sinterests,skillsandcareergoals.Studentscanpreparefortechnologicalcareersinindustry,academiaormanagement.

- PostGraduatePostgraduatestudyin ECEpreparesstudentsforleadership rolesinresearch, development and design positions that require skillful and imaginativeengineering solutions. The department offers several postgraduate degrees in thelatestadvancedtechnology.
- Research Focus Interdisciplinary research, a system-level approach and close tieswithindustrycombineto yieldup-to-dateresearch.Throughresearchcenterindustrialliaison programs and departmental advisory boards, faculty and students can worktowardsfuturetechnologies.
- AdvantageState-of-the-artcomputerlabsupdatedwiththelatestsoftwarecurrentlyusedbyindustry.ManyMOLT's withleadingelectronics companieshavebeensigned.

PROGRAM EDUCATIONAL OBJECTIVES(PEO):

- To undertake industry careers involving innovation and problem solving using Electronics & Communicationtechnologies.

- ToundertakeresearchcareersinElectronicsCommunicationsandalliedareas.

- Tocontributetosocietybybecomingamodelcitizen,whoisgoodatcommunication,ethics,professionalism.
- TObuildstrongfundamentalknowledgeamongststudentstopursuehighereducationandcontinueprofessionaldevelopment inElectronics&otherfield.

- Todevelopaqualitativeeducationalandresearchplatformtoattract goodstudentsandfacultytocarryout theiracademic andprofessional carrierhere.
- TOdevelopstate-of-artlaboratoryfortheUGandPGstudentsfortheknowledgegaininadvancedandrecenttechnologies.

- TobeoneoftheleadingdepartmentgloballyinthefieldofElectronicsandTelecommunicationEngineeringintermsofproducingqualityengineersandresearchers.
- TO bridge the gap between the industry and institute withexpanding collaborationandpartnershipswithindustryandOtherorganization.
- ToenablestudenttoachieveimmediateemploymentinElectronics,CommunicationandITrelatedindustrieswithappropriatetitle andcompensation.
- TOnurturestudenttobesensitivetoethical,societalandenvironmentalissueswhileconductingtheirprofessionalwork.
- Toachieveglobalrecognitioninthefieldofcommunicationtechnologies,SignalandImageprocessingapplicationinRoboticsandVLSI designing.

LONG-RANGEGOALS

- Achieveexcellenceinteachingandresearchby recruitingandretainingdeservingfacultymembersthusmakingittobepreferred destinationforhigherstudies
- PromoteandstrengtheningPGaswellasPhDprogramsbystrengtheningtheR&Dactivities

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- Promote and strengthening Industryinstituteinteractionand
- consultancy.Establishingthedepartmentasoneofthegloballeadinglearningandresearchc
- enter.Leadingrole intheContributiontothecommunity aswellassociety.

STRENGTHOFTHEDEPARTMENT

Quality of student input

- Digital classroom facilities.
- Highly qualified faculty members.
  - Modern equipment (Tl DSP processors, Spectrum Analyzer, RF Trainer Kits, Network Analyzer, IE3D
  - Software, Well equipped Work Benches, Cadence, Tanner Tools, FPGA Boards, Media Kits etc.
- WIFI connectivity.
- Well equipped computing facility.
- Faculty retention.
- Industry based training program through centers of excellence.
- Excellent placement.
- Research publications.
- Student internship - Regular conduction of workshops, FDPs, guest lectures and seminars for students, faculty members and staff.
- Faculty interaction with outside world.
- Highly successful and recognized Alumnae

PROGRAMSPECIFICOUTCOME(PSO):

The ability to absorb and apply fundamental knowledge of core Electronics and Communication Engineering subjectsintheanalysis,design,anddevelopmentOfvarioustypesofelectronicsystems.CompetenceinusingmodernElectronicsandCommunicationEngineeringsoftwareandhardwaretoolsforthedesignandanalysisOfcomplex electronicsystemsandtheirrealapplications.Excellentadaptabilitytochangingworkenvironment,goodinterpersonalskills,professionalethicsandsocietalresponsibilities.

HODDESK

I take this opportunity to welcome you all to the departmentofElectronicsandCommunication Engineering which is committed to producing world class professional Engineers of this corebranch of Electronics and Communication Engineering. The process of learning is extremelyimportant in life. What you learn, how you learn and where you learn, play a crucial role indevelopmg one's intellectual capability, besides career. We at the Department of Electronics andCommunication Engineering of YBN UNIVERSITY strive towards a world class Institution byproducing professional Electronics and Communication Engineers with high technical knowledge,professional skills and ethical values. We in this department provide our students with severalvalueaddedcoursesbesidestheprescribedsyllabustoaugmentvariouspanoramaoftheircareer,provide best professional opportunities and look forward to their bright future. The perseveranceofstudents andtheencouragementofthefaculty arealwaysreflectedintheuniversityresults.

We, as a team resolve to take the department to heights of success and glory and prepare thestudents for the forthcoming challenges of real life. We are confident that our students willemergeasassets notonlytothisinstitutionandtotheorganizationtheybelong,butalso tothecountry at large. We are a preferred partner to the industry and community for contributiontowards their economic and social development by providing high quality manpower throughexcellencem teaching,researchandconsultancy.

ER.KUMARIVINITA

HeadOfDepartmentELECTRONICS &COMMUNICATIONS ENGINEERINGSCHOOLOF ENGINEERING&TECHNOLOGY YBNUNIVERSITY,RANCHI

YBN UNIVERSITY is recognized as a point of reference, a catalyst, a facilitator, a trend setter and a leaderin technical education. The excellent performance of our alumni has enabled the department tomaintain its strong reputation. The department has a global reach with its wide and strong alumninetwork. Our Alumni network involves Entrepreneurs, Teaching professionals, Managers andAdministrators at the highest levels in their respective fields. The Department of Electronics andCommunication Engineering was instituted in the year 2017 with the objective of imparting knowledgein cutting-edge technologies of Electronics and Communication Technology. Ever since the inception ofthe department, it has been fulfilling to the needs of the students by imparting the latest and needbased technical knowledge. The department has enough technical background besides well-equippedcomputerlaboratoriestogivepracticalexposuretothestudents.Thedepartment,headedbyprofessors who are experts in their own disciplines, aims at educating and training students with soundknowledge and awareness in the latest trends in electronics, communication and informationtechnology. The department houses student branches of professional bodies like IETE and IEEE. Studentbranches often conduct technical and non-technical events to motivate the students. These events honethe soft, technical skills , attitude and self-confidence of the students. Our mission is to drive theconcepts intothemindsofstudentsandinfusescientifictemper inthestudents andguidethemtowards research in communication engineering. Students are encouraged to participate in variousactivities like paper presentation, technical quiz, project design, project contests, sports, NSS, YRC, andcultural activities. Students are motivated to undergo In-Plant Training and many Industrial Visits arearranged every year to get industry exposure. Electronics and Communication Engineering (ECE) is oneof the largest and fastest growing fields of engineering. The present Technology revolution is changingthe world and is offering challenging opportunities to specifically Engineers. Electronics andCommunication Engineering has a vital position in this technology revolution. Electronics engineer mustfind new solutions to the practical problems affecting our daily lives. It covers a wide range ofapplications which make our life easier and enjoyable such as Television, Radio, computers,telecommunication, mobile communication etc. Electronics has a major role in improving productivity inindustries like oil, energy, agriculture and so many other important sectors of economy. In steel,petroleum and chemical industries it is the electronic devices that direct, control and test productionprocesses. Health care industry depends on electronic instruments to perform chemical tests and thecheck body functions. There is a good scope for ECE engineers. The Scope is very wide open because theworld is moving in the field of technology and developments. It has scope in almost every industry asevery industry deal with electronics and computers. They can also find jobs with both private and publicTelecommunication companies. They can find job in power sector, steel plants petroleum and chemicalindustry also. They have scope in both public and private sector with regard to installation, operationand maintenance of electronics equipment and systems. Defense, space and other organizations, whichundertake research on a large scale basis, employ electronics engineers in developing and designingsystems and devices for telecommunication and signal processing. They can go for PG Courses withvarious Specializations like IOT (INTERNET OF THINGS) MACHINE LEARNING ,VLSI Design, EmbeddedSystem, Communication Engineering, Signals and System, Microwave Communications etc., CorecompaniesofferingjobstoElectronicsandCommunicationEngineers:ECIL,DERL,BEL,BSNL,ISRO,NRSAIntel, Samsung Electronics, Sony, Toshiba, Philips Semiconductors, Texas Instruments, LG Electronics,Nokia,AMD,CISCO,NVidia,HPandIBMarejustfewtomention.

With technology spreading its domain to all walks of life, there is a need to upgrade the everwideningknowledge base. YBN University has risen to the occasion, and resolves to provide talented, skilled andhighly competent technical human resource to the industrial society. Education is imparted at theUniversityinamannersothateachstudentrealizeshisresponsibilityofenhancing thepresent skills.

Initsendeavourtofosteranoptimumblendofself-disciplineandconsistency,theUniversityprovidesarobust curriculum to cater to the versatile scenario of the industry. It commits to serve the society withzeal and to fulfill its societal obligations with distinction. With consistent efforts to provide the industrywith apt talent, I invite the prospective potential seekers to participate in the campus admissionprogram.

WISHYOUALLHAPPYLEARNINGHERE.....

ERKumariVinita
Assistant Professor. Cum Head of the
departmentELECTRONICANDCOMMUNICATIONIN
ENGINEERINGSCHOOLOF
ENGINEERINGANDTECHNOLOGY

FIRST - SEMESTER

Subject Code	COURSETITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		SEMESTEREVALUATION THEORYPAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTEREVALUATION PRACTICAL /ORALEXAMINATION (VIVA) MARKS	CREDIT
				I	II				
YDEC101	MATHEMATICS-I	03	10	10	10	70	---	---	03
YDEC102	APPLIED PHYSICS-I	03	10	10	10	70	---	---	03
YDEC103	APPLIED CHEMISTRY	03	10	10	10	70	---	---	03
YDEC104	COMMUNICATION SKILLS IN ENGLISH	03	10	10	10	70	---	---	03
YDEC102P	APPLIED PHYSICS-I LAB	02	---	---	---	---	20	30	02
YDEC103P	APPLIED CHEMISTRY LAB	02	---	---	---	---	20	30	02
YDEC104P	COMMUNICATION SKILLS IN ENGLISH LAB	02	---	---	---	---	20	30	02
YDEC105P	ENGINEERING GRAPHICS LAB	03	---	---	---	---	20	30	02
YDEC106P	WORKSHOP PRATICAL LAB	03	---	---	---	---	20	30	02
	TOTAL	24	40	40	40	280	100	150	22

SECOND - SEMESTER

Subject Code	COURSETITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MIDTERMTEST (TWO)		SEMESTEREVALUATION THEORYPAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTEREVALUATION PRACTICAL /ORALEXAMINATION (VIVA) MARKS	CREDIT
				I	II				
YDEC201	MATHEMATICS-II	04	10	10	10	70	---	---	04
YDEC202	APPLIED PHYSICS-II	03	10	10	10	70	---	---	03
YDEC203	INTRODUCTION TO IT SYSTEMS	03	10	10	10	70	---	---	03
YDEC204	FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING	03	10	10	10	70	---	---	03
YDEC205	ENGINEERING MECHANICS	03	10	10	10	70			03
YDEC202P	APPLIED PHYSICS-II LAB	02	---	---	---	---	20	30	02
YDEC203P	INTRODUCTION TO IT SYSTEMS LAB	02	---	---	---	---	20	30	02
YDEC204P	FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING LAB	02	---	---	---	---	20	30	02
YDEC205P	ENGINEERING MECHANICS LAB	02	---	---	---	---	20	30	02
	TOTAL	24	40	40	40	280	100	150	24

THIRD – SEMESTER

Code	Subject	Hrs/week			Marks		Sem.End Duration-Hrs	Credits
		L	T	P/D	Internal	Sem End		
YDEC-301	Engineering Mathematics-III	3	1	-	30	70	3	03
YDEC-302	Humanities andCommunicationSkills	2	1	-	30	70	3	02
YDEC-303	Network Analysis &Synthesis	4	1	-	30	70	3	04
YDEC-304	SignalsandSystems	3	1	-	30	70	3	03
YDEC-305	DigitalElectronics	3	1	-	30	70	3	03
YDEC-306	ElectricalEngineering	3	1	-	30	70	3	03
YDEC-307	DigitalElectronics Lab	-	-	3	50	50	3	02
YDEC-308	ElectricalEngineeringLab	-	-	3	50	50	3	02
TOTAL		**18**	**6**	**6**				**22**

FOURTH –SEMESTER

Code	Subject	Hrs/week			Marks		Sem. EndDuration -Hrs	Credits
		L	T	P	Internal	Sem End		
YDEC 401	EngineeringMathematicsIV	3	1	-	30	70	3	03
YDEC-402	Environmental Science	2	1	-	30	70	3	02
YDEC-403	ElectronicCircuits	4	1	-	30	70	3	04
YDEC-404	AnalogCommunication	3	1	-	30	70	3	03
YDEC-405	ComputerOrganization &Architecture	3	1	-	30	70	3	03
YDEC-406	SolidState Devices	3	1	-	30	70	3	03
YDEC-407	Electronic CircuitsLab	-	-	3	50	50	3	02
YDEC-408	AnalogCommunicationLab	-	-	3	50	50	3	02
TOTAL		**18**	**6**	**6**				**22**

FIFTH–SEMESTER

Code	Subject	Hrs/week			Marks		Sem. EndDuration -Hrs	Credits
		L	T	P	Internal	Sem End		
YDEC-501	Digital SignalProcessing	4	1	-	30	70	3	04
YDEC-502	Quantitative Techniques ForManagerialDecisions	3	1	-	30	70	3	03
YDEC-503	Electromagnetic FieldTheory	3	1	-	30	70	3	03
YDE 504	DigitalCommunication	3	1	-	30	70	3	03
YDEC-505	Microprocessors &Microcontrollers	3	1	-	30	70	3	03
YDE 506	Linear IntegratedCircuits	2	1	-	30	70	3	03
YDEC-507	Microprocessors &MicrocontrollersLab	-	-	3	50	50	3	03
YDEC- 508	LinearIntegratedCircuitsLab	-	-	3	50	50	3	02
TOTAL		**18**	**6**	**6**				**24**

SIXTH – SEMESTER

Code	Subject	Hrs/week			Marks		Sem. EndDuration -Hrs	Credits
		L	T	P	Internal	Sem End		
YDEC-601	Basics of VLSIDesign	4	1	-	30	70	3	04
YDEC-602	Engineering EconomicsandPrinciples ofManagement	3	1	-	30	70	3	03
YDEC-603	Radiation andPropagation	3	1	-	30	70	3	03
YDEC-604	Control Systems	3	1	-	30	70	3	03
YDEC-605	Opticalcommunication	2	1	-	30	70	3	03
YDEC-606		3	1	-	30	70	3	03
YDEC-607	DigitalCommunication &DSPLab	-	-	3	50	50	3	02
YDEC-608	MiniProject	-	-	3	50	50	3	02
TOTAL		**18**	**6**	**6**				**23**

MATHEMATICS-I (YDEC101)

Objectives:

This course is designed to give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus and Basic elements of algebra.

Content:

UNIT - I: Trigonometry

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of sin x, cos x, tan x and e^x.

UNIT - II: Differential Calculus

Definition of function; Concept of limits. Four standard limits $\lim_{x \to a} \frac{x^n - a^n}{x-a}$, $\lim_{x \to 0} \frac{\sin x}{x}$, $\lim_{x \to a} \left(\frac{a^x - 1}{x}\right)$ and $\lim_{x \to a} (1+x)^{\frac{1}{x}}$.

Differentiation by definition of X^n, sinx,cosx,tanx, ex and $\log_a x$. Differentiation of sum, productand quotient of functions.Differentiation of function of a function. Differentiation of trigonometricand inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

UNIT - III: Algebra

Complex Numbers: Definition, real and imaginary parts of a Complex number, polar and Cartesian,representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus and amplitude of a complex number Addition, Subtraction, Multiplication andDivision of a complex number.De-movier's theorem, its application.

UNIT – IV: Partial fractions: Definition of polynomial fraction proper & improper fractions and definitionof partial fractions. To resolve proper fraction into partial fraction with denominator containingnon-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors.To resolve improper fraction into partial fraction.

UNIT – V: Permutations and Combinations: Value of ${}^nP_r$ and ${}^nC_r$.

Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion andgeneral form); binomial theorem for any index (expansion without proof) first and second binomialapproximation with applications to engineering problems

References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. ReenaGarg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e., ViFirst Year Curriculum Structure Common to All Branches 14kas Publishing House.
5. ReenaGarg&Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House,

APPLIED PHYSICS-I(YDEC102)

Objectives:

Applied Physics includes the study of a large number of diverse topics all related to materials/thingsthat exist in the world around us. It aims to give an understanding of this world both by observationand by prediction of the way in which such objects behave. Concrete use of physical principles andanalysis in various fields of engineering and technology are given prominence in the course content.The course will help the diploma engineers to apply the basic concepts and principles to solve broadbasedengineering problems and to understand different technology based applications.

Content:

Unit 1: **Physical world, Units and Measurements**

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.

Unit 2: Force and Motion

Scalar and Vector quantities – examples, representation of vector, types of vectors.Additionand Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller.Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun, rockets, Impulse and its applications. Circular motion, definition of angular displacement, angular velocity, angular acceleration,frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist.

Unit 3: Work, Power and Energy

Work: Concept and units, examples of zero work, positive work and negative work Friction: concept, types, laws of limiting friction, coefficient of friction, reducing friction and its engineering applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications. Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, transformation of energy (examples). Power and its units, power and work relationship, calculation of power (numerical problems).

Unit 4: **Rotational Motion**

Translational and rotational motions with examples, Definition of torque and angular momentum
and their examples, Conservation of angular momentum (quantitative) and its applications. Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).

Unit 5: **Properties of Matter**

Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve. Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's

Barometer and its applications.Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension.
Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems. Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numericals) and its applications.

Unit 6: Heat and Thermometry Concept of heat and temperature, modes of heat transfer (conduction, convection and radiationwith examples), specific heats, scales of temperature and their relationship, Typesof Thermometer (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer,Pyrometer) and their uses.Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansionsand relation amongst them, Co-efficient of thermal conductivity, engineering applications.

References:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
3. Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. Engineering Physics by DK Bhhatacharya&PoonamTandan; Oxford University Press, New Delhi.
6. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
7. Practical Physics by C. L. Arora, S. Chand Publication.
8. e-books/e-tools/ learning physics software/websites etc.

APPLIED CHEMISTRY(YDEC103)

Objectives:

There are numerous number materials are used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentiallyrequires principles and concepts of Applied Chemistry for technicians. On successful completionof this course content will enable technicians to understand, ascertain and analyse and propertiesof natural raw materials require for producing economical and eco-friendly finished products.

- Solve various engineering problems applying the basic knowledge of atomic structure andchemical bonding.
- Use relevant water treatment method to solve domestic and industrial problems.
- Solve the engineering problems using knowledge of engineering materials and properties.
- Use relevant fuel and lubricants for domestic and industrial applications
- Solve the engineering problems using concept of Electrochemistry and corrosion.

Content:

- **Unit 1: Atomic Structure, Chemical Bonding and Solutions**

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertaintyprinciple, Quantum numbers – orbital concept. Shapes of s,p and d orbitals, Pauli's exclusionprinciple, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding(NaCl example), covalent bond (H_2, F_2, HF hybridization in $BeCl_2$, BF_3, CH_4, NH_3, H_2O), coordinationbond in NH_4^+, and anomalous properties of NH_3, H_2O due to hydrogen bonding, andmetallicbonding.Solution – idea of solute, solvent and solution, methods to express the concentration of solution-molarity (*M* = mole per liter), ppm, mass percentage, volume percentage and mole fraction

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- **Unit 2: Water**

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification ofsoft and hard water based on soap test, salts causing water hardness, unit of hardness andsimple numerical on water hardness.Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measurementof water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation.

i). Water softening techniques – soda lime process, zeolite process and ion exchange process.

ii). Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.Water for human consumption for drinking and cooking purposes from any water sourcesand enlist Indian standard specification of drinking water (collect data and understandstandards).

- **Unit 3: Engineering Materials**

Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix),flux, slag, metallurgy – brief account of general principles of metallurgy.Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite alongwith reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous withsuitable examples, properties and applications.General chemical composition, composition based applications (elementary idea only detailsomitted):Port land cement and hardening, Glasses Refractory and Composite materials. Polymers – monomer, homo and co polymers, degree of polymerization, simple reactionsinvolved in preparation and their application of thermoplastics and thermosetting plastics(using PVC, PS, PTFE, nylon – 6, nylon-6,6 and Bakelite), rubber and vulcanization of rubber.

- **Unit 4: Chemistry of Fuels and Lubricants**

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV andLCV), calculation of HCV and LCV using Dulong'sformula.Proximate analysis of coal solid fuelpetrol and diesel - fuel rating (octane and cetane numbers),Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producergas and biogas.Lubrication – function and characteristic properties of good lubricant, classification with

examples,lubricationmechanism – hydrodynamic and boundary lubrication, physical properties(viscosity and viscosity index, oiliness, flash and fire point, could and pour point only)and chemical properties (coke number, total acid number saponification value) of lubricants.

• **Unit 5: Electro Chemistry**

Electronic concept of oxidation, reduction and redox reactions.Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws ofelectrolysis and simple numerical problems.Industrial Application of Electrolysis –

• Electrometallurgy
• Electroplating
• Electrolytic refining.

Application of redox reactions in electrochemical cells –

• Primary cells – dry cell,
• Secondary cell - commercially used lead storage battery, fuel and Solar cells.

Introduction to Corrosion of metals –

• definition, types of corrosion (chemical and electrochemical), H2 liberation andO2 absorption mechanism of electrochemical corrosion, factors affecting rate ofcorrosion.Internal corrosion preventive measures –
• Purification, alloying and heat treatment andExternal corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organicinhibitors.

References/Suggested Learning Resources:

(a) Books :

1) Text Book of Chemistry for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
2) Agarwal, &Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.
3) C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
4) Dara, S. S. &Dr.S.S.Umare, Engineering Chemistry, S.Chand. Publication, New Delhi, New Delhi,2015.
5) Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi, 2015.
6) Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013.
7) Dr. G. H. Hugar& Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II,
NITTTR, Chandigarh, Publications, 2013-14.
8) Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.

(b) Open source software and website address:

1 www.chemguide.co.uk/atommenu.html (Atomic structure and chemical bonding)
2 www.visionlearning.com (Atomic structure and chemical bonding)
3 www.chem1.com (Atomic structure and chemical bonding)
4 https://www.wastewaterelearning.com/elearning/ (Water Treatment)
5 www.capital-refractories.com (Metals, Alloys, Cement, and Refractory Materials)
7 www.chemcollective.org (Metals, Alloys)

COMMUNICATION SKILLS IN ENGLISH(YDEC104)

Objectives:
Communication skills play an important role in career development. This course aims at introducing basic concepts of communication skills with an emphasis on developing personality of the students.
Thus, the main objectives of this course are:21 First Year Curriculum Structure Common to All Branches
To develop confidence in speaking English with correct pronunciation.To develop communication skills of the students i.e. listening, speaking, reading and writing skills.To introduce the need for personality development- Focus will be on developing certain qualitieswhich will aid students in handling personal and career challenges, leadership skills etc.

Content
Unit-1 Communication: Theory and Practice
• Basics of communication: Introduction, meaning and definition, process of communicationetc.
• Types of communication: formal and informal, verbal, non-verbal and written Barriers toeffective communication.
• **7** Cs for effective communication (considerate, concrete, concise, clear, complete, correct,courteous).
• Art of Effective communication,
o Choosing words
o Voice
o Modulation
o Clarity
o Time
o Simplification of words
• Technical Communication.

Unit-2 Soft Skills for Professional Excellence
• Introduction: Soft Skills and Hard Skills.
• Importance of soft skills.
• Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligenceand empathy etc.
• Applying soft skills across cultures.
• Case Studies.

Unit-3: Reading Comprehension
Comprehension, vocabulary enhancement and grammar exercises based on reading of the followingtexts:
Section-1
Malgudi Days: R.K. Narayan
The Room on Roof: Ruskin Bond
"The Gift of the Magi" by O. Henry
"Uncle Podger Hangs a Picture" Jerome K. Jerome
Section-2
Night of the Scorpion by Nissim Ezekiel,
Stopping by Woods on a Snowy Evening by Robert Frost,
Where the Mind is Without Fear by Rabindranath Tagore,
Ode to Tomatoes by Pablo Neruda,

Unit-4: Professional Writing
The art of précis writing,
Letters: business and personnel,
Drafting e-mail, notices, minutes of a meeting etc.

Filling-up different forms such as banks and on-line forms for placement etc.

Unit-5: Vocabulary and Grammar

Vocabulary of commonly used words
Glossary of administrative terms (English and Hindi)
One-word substitution, Idioms and phrases etc.
Parts of speech, active and passive voice, tenses etc., Punctuation

References:

1. J.D.O'Connor. *Better English Pronunciation.* Cambridge: Cambridge University Press, 1980.
2. Lindley Murray. *An English Grammar: Comprehending Principles and Rules.* London: Wilson and Sons, 1908.
3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Edition 2018)
4. Margaret M. Maison. *Examine your English.* Orient Longman: New Delhi, 1964.
5. M. Ashraf Rizvi. *Effective Technical Communication*.Mc-Graw Hill: Delhi, 2002.
6. John Nielson. *Effective Communication Skills.*Xlibris, 2008.
7. Oxford Dictionary
8. Roget's Thesaurus of English Words and Phrases
9. Collin's English Dictionary

ENGINEERING GRAPHICS(YDEC103)

Course Objectives:

• To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.

• To develop drafting and sketching skills, to know the applications of drawing equipments, and Nget familiarize with Indian Standards related to engineering drawings.

• To develop skills to visualize actual object or a part of it, on the basis of drawings.

• To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.

• To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD. 23 First Year Curriculum Structure Common to All Branches

Course Content

Unit – I Basic elements of Drawing

Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications.Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale. Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning. Geometrical and Tangency constructions. (Redraw the figure)

Unit – II Orthographic projections

Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination). Introduction to orthographic projection, First angle and Third angle method, their symbols.Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only)

Unit – III Isometric Projections

Introduction to isometric projections.Isometric scale and Natural scale.Isometric view and isometric projection.Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection.

Unit – IV Free Hand Sketches of engineering elements

Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washer, Locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching) Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)

Unit – V Computer aided drafting interface

Computer Aided Drafting: concept. Hardware and various CAD software available. System requirements and Understanding the interface. Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon. File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit. Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.

Unit – VI Computer aided drafting

Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, PolyLine.Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates. Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers. Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions. Dim scale variable.Editing dimensions.Text: Single line Text, Multiline

text.Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

S.No.	PracticalExercises	UnitNo.	Ap-prox.Hrs
1	Draw horizontal, Vertical, 30 degree, 45 degree, 60 and 75 degrees lines, differ-ent types of lines, dimensioning styles using Tee and Set squares/ drafter. (dothisexercisein sketchbook)	I	02
2	Writealphabetsandnumerical(Verticalonly)(dothisexerciseinsketchbook)	I	02
3	Drawregulargeometricconstructionsandredrawthegivenfigure(dothisexer-cisein sketchbook)PartI	II	02
4	Drawregulargeometricconstructionandredrawthegivenfigure(dothisexer-cisein sketchbook)PartII	II	02
5	Drawaproblemonorthographicprojectionsusingfirstanglemethodofprojec-tionhaving plainsurfacesandslanting.PartI	III	02
6	Drawanotherproblemonorthographicprojectionsusingfirstanglemethodof projectionhavingslantingsurfaceswithslots.PartII	III	02
7	Drawtwoproblemsonorthographicprojectionsusingfirstanglemethodofpro-jectionhaving cylindricalsurfaces,ribs.PartI	III	02
8	Draw twoproblemsonIsometricviewofsimpleobjectshavingplainand slant-ingsurfacebyusingnaturalscale. PartI	IV	02
9	DrawsomeproblemsonIsometricprojectionofsimpleobjectshavingcylindri-calsurfaceby usingisometricscale. PartI	IV	02
10	Draw free hand sketches/ conventional representation of machine elementsin sketch book such as thread profiles, nuts, bolts, studs, set screws, washers,Lockingarrangements.PartI	V	02
11	ProblembasedLearning:Giventheorthographicviewsofatleastthreeobjectswith few missing lines, the student will try to imagine the corresponding ob-jects,completetheviewsanddrawtheseviewsinsketchbook.PartI	III, II, V	02
12	Drawbasic2Dentitieslike:Rectangle,Rhombus,PolygonusingAutoCAD(Printo utshouldbeapartofprogressiveassessment).PartI	V	02
13	Drawbasic2Dentitieslike:Circles,Arcs,circularusingAutoCAD(Printoutshould beapartofprogressiveassessment).PartII	V	02
14	Drawbasic2Dentitieslike:CircularandrectangulararrayusingAutoCAD(Printou tshouldbeapartofprogressiveassessment).PartIII	V	02
15	DrawblocksofDentitiescomprisesofRectangle,Rhombus,Polygon,Circles,Ar cs, circular and rectangular array, blocks using AutoCAD (Print out shouldbeapartofprogressive assessment).PartIV	V	02
16	DrawbasicbranchspecificcomponentsinDusingAutoCAD(Printoutshouldbea partoftermwork).PartI	VI	02
17	DrawcomplexbranchspecificcomponentsinDusingAutoCAD(Printshould beapartofprogressiveassessment).PartI	VI	02
	Total		**34**

SUGGESTED LEARNING RESOURCES

1. Bureau of Indian Standards. *Engineering Drawing Practice for Schools and Colleges IS: Sp-46.* BIS.

Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2.
2. Bhatt, N. D. *Engineering Drawing*. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93- 80358-17-8.
3. Jain &Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978-93-86173-478)

4. Jolhe, D. A. *Engineering Drawing*. Tata McGraw Hill Edu. New Delhi, 2010; ISBN: 978-0-07-064837-1
5. Dhawan, R. K. *Engineering Drawing*. S. Chand and Company, New Delhi; ISBN: 81-219-1431-0.
6. Shah, P. J. *Engineering Drawing*. S. Chand and Company, New Delhi, 2008, ISBN:81-219-2964-4.
7. Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. *Engineering Graphics with AutoCAD*. PHI Learning Private Limited-New Delhi (2010); ISBN: 978-8120337831.
8. Jeyapoovan, T. *Essentials of Engineering Drawing and Graphics using AutoCAD*. Vikas Publishing HousePvt. Ltd, Noida, 2011; ISBN: 978-8125953005.
9. Autodesk. *AutoCAD User Guide*. Autodesk Press, USA, 2015.

Software/Learning Websites

1. https://www.youtube.com/watch?v=TJ4jGyD-WCw
2. https://www.youtube.com/watch?v=dmt6_n7Sgcg
3. https://www.youtube.com/watch?v=_MQScnLXL0M
4. https://www.youtube.com/watch?v=3WXPanCq9LI
5. https://www.youtube.com/watch?v=fvjk7PlxAuo
6. http://www.me.umn.edu/coursesme2011/handouts/engg%20graphics.pdf
7. https://www.machinedesignonline.com

Course Outcomes

Following outcomes will be achieved:
1) Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing
2) Draw views of given object and components 3) Sketch orthographic projections into isometric projections and vice versa.
3) Apply computer aided drafting tools to create 2D engineering draw

WORKSHOP PRATICAL(YDEC103)

Course Objectives:

- To understand basic engineering processes for manufacturing and assembly.
- To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's
- To understand and interpret job drawings, produce jobs, and inspect the job for specified dimensions
- To understand the various types of wiring systems and acquire skills in house wiring
- To understand, operate, control different machines and equipment's adopting safety practices

CourseContent:

S.No.	DetailsOfPracticalContent
I	**Carpentry:**i)Demonstrationofdifferentwoodworkingtools/machines.ii)Demonstrationof different wood working processes, like plaining, marking, chiseling, grooving, turning ofwood etc. iii) One simple job involving any one joint like mortise and tenon dovetail, bridle,halflapetc.
II	**Fitting:** i) Demonstration of different fitting tools and drilling machines and power tools ii)Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cuttingetc. iii) One simple fitting job involving practice of chipping, filing, drilling, tapping, cuttingetc
III	**Welding:** i) Demonstration of different welding tools / machines. ii) Demonstration on ArcWelding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts withwelding.iii) Onesimplejobinvolvingbuttandlapjoint
IV	**Sheet Metal Working:** i) Demonstration of different sheet metal tools / machines. ii)Demonstration of different sheet metal operations like sheet cutting, bending, edging, endcurling, lancing, soldering, brazing, and riveting. iii) One simple job involving sheet metaloperationsandsolderingandriveting.
V	**Electrical House Wiring:** Practice on simple lamp circuits (i) one lamp controlled by oneswitch by surface conduit wiring, (ii) Lamp circuits- connection of lamp and socket by sep-arateswitches,(iii)ConnectionofFluorescentlamp/tubelight,(iv)simplelampcircuits-in-stallbedroomlighting.And(v) Simplelampcircuits-install staircasewiring.
VI	**Demonstration:**i)DemonstrationofmeasurementofCurrent,Voltage,PowerandEnergy. ii)Demonstrationofadvancepowertools,pneumatictools,electricalwiringtoolsandacces-sories.iii) Tools forCuttinganddrilling

References:

1. S.K. HajaraChaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015
2. B.S. Raghuwanshi, Workshop Technology, DhanpatRai and sons, New Delhi 2014
3. K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad 2014
4. Kents Mechanical Engineering Hand book, John Wiley and Sons, New York

APPLIED PHYSICS-I(YDEC102P)

Course Objectives

Study of Applied Physics aims to give an understanding of physical world by observations and predictions. Concrete use of physical principles and analysis in various fields of engineering and technologyis very prominence. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

List of Practical's/Activities (To perform minimum 10 practical's).

1. To measure length, radius of a given cylinder, a test tube and a beaker using a Verniercaliper and find volume of each object.
2. To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3. To determine radius of curvature of a convex and a concave mirror/surface using a spherometer.
4. To verify triangle and parallelogram law of forces.
5. To find the co-efficient of friction between wood and glass using a horizontal board.
6. To determine force constant of a spring using Hook's Law.
7. To verify law of conservation of mechanical energy (PE to KE).

8. To find the moment of inertia of a flywheel.
9. To find the viscosity of a given liquid (Glycerin) by Stoke's law.
10. To find the coefficient of linear expansion of the material of a rod.
11. To determine atmospheric pressure at a place using Fortin's barometer.
12. To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

Learning Outcome:

After undergoing this lab work, the student will be able to:

- Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, Spherometeretc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.
- Differentiate various shapes and determine dimensions of plane, curved and regular surfaces/ bodies.
- Apply and Verify laws of forces and determine resultant force acting on a body.
- Appreciate role of friction and measure co-efficient of friction between different surfaces.
- Describe and verify Hook's law and determine force constant of spring body.
- Identify various forms of energy, energy transformations and verify law of conservation of energy.
- Understand rotational motion and determine M.I. of a rotating body (flywheel)
- Understand Stoke's law for viscous liquids and determine viscosity of a given liquid.
- Understand how materials expand on heating and determine linear expansion coefficient for a given material rod.
- Understand working and use Fortin's barometers for determining pressure at a place.
- Understand use of thermometers to measure temperature under different conditions and different scales of temperature measurements.

References:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P)Ltd.,
3. Practical Physics by C. L. Arora, S. Chand Publication.
4. e-books/e-tools/ learning physics software/YouTube videos/websites etc.

APPLIED CHEMISTRY(YDEC103P)

Course Objectives:

There are numerous number of materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. The course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.

LIST OF PRACTICALS:

Perform any 12 (twelve) Laboratory Practicals.

Volumetric and Gravimetric analysis:

1 Preparation of standard solution of oxalic acid or potassium permanganate.
2 To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
3 Standardization of $KMnO_4$ solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by $KMnO_4$ solution.
4 Iodometric estimation of copper in the copper pyrite ore.
5 Volumetric estimation of total acid number (TAN) of given oil.
6 Volumetric estimation of
a) Total hardness of given water sample using standard EDTA solution.
b) Alkalinity of given water sample using 0.01M sulphuric acid
7 Proximate analysis of coal
a) Gravimetric estimation moisture in given coal sample
b) Gravimetric estimation ash in given coal sample

Instrumental analysis

8. Determine the conductivity of given water sample.
9. Determination of the Iron content in given cement sample using colorimeter.
10. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
11. Determination of viscosity of lubricating oil using Redwood viscometer.
12. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.
13. To verify the first law of electrolysis of copper sulfate using copper electrode.
14. Construction and measurement of emf of elector chemical cell (Daniel cell).
15. To study the effect of dissimilar metal combination.

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- 15-20% of the topics which are relatively simpler of descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Micro-projects may be given to group of students for hand-on experiences
- Encouraging students to visit to sites such as Railway station and research establishment around the institution.

Learning Outcomes:

At the end of the course student will be able to

 To express quantitative measurements accurately.
 To practice and adapt good measuring techniques.
 To use various apparatus for precise measurements.
 To understand and differentiate different methods of quantitative analysis.

 To know and understand principles of quantitative analysis using instruments.
 To construct different electrochemical cells used in developing batteries.
 To understand and appreciate methods of corrosion abetments.

Reference Books:

1. Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
2. Dr. G. H. Hugar and Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
3. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.
4. Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi, 2015.

COMMUNICATION SKILLS IN ENGLISH LAB(YDEC104P)

Objectives:

Communication skills play an important role in career development. This lab course aims at actively involving students in various activities to improve their communication skills with an emphasis on developing personality of the students. Thus, the objectives of this course are:

1. To develop listening skills for enhancing communication.
2. To develop speaking skills with a focus on correct pronunciation and fluency.
3. To introduce the need for Personality development- Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc. for that purpose group discussion, extempore and other activities should be conducted during lab classes.

Content:

Unit 1 Listening Skills

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

Unit II Introduction to Phonetics

Sounds: consonant, vowel, diphthongs, etc. transcription of words (IPA), weak forms, syllable division, word stress, intonation, voice etc.

Unit III Speaking Skills

Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

Unit IV Building vocabulary

Etymological study of words and construction of words, phrasal verbs, foreign phrases, idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

Recommended Readings:

1. Daniel Jones. *The Pronunciation of English*.Cambridge: Cambridge University Press, 1956.
2. James Hartman& et al. Ed. *English Pronouncing Dictionary*.Cambridge: Cambridge University Press, 2006.
3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4. J.D.O'Connor. *Better English Pronunciation.* Cambridge: Cambridge University Press, 1980.
5. Lindley Murray. *An English Grammar: Comprehending Principles and Rules*. London: Wilson and Sons, 1908.
6. Margaret M. Maison. *Examine your English.* Orient Longman: New Delhi, 1964.
7. J.Sethi& et al. *A Practice Course in English Pronunciation*. New Delhi: Prentice Hall, 2004.
8. Pfeiffer, William Sanborn and T.V.S Padmaja. *Technical Communication: A Practical Approach*. 6th ed. Delhi: Pearson, 2007.

MATHEMATICS-II(YDEC201)

Course Objectives:

This course is designed to give a comprehensive coverage at an introductory level to the subject of matrices, Integral Calculus coordinate geometry, Basic elements of vector algebra and First Order Differential Equations.

Course Content:

UNIT - I: Determinants and Matrices

Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule.
Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

UNIT - II: Integral Calculus

Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Use of formulas $\int_0^{\frac{\pi}{2}} \sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} \cos^n x\, dx$ and $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x\, dx$ for solving problems Where m and n are positive integers.
Applications of integration for i. Simple problem on evaluation of area bounded by a curve and axes.
ii. Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT - III: Co-Ordinate Geometry

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.
General equation of a circle and its characteristics. To find the equation of a circle, given:
i. Centre and radius,
ii. Three points lying on it and
iii. Coordinates of end points of a diameter;
Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof.Problems on conics when their foci, directories or vertices are given.

UNIT - IV: Vector Algebra

Definition notation and rectangular resolution of a vector.Addition and subtraction of vectors.Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

UNIT-V: Differential Equations

Solution of first order and first degree differential equation by variable separation method (simple problems). MATLAB – Simple Introduction.

References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
4. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
5. ReenaGarg&Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

APPLIED PHYSICS-II(YDEC202)

Course Objectives

Applied Physics aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

Teaching Approach

Teachers should give examples from daily routine as well as, engineering/technology applications on various concepts and principles in each topic so that students are able to understand and grasp these concepts and principles. In all contents, SI units should be followed. Use of demonstration can make the subject interesting and develop scientific temper in the students. Student activities should be planned on all the topics.
Activity- Theory - Demonstrate/practice approach may be followed throughout the course so that learning may be outcome and employability based.

Course Content

UNIT - 1: Wave motion and its applications

Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation ($y = r \sin \omega t$) amplitude, phase, phase difference, principle of superposition of waves and beat formation. Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc. Simple harmonic progressive wave and energy transfer, study of vibration of cantilever and determination of its time period, Free, forced and resonant vibrations with examples. Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.

UNIT - 2: Optics

Basic optical laws; reflection and refraction, refractive index, Images and image formation by mirrors, lens and thin lenses, lens formula, power of lens, magnification and defects. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber.
Optical Instruments; simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, uses of microscope and telescope, optical projection systems.

UNIT - 3: Electrostatics

Coulombs law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.
Capacitor and its working, Types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors (related numerical), dielectric and its effect on capacitance, dielectric break down.

UNIT - 4: Current Electricity

Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and colourcoding.Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and

its applications (slide wire bridge only), Concept of terminal potential difference and Electro motive force (EMF) Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy.

UNIT - 5: Electromagnetism

Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization.
Concept of electromagnetic induction, Faraday's Laws, Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.

UNIT - 6: Semiconductor Physics

Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes.Diode as rectifier – half wave and full wave rectifier (centre taped). Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only). Photocells, Solar cells; working principle and engineering applications.

UNIT - 7: Modern Physics

Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission;

population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers.
Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors. Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, nanotechnology based devices and applications.

References:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
5. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
6. A Textbook of Optics, N Subramanyam, BrijLal, MN Avahanulu, S Chand and Company Ltd.
7. Introduction to Fiber Optics, AjoyGhatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.
8. Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.
9. Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd, New Delhi.
10. e-books/e-tools/ learning physics software/websites etc.

INTRODUCTION TO IT SYSTEMS(YDEC203)

Course Objectives::
This course is intended to make new students comfortable with computing environment - Learning basic computer skills, Learning basic application software tools, Understanding Computer Hardware, Cyber security awareness

Content:

UNIT 1:
Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. General understanding of various computer hardware components – CPU, Memory, Display, Keyboard, Mouse, HDD and other Peripheral Devices.

UNIT 2:
OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.

UNIT 3:
HTML4, CSS, making basic personal webpage.

UNIT 4:
Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.

UNIT 5:
Information security best practices. Class lectures will only introduce the topic or demonstrate the tool, actual learning will take place in the Lab by practicing regularly.

Suggested Lab Work:
This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. This course is all about some theory and a lot of practice.

References:

- R.S. Salaria, Computer Fundamentals, Khanna Publishing House
- Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House
- Online Resources, Linux man pages, Wikipedia
- Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by MokhtarEbrahim, Andrew Mallett

Course outcomes:
At the end of the course student will be able to comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/ attacks

FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING(YDEC204)

Course Objectives:

To provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.

Course Content:

UNIT I Overview of Electronic Components & Signals:
Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and
CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources.

UNIT II Overview of Analog Circuits: Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.

UNIT III Overview of Digital Electronics: Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach, Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).

Unit IV Electric and Magnetic Circuits:
EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically inducedemf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

Unit V A.C. Circuits: Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits;Power in A. C. Circuits, power triangle.

Unit VI Transformer and Machines: General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations and characteristic of motors.

References:

1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353

4. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924375

6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
7. Sedha, R.S., A text book of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978-8121927833
8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13: 0070634244-978
9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504
10. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239

ENGINEERING MECHANICS(YDEC204)

Course Contents:

Unit – I Basics of mechanics and force system

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics.Space, time, mass, particle, flexible body and rigid body.Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units.Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force - Orthogonal components of a force, moment of a force, Varignon'sTheorem.Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Unit– II Equilibrium

Equilibrium and Equilibrant, Free body and Free body diagram, Analytical and graphical methods ofanalysingequilibriumLami's Theorem – statement and explanation, Application for various engineering problems. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple), Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load. Beam reaction graphically for simply supported beam subjected to vertical point loads only.

Unit– III Friction

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.

Unit– IV Centroid and centre of gravity

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle) Centroid of composite figures composed of not more than three geometrical figures Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere) Centre of Gravity of composite solids composed of not more than two simple solids.

Unit – V Simple lifting machine

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel,Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block.

Suggested Learning Resources:

1. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
2. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.
3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
4. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
5. Dhade, Jamadar&Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
6. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
7. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

APPLIED PHYSICS-II LAB(YDEC202P)

Course Objectives:

Concrete use of physical principles and analysis in various fields of engineering and technology is very prominence. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

List of Practicals/Activities: (To perform minimum 12 Practicals)

1. To determine and verify the time period of a cantilever.
2. To determine velocity of ultrasonic in different liquids using ultrasonic interferometer.
3. To verify laws of reflection from a plane mirror/ interface.
4. To verify laws of refraction (Snell's law) using a glass slab.
5. To determine focal length and magnifying power of a convex lens.
6. To verify Ohm's law by plotting graph between current and potential difference.
7. To verify laws of resistances in series and parallel combination.
8. To find the frequency of AC main using electrical vibrator.
9. To verify Kirchhoff's law using electric circuits.
10. To study the dependence of capacitance of a parallel plate capacitor on various factors and determines permittivity of air at a place.
11. To find resistance of a galvanometer by half deflection method.
12. To convert a galvanometer into an ammeter.
13. To convert a galvanometer into a voltmeter.
14. To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee voltage.
15. To verify inverse square law of radiations using a photo-electric cell.
16. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
17. To measure numerical aperture (NA) of an optical fiber.
18. Study of an optical projection system (OHP/LCD) - project report.

Suggested Student Activities & Strategies

Apart from classroom and laboratory learning following are the suggested student related activities which can be undertaken to accelerate the attainment of various outcomes of the course.

a. Make survey of different physical products and compare the following points

- Measurements of dimensions
- Properties
- Applications

b. Library survey regarding engineering materials/products used in different industries

c. Seminar on any relevant topic.

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations/projects.
- Micro-projects on relevant may be given to group of students for hand-on experiences.

Learning Outcome:

After undergoing this subject, the student will be able to;

a) Apply concept of vibrations and determine the time period of vibrating objects.

b) Use of equipment for determining velocity of ultrasonics in different liquids.
c) Verify optical laws; reflection, refraction from plane interfaces and surfaces.
d) Apply knowledge of optics to determine focal length and magnifying power of opticallenses.

e) Understand uses of electrical components and meters and verify Ohm's law for flow ofcurrent.
f) Quantify resistances and verify laws of series and parallel combination of resistances.
g) Apply concept of electrical vibrations in determine frequency of AC main.
h) Analyse electrical circuits and verify Kirchhoff's law governing electrical circuits.
i) Measure resistance of a galvanometer and how it is converted into an ammeter and voltmeter.
j) Investigate characteristics of semiconductor diodes, photoelectric cells and determine operational parameters associated with their performance.
k) Work with laboratory lasers and understand method to measure the wavelength of the light emitted from a laser.
l) Handle optical fibers and determine numerical aperture of given optical fiber.
m) Understand construction and working of an optical projection system.

Recommended Books:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
3. Practical Physics by C. L. Arora, S. Chand & Company Ltd.
4. e-books/e-tools/ learning physics software/you Tube videos/ websites etc.

INTRODUCTION TO IT SYSTEMS LAB(YDEC203P)

Course Objectives:

This Lab course is intended to practice whatever is taught in theory class of 'Introduction of IT Systems' and become proficient in using computing environment - basic computer skills, basic application software tools, Computer Hardware, cyber security features, etc.

CourseContent:

S.No.	TopicsforPractice
1	Browserfeatures,browsing,usingvarioussearchengines,writingsearchqueries
2	Visitvariouse-governance/DigitalIndiaportals,understandtheirfeatures,servicesof-fered
3	Read Wikipedia pages on computer hardwarecomponents, look at thosecomponentsinlab,identifythem,recognisevariousports/interfacesandrelatedcables,etc.
4	InstallLinuxandWindowsoperatingsystemonidentifiedlabmachines,explorevarious options,doitmultipletimes
5	Connectvariousperipherals(printer,scanner,etc.)tocomputer,explorevariousfeatures ofperipheralandtheirdevicedriversoftware.
6	PracticeHTMLcommands,trythemwithvariousvalues,makeyourownWebpage
7	ExplorefeaturesofOpenOfficetools,createdocumentsusingthesefeatures,doitmulti-pletimes
8	ExploresecurityfeaturesofOperatingSystemsandTools,tryusingthemandseewhathappens.

This is a skill course. More you practice, better it will be.

References:

1. Online resources, Linux man pages, Wikipedia.
2. R.S. Salaria, Computer Fundamentals, Khanna Publishing House.
3. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by MokhtarEbrahim, Andrew Mallett.
5. IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, CISC Press, Pearson Education.
6. PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).

Course outcomes:

At the end of the course student will be able to comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/attacks.

FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING LAB(YDEC204P)

Suggested Practicals/Exercises:
The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S.No.	PracticalOutcomes(PrOs)	Approx.Hrs.
1.	Determinethepermeabilityofmagneticmaterialbyplottingits B-Hcurve.	02*
2.	Measurevoltage,currentandpowerin1-phasecircuitwithresistiveload.	02*
3.	Measurevoltage,currentandpowerinR-Lseriescircuit.	02*
4.	Determinethetransformationratio(K)of1-phasetransformer.	02
5.	Connectsinglephasetransformerandmeasureinputandoutputquantities.	02
6.	MakeStarandDeltaconnectionininductionmotorstartersandmeasurethelineandphasevalues.	02
7.	Identifyvariouspassiveelectroniccomponentsinthegivencircuit	02
8.	Connectresistorsinseriesandparallelcombinationonbreadboardandmeasureitsvalueusingdigital multimeter.	02
9.	Connectcapacitorsinseriesandparallelcombinationonbreadboardandmeasureits valueusingmultimeter.	02*
10.	Identifyvariousactiveelectroniccomponentsinthegivencircuit.	02
11.	Usemultimetertomeasurethevalueofgivenresistor.	02
12.	UseLCR-Qtestertomeasurethevalueofgivencapacitorandinductor.	02
13.	Determinethevalueofgivenresistorusingdigitalmultimetertoconfirmwithcolourcode.	02*
14.	TestthePN-junctiondiodesusingdigitalmultimeter.	02*
15.	TesttheperformanceofPN-junctiondiode.	02
16.	TesttheperformanceofZenerdiode.	02
17.	TesttheperformanceofLED.	02
18.	Identifythreeterminalsofatransistorusingdigitalmultimeter.	02
19.	TesttheperformanceofNPNtransistor.	02*
20.	DeterminethecurrentgainofCEtransistorconfiguration.	02
21.	Testtheperformanceoftransistorswitchcircuit.	02
22.	Testtheperformanceoftransistoramplifiercircuit.	02
23.	TestOp-AmpasamplifierandIntegrator	02
	Total	**46**

References:

1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House, 2018
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
4. Theraja, B. L., Electrical Technology Vol – I, S. Chand publications, New Delhi, 2015, ISBN:

9788121924405
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand publications, New Delhi, 2015, ISBN:

9788121924375
6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
7. Sedha, R.S., A text book of Applied Electronics, S.Chand ,New Delhi, 2008, ISBN-13: 978-8121927833
8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Eduction, New Delhi,2015, ISBN-13: 0070634244-978
9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504
10. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239

Suggested Softwares/Learning Websites:

a. en.wikipedia.org/wiki/Transformer
b. www.animations.physics.unsw.edu.au//jw/AC.html
c. www.alpharubicon.com/altenergy/understandingAC.htm
d. www.electronics-tutorials
e. learn.sparkfun.com/tutorials/transistors
f. www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
g. www.technologystudent.com/elec1/transis1.htm
h. www.learningaboutelectronics.com
i. www.electrical4u.com

Course Outcomes:

At the end of the course student will be able to:
1. Understand basic principle and operation of electric circuits and machines.
2. Solve basic problems related to electrical circuits and machines. Explain the operation of different electrical technologies.
3. Demonstrate an understanding of the control systems.
4. Understand the basic circuit elements
5. Understand different types of signal waveforms.
6. Understand logic gates and apply them in various electronic circuits.
7. Understand the basic concepts of op-amps, and their applications.
8. Use relevant electric/electronic protective devices safely.

ENGINEERING MECHANICS LAB(YDEC205P)

Course Objectives::

Following are the objectives of this course:

1) To obtain resultant of various forces
2) To calculate support reactions through conditions of equilibrium for various structures
3) To understand role of friction in equilibrium problems
4) To know fundamental laws of machines and their applications to various engineering problems

List of Practical to be performed:

1. To study various equipments related to Engineering Mechanics.
2. To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4. Derive Law of machine using Worm and worm wheel.
5. Derive Law of machine using Single purchase crab.
6. Derive Law of machine using double purchase crab.
7. Derive Law of machine using Weston's differential or wormed geared pulley block.
8. Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
9. Determine resultant of concurrent force system graphically.
10. Determine resultant of parallel force system graphically.
11. Verify Lami's theorem.
12. Study forces in various members of Jib crane.
13. Determine support reactions for simply supported beam.
14. Obtain support reactions of beam using graphical method.
15. Determine coefficient of friction for motion on horizontal and inclined plane.
16. Determine centroid of geometrical plane figures.

Suggested Learning Resources:

1. Bedi D.S., Engineering Mechanics, Khanna Publishing House
2. Khurmi, R.S., Applied Mechanics, S.Chand& Co. New Delhi.
3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
4. Ramamrutham, Engineering Mechanics, S.,S Chand & Co. New Delhi.
5. Dhade, Jamadar&Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthiGruh.
6. Ram, H. D.; Chauhan, A. K. Foundations and Applications of Applied Mechanics, Cambridge University Press.
7. Meriam, J. L., Kraige, L.G. , Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

Course outcomes:

After completing this course, student will be able to

1. Identify the force systems for given conditions by applying the basics of mechanics.
2. Determine unknown force(s) of different engineering systems.
3. Apply the principles of friction in various conditions for useful purposes.
4. Find the centroid and centre of gravity of various components in engineering systems.
5. Select the relevant simple lifting machine(s) for given purposes.

ElectiveI

YDEC-09L01
PowerElectronics

YDEC-09L02	Numericalmethodsfor Engineers
YDEC-09L03	Entrepreneurship
YDEC-09L04	Speech&AudioProcessing
YDEC-09L05	SatelliteCommunication.

CourseContent:

ANALOGMODULATION: Conceptoffrequencytranslation.AmplitudeModulation:Descriptionoffull AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation &demodulation, descriptionsofFMsignalintimeandfrequencydomains

PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, naturalandflattopsamplingintimeandfrequency domains

PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and deltamodulation, SignaltoquantizationnoiseratioinPCManddeltamodulation.

DIGITALMODULATION: Basebandtransmission:Linecoding(RZ,NRZ),intersymbolinterference(ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosinespectrum. Passbandtransmission:Geometricinterpretationofsignals,orthogonalization.

SPREAD-SPECTRUMMODULATION: Introduction,Pseudo-Noisesequences,directsequencespread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hopspreadspectrum(FHSS).Applicationofspreadspectrum:CDMA.

Books:

1. PrinciplesofcommunicationsystemsByTaubSchilling,T.M.H.
2. FundamentalsofcommunicationsystemsByProakis&Salehi,Pearsoneducation
3. CommunicationSystemsbySimonHaykin,JohnWiley
4. CommunicationSystems(AnalogandDigital)ByR.P.Singh,S.D.Sapre,T.M.H.
5. ModernDigital&AnalogCommunicationByB.P.Lathi,OxfordPublications
6. Digital&AnalogCommunicationSystemsByK.S.Shanmugam,JohnWiley

CourseOutcomes:

1. Use ofdifferentmodulationanddemodulation techniquesusedinanalogcommunication.
2. Identifyandsolvebasiccommunicationproblems.
3. Analysetransmitterandreceivercircuits.
4. Compareandcontrastdesign
issues,advantages,disadvantagesandlimitationsofanalogcommunicationsystems

CourseContent:

1. Harmonicanalysisofa squarewaveofmodulatedwaveform:measuresmodulation index
ElectronicsandCommunicationEngineeringCurriculumStructure406
2. Tomodulatea highfrequencycarrierwithsinusoidalsignaltoobtainFMsignal.
3. Tostudyandobserve theoperation ofasuperheterodynereceiver
4. Tomodulateapulsecarrierwithsinusoidalsignaltoobtain PWMsignalanddemodulateit.
5. Tomodulateapulsecarrierwithsinusoidalsignaltoobtain PPMsignalanddemodulateit.
6. Toobservepulseamplitudemodulatedwaveformanditsdemodulation.
7. Toobserve the operationofa PCMencoderanddecoder.Toconsiderreason
forusingdigitalsignal x-missionsofanalogsignals.
8. Tostudy&observethe amplituderesponse ofautomaticgain controller(AGC).

PracticalOutcomes(PrOs)

1. Understandingthe differenttechniquesofsignalmodulation anddemodulation.
2. Understandingthevariationinamplitudeofcontrollers.

CourseContent:

Unit1–SemiconductorandDiodes
Definition,Extrinsic/Intrinsic,N-type&p-type
PN Junction Diode – Forward and Reverse Bias
CharacteristicsZener Diode – Principle, characteristics,
construction, workingDiodeRectifiers–HalfWaveandFullWave
Filters–C, LC andPIFilters
Unit2– BipolarJunctionTransistor(BJT)
NPN and PNP Transistor – Operation and
characteristicsCommon Base Configuration – characteristics
and workingCommonEmitterConfiguration–
characteristicsandworkingCommon Base Configuration –
characteristics and workingHighfrequency modelofBJT
Classificationofamplifiers,negativefeedback
Unit3–FieldEffectTransistors
FET–
WorkingPrinciple,ClassificationMOSFE
TSmallSignalmodel
N-Channel/P-ChannelMOSFETs–characteristics,enhancementanddepletionmode,MOSFETas
aSwitch
CommonSourceAmplifiers
Uni-Junction Transistor – equivalent circuit and
operation407ElectronicsandCommunicationEngineeringCurriculum
Structure**Unit4** –SCRDIAC& TRIAC
SCR – Construction, operation, working,
characteristicsDIAC - Construction, operation, working,
characteristicsTRIAC - Construction, operation, working,
characteristicsSCRandMOSFETasa

Switch,DIACasbidirectionalswitch

ComparisonofSCR,DIAC,TRIAC,MOSFET

Unit5– AmplifiersandOscillators

Feedback Amplifiers – Properties of negative Feedback, impact of feedback on different parametersBasicFeedbackAmplifierTopologies:VoltageSeries,VoltageShuntCurrentSeries,Current Shunt

Oscillator–BasicPrinciples,CrystalOscillator,Non-linear/PulseOscillator

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Analog Circuits	A.K. Maini	Khanna Publishing House Ed. 2018 (ISBN: 978-93-86173-584)
2.	Electronic Devices and Circuits	S. Salivahanan and N. Suresh Kumar	McGraw Hill Education; Fourth edition (١ July ٢٠١٧) ISBN: 978-9339219505
3.	Electronics Devices and circuit theory	Boyestad & Nash-elsky	Pearson Education India; 11 edition (2015) ISBN: 978-9332542600
4.	Electronic Principles	Albert Malvino & David Bates	Tata McGraw Hill Publication 2010 ISBN: 978-0070634244
5.	Electronics Devices & Circuits	Jacob Millman	McGraw Hill Education; 4 edition (2015) ISBN: 978-9339219543

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:

a. https://www.electronics-tutorials.ws/

b. https://www.youtube.com/watch?v=Rx43l-QpeWQ

c. https://electronicsforu.com/resources/electronic-devices-and-circuit-theory

CourseContent:

SUGGESTEDPRACTICALS/EXERCISES

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.
1.	Construct the circuit and plot the VI characteristics of the PN Junction Diode , find the cut in voltage	1
2.	Construct the circuit and plot the characteristics of a Zener Diode. Find the breakdown voltage	1
3.	Construct a Half Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results	1
4.	Construct a Full Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results	1
5.	Construct a Bridge Rectifier and obtain regulation characteristics – Without Filters and with Filters	1
6.	Obtain the characteristics of DIAC and TRIAC	3
7.	Simulate half wave, full wave and bridge rectifier using simulation tool like PSpice/ Orcad/ Multisim.	3
8.	Develop a simulation model for Voltage Series and Voltage Shunt Feedback Amplifiers	5
9.	Develop circuits for Voltage Series and Voltage Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.	5
10.	Develop a simulation model for Current Series and Current Shunt Feedback Amplifiers	5
11.	Develop circuits for Current Series and Current Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.	
12.	**Total**	

Reference Books:

S. No.	Title of Book	Author	Publication
1.	Analog Circuits	A.K. Maini	Khanna Publishing House Ed. 2018 (ISBN: 978-93-86173-584)
2.	Electronic Devices and Circuits	S. Salivahanan and N. Suresh Kumar	McGraw Hill Education; Fourth edition (1 July 2017) ISBN: 978-9339219505
3.	Electronics Devices and circuit theory	Boyestad & Nashelsky	Pearson Education India; 11 edition (2015) ISBN: 978-9332542600
4.	Electronic Principles	Albert Malvino & David Bates	Tata McGraw Hill Publication 2010 ISBN: 978-0070634244
5.	Electronics Devices & Circuits	Jacob Millman	McGraw Hill Education; 4 edition (2015) ISBN: 978-9339219543

CourseContent:

Unit1–NumberSystems& BooleanAlgebra

Introduction to different number systems – Binary, Octal, Decimal, HexadecimalConversionfromonenumbersystemtoanother.

Booleanvariables–RulesandlawsofBooleanAlgebraDe-Morgan's Theorem

KarnaughMapsandtheiruseforsimplificationofBooleanexpressions

Unit2 –LogicGates
LogicGates–AND,OR,NOT,NAND,NOR,XOR,XNOR:Symbolicrepresentationandtruthtable
ImplementationofBooleanexpressionsandLogicFunctionsusinggatesSimplific
ationofexpressions
Unit3–CombinationalLogicCircuits
ArithmeticCircuits –Addition,Subtraction,1's2'sComplement,HalfAdder,FullAdder,Half
Subtractor,FullSubtractor,ParallelandSeriesAddersEncoder,
Decoder
Multiplexer –2to1MUX,4to1MUX,8to1MUX.Applications
Demultiplexer–1to2DEMUX,1-4DEMUX, 1-8DEMUX
Unit4–SequentialLogicCircuits
FlipFlops–SR,JK,T,D, FF,JK-MS,Triggering
Counters – 4 bit Up – Down Counters, Asynchronous/ Ripple Counter, Decade Counter-
Mod3, Mod7Counter,JohnsonCounter, RingCounter
Registers –4bitShiftRegister:SerialIn SerialOut,Serialin ParallelOut,ParallelIn SerialOut,Parallel
InParallelOut
Unit5– MemoryDevices
Classification of Memories – RAM Organization, Address Lines and Memory
Sixe,StaticRAM,Bipolar RAM, cell DynamicRAM, DRAM,DDRRAM
ReadOnlymemory –ROMorganization,Expandingmemory,PROM,EPROM,EEPROM,Flashmemory
DataConverters– DigitaltoAnalogconverters,AnalogtoDigitalConverters

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	Digital principles & Applications	Albert Paul Malvino & Donald P. Leach	McGraw Hill Education; Eighth edition ISBN: 978-9339203405
2.	Digital Electronics	Roger L. Tokheim Macmillian	McGraw-Hill Education (ISE Editions); International 2 Revised ed edition ISBN: 978-0071167963
3.	Digital Electronics – an introduction to theory and practice	William H. Gothmann	Prentice Hall India Learning Private Limited; 2 edition ISBN: 978-8120303485
4.	Fundamentals of Logic Design	Charles H. Roth Jr.	Jaico Publishing House; First edition ISBN: 978-8172247744
5.	Digital Electronics	R. Anand	Khanna Publications, New Delhi (Edition 2018) ISBN: 978-93-82609445

CourseContent:
SUGGESTEDPRACTICALS/EXERCISES
The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	To verify the truth tables for all logic fates – NOT OR AND NAND NOR XOR XNOR using CMOS Logic gates and TTL Logic Gates	1	02
2.	Implement and realize Boolean Expressions with Logic Gates	2	02
3.	Implement Half Adder, Full Adder, Half Subtractor, Full subtractor using ICs	3	02
4.	Implement parallel and serial full-adder using ICs	3	02
5.	Design and development of Multiplexer and De-multiplexer using multiplexer ICs	3	02
6.	Verification of the function of SR,D, JK and T Flip Flops	4	02
7.	Design controlled shift registers	4	02
8.	Construct a Single digit Decade Counter (0-9) with 7 segment display	4	03
9.	To design a programmable Up-Down Counter with a 7 segment display.	4	03
10.	Study of different memory ICs	5	02
11.	Study Digital- to – Analog and Analog to Digital Converters	5	02
12.	Simulate in Software (such as PSpice) an Analog to Digital Converter	5	03
13.	Simulate in Software (such as PSpice) an Analog to Digital Converter	5	03
	Total		**30**

Reference Books:

S.No.	Title of Book	Author	Publication
1.	Digital principles & Applications	Albert Paul Malvino & Donald P. Leach	McGraw Hill Education; Eighth edition ISBN: 978-9339203405
2.	Digital Electronics	Roger L. Tokheim Macmillian	McGraw-Hill Education (ISE Editions); International 2 Revised ed edition ISBN: 978-0071167963
3.	Digital Electronics – an introduction to theory and practice	William H. Gothmann	Prentice Hall India Learning Private Limited; 2 edition ISBN: 978-8120303485
4.	Fundamentals of Logic Design	Charles H. Roth Jr.	Jaico Publishing House; First edition ISBN: 978-8172247744
5.	Digital Electronics	R. Anand	Khanna Publications, New Delhi (Edition 2018) ISBN: 978-93-82609445

CourseContent:

Unit–I BasicsofMeasurementsandBridges

Accuracy&precision,ResolutionT
ypes ofErrors
DCBridges–WheatstoneandKelvinDouble Bridge
ACBridges-Maxwell'sBridge,Hay'sBridge,AndersonBridge,De-Sauty'sBridge

Unit-IIPotentiometer

Basic DC slide wire
PotentiometerCrompton's DC
PotentiometerApplications of DC
PotentiometerACPotentiometers
ApplicationsofACPotentiometers

Unit–III MeasuringInstruments

Permanent Magnet Moving Coil Instruments
(PMMC)MovingIrontypeInstruments(MI)
Electro Dynamo Type
InstrumentsSinglePhaseEnergyMe
ter

Unit–IVElectronicInstruments

Electronic Voltmeter and Digital
VoltmeterElectronicMultimeters
Q–Meter
VectorImpedanceMeter

Unit–VOscilloscopes

Cathode ray tube: construction, operation, screens,
graticulesVerticaldeflectionsystem,Horizontaldeflectionsystem,Dela
yline,
Measurementoffrequency,timedelay,phaseangleandmodulationindex(trapezoidalmethod)Oscilloscopepro
be:Structureof1:1and10:1probe
MultipleTraceCRO

Unit-VITransducers

Classification, Selection Criteria, Characteristics, Construction, Working Principles and
ApplicationoffollowingTransducers:
RTD,Thermocouple,Thermistor
LVDT, StrainGauge
LoadCell
PiezoelectricTransducers

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Electrical & Electronic Measurement & Instruments	A.K. Sawhney	Dhanpat Rai & Sons, India
2.	Electronic Instrument and Measurement Technique	W.D. Cooper	Prentice Hall International, India.
3.	Electronic Measurement & Instrumentation	J.G. Joshi	Khanna Publishing House, Delhi
4.	Measurement systems application and design	E.O. Doebelin and D. N. Manik	The Mcgraw-Hill
5.	Electronic Measurements and Instrumentation	Oliver and Cage	The Mcgraw-Hill
6.	Basic Electrical Measurement	M.B. Stout	Prentice hall of India, India
7.	Electronic Instrumentation	H. S. Kalsi	The Mcgraw-Hill
8.	Electrical and Electronics Measurement and Instrumentation	Prithwiraj Pukrait, Budhaditya Biswas, Santanu Das, Chiranjib Koley	The Mcgraw-Hill

Course Code	:	ECPC215
Course Title	:	Electronic Measurements and Instrumentation Lab
Number of Credits	:	1 (L: 0, T:0 P: 2)
Prerequisites	:	NIL
Course Category	:	PC

CourseContent:

SUGGESTEDPRACTICALS/EXERCISES

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx Hrs. Required
1.	Measure unknown inductance using following bridges (a) Anderson Bridge (b) Maxwell Bridge	I	4
2.	Measure Low resistance by Kelvin's Double Bridge	I	2
3.	Calibrate an ammeter using DC slide wire potentiometer	II	2
4.	Calibrate a voltmeter using Crompton potentiometer	II	2
5.	Measure low resistance by Crompton potentiometer	II	2
6.	Calibrate a single-phase energy meter by phantom loading	III	2
7.	Study the working of Q-meter and measure Q of coils	IV	2
8.	Study working and applications of (i) C.R.O. (ii) Digital Storage C.R.O. & (ii) C.R.O. Probes	V	2
9.	Measurement of displacement with the help of LVDT	VI	2
10.	Draw the characteristics of the following temperature transducers (a) RTD (Pt-100) (b) Thermistor	VI	2
11.	Measurement of strain/force with the help of strain gauge load cell	VI	2

Reference Books:

S. No.	Title of Book	Author	Publication
1.	Electrical & Electronic Measurement & Instruments	A.K. Sawhney	Dhanpat Rai & Sons, India
2.	Electronic Instrument and Measurement Technique	W.D. Cooper	Prentice Hall International, India.
3.	Electronic Measurement & Instrumentation	J.G. Joshi	Khanna Publishing House, Delhi
4.	Measurement systems application and design	E.O. Doebelin and D. N. Manik	The Mcgraw-Hill
5.	Electronic Measurements and Instrumentation	Oliver and Cage	The Mcgraw-Hill
6.	Basic Electrical Measurement	M.B. Stout	Prentice hall of India, India
7.	Electronic Instrumentation	H. S. Kalsi	The Mcgraw-Hill
8.	Electrical and Electronics Measurement and Instrumentation	Prithwiraj Pukrait, Budhaditya Biswas, Santanu Das, Chiranjib Koley	The Mcgraw-Hill

CourseContent:

Unit–1BasicsofNetworkand NetworkTheorem

Node and Mesh
AnalysisSuperposition
TheoremThevenin
TheoremNortonTheore
m
Maximum Power transfer
theoremReciprocityTheorem

Unit–2GraphTheory

Graphofnetwork,tree,incidencematrix
415ElectronicsandCommunicationEngineeringCurriculumStructure
F- Tie Set
AnalysisF-
CutSetAnalysis
Analysis of resistive network using cut-set and tie-
setDuality

Unit–3TimeDomainandFrequencyDomainAnalysis

Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-Ccircuits
Initial and Final conditions in network
elementsForced and Free response, time
constantsSteadyStateandTransientStateRespon
se
AnalysisofelectricalcircuitsusingLaplaceTransformforstandardinputs(unit,Ramp,Step)

Unit–4TrigonometricandexponentialFourierseries

Discretespectraandsymmetryofwaveform
Steady state response of a network to non-sinusoidal periodic inputs, power factor, effectivevalues
Fouriertransformandcontinuousspectra

Unit-5TwoPortNetwork

TwoPortNetwork

Open Circuit Impedance ParametersShort Circuit Admittance ParametersTransmissionParameters HybridParameters
Interrelationship of Two Port NetworkInter Connection of Two Port Network**SUGGESTEDLEARNINGRESOURCES:**

SUGGESTEDSOFTWARE/LEARNINGWEBSITES

S. No.	Title of Book	Author	Publication
1	Networks and Systems	Ashfaq Husain	Khanna Publishing House
2	Network Analysis	M. E. Van Valkenburg	Prentice Hall of India
3	Engineering Circuit Analysis	W. H. Hayt, J. E. Kemmerly and S. M. Durbin	McGraw Hill
4	Electrical Circuits	Joseph Edminister	Schaum's Outline, Tata McGraw Hill
5	Basic Circuit Theory	Lawrence P. Huelsma	Prentice Hall of India
6	Network & Systems	D. Roy Choudhury	Wiley Eastern Ltd
7	Linear Circuit Analysis	De Carlo and Lin	Oxford Press

CourseContent:

UnitIIntroduction
Introduction to Microprocessors and Microcontrollers, Architectures [8085,8086] Intel MCS-51family features–8051-organizationandarchitecture

UnitIIProgrammingwith8051
10 8051 instruction set, addressing modes, conditional instructions, I/O Programming,Arithmeticlogicinstructions,singlebitinstructions,interrupthandling,programming counters,timersandStack

UnitIII
MCS51 and external Interfaces 8 User interface – keyboard, LCD, LED, Real world interface - ADC, DAC,SENSORSCommunicationinterface.

UnitIVCprogrammingwith8051
8 I/O Programming, Timers/counters, Serial Communication, Interrupt, User Interfaces-LCD,Keypad, LED andcommunicationinterfaces [RS232].

Unit V ARM processor core based microcontrollers 14 Need for RISC Processor-ARM processorfundamentals,
ARMcore basedcontroller[LPC214X],IOports,ADC/DAC,Timers.

References:

S. No.	Title of Book	Author	Publication
1.	The 8051 Micro Controller and Embedded Systems	Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely	PHI Pearson Education, 5th Indian reprint
2.	Microprocessor and Microcontrollers	Krishna Kant	Eastern Company Edition, Prentice Hall of India, New Delhi
3.	Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086,8051	Soumitra Kumar Mandal	McGraw Hill Edu,
4.	Microcontrollers: Architecture implementation and Programming	Tabak Daniel, Hintz Kenneth j	Tata McGraw Hill, 2007
5.	ARM Developer's Guide.UM10139 LPC214X User manual – Rev.4	Andrew N.Sloss, Dominic Symes, Chris Wright	User manual – Rev.4
6.	Microprocessors and interfacing: programming and hardware	Douglas V. Hall	Tata McGraw Hill, 2editon, 2007
7.	"Microcontroller – Fundamentals and Applications with Pic	Valder – Perez	Yeesdee Publishers, Tayler & Francis

CourseContent:

1. Programming8051MicrocontrollerusingASMandC,andimplementation inflash8051microcontroller.
2. ProgrammingwithArithmeticlogicinstructions[Assembly]
3. Programusingconstructs(Sortinganarray)[Assembly]
4. ProgrammingusingPorts[AssemblyandC]
5. Delaygeneration using Timer[AssemblyandC]
6. ProgrammingInterrupts[AssemblyandC]
7. ImplementationofstandardUARTcommunication(usinghyperterminal)[AssemblyandC].
8. InterfacingLCDDisplay. [AssemblyandC]
9. InterfacingwithKeypad[AssemblyandC]
10. ProgrammingADC/DAC[AssemblyandC]
11. Interfacing withsteppermotor. [AssemblyandC]
12. PulseWidthModulation.[AssemblyandC]ProgrammingARMMicrocontrollerusingASMandC using simulator.11.Programming withArithmeticlogicinstructions[Assembly]
13. GPIOprogramminginARMmicrocontroller.[CProgramming].
14. TimersprograminginARMMicrocontroller.[CProgramming].

References:

S.No.	Title of Book	Author	Publication
1.	The 8051 Micro Controller and Embedded Systems	Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely	PHI Pearson Education, 5th Indian reprint
2.	Microprocessor and Microcontrollers	Krishna Kant	Eastern Company Edition, Prentice Hall of India, New Delhi
3.	Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086,8051	Soumitra Kumar Mandal	McGraw Hill Edu,
4.	Microcontrollers: Architecture implementation and Programming	Tabak Daniel, Hintz Kenneth j	Tata McGraw Hill, 2007
5.	ARM Developer's Guide. UM10139 LPC214X User manual – Rev.4	Andrew N.Sloss, Dominic Symes, Chris Wright	User manual – Rev.4
6.	Microprocessors and interfacing: programming and hardware	Douglas V. Hall	Tata McGraw Hill, 2editon, 2007
7.	"Microcontroller – Fundamentals and Applications with Pic	Valder – Perez	Yeesdee Publishers, Tayler & Francis

CourseContent:

UNIT-I AudioFundamentalsandDevices

Basiccharacteristicsofsoundsignal,Audiolevelmetering,decibellevelinacousticmeasurement,Microphone &Types,speakertypes&workingprinciple,Soundrecording principle&types

UNIT-II AudioSystems

CDplayer,hometheatresoundsystem,surroundsound,Digitalconsole blockdiagram,workingprinciple, applications,FMtuner, ICsusedinFMtunerTDA7021T,PAaddress system.

UNIT-III Television Systems-

MonochromeTVstandards,scanningprocess,aspectratio,persistenceofvisionandflicker,interlace scanning,pictureresolution,Compositevideosignal,ColourTVstandards,colourtheory,hue,brightness, saturation,luminanceandchrominance,DifferenttypesofTVcamera,Transmissionstandards

UNIT-IV TelevisionReceiversandVideoSystems-

PAL-D colour TV receiver, Digital TVs:- LCD, LED , PLASMA, HDTV, 3-D TV, projection TV, DTHreceiver,

Video interface, Digital Video, SDI, HDMI Multimedia Interface , Digital Video Interface, CD andDVD player

UNIT-V Home/OfficeAppliances

Diagrams,operatingprinciplesandcontrollerforFAXandPhotocopier,Microwave Oven,WashingMachine, Airconditioner andRefrigerators, Digitalcameraandcamcoder.

References:

S. No.	Title of Book	Author	Publication
1.	Consumer Electronics	Bali S.P.	Pearson Education India,2010 , latest edition
2.	Audio video systems : principle practices & troubleshooting	Bali R and Bali S.P	Khanna Book Publishing Co. (P) Ltd., 2010Delhi , India, latest edition
3.	Modern Television practices	Gulati R.R.	New Age International Publication (P) Ltd. New Delhi Year 2011, latest edition
4.	Audio video systems	Gupta R.G.	Tata Mc graw Hill, New Delhi, India 2010, latest edition
5.	Mastering Digital Television	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010, latest edition
6.	Standard handbook of Audio engineering	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010 , latest edition.

CourseContent:

UNIT1

Block diagram and sub-system description of a digital communication system. Sampling of low-passand band-pass signals, PAM , PCM, signal to quantization noise ratio analysis of linear and nonlinearquantizers, Line codes and bandwidth considerations; PCM TDM hierarchies, frame structures,framesynchronizationandbitstuffing.

UNIT 2

QuantizationnoiseanalysisofDMandADM; DPCMandADPCM;Lowbitratecodingofspeechandvideosignals.Baseband transmission,matchedfilter,performanceinadditive Gaussian noise; Intersymbol interference (ISI), Nyquist criterion for zero ISI, sinusoidal roll-off filtering, correlativecoding, equalizers andadaptiveequalizers;Digitalsubscriber lines.

UNIT 3

Geometricrepresentationofsignals,maximumlikelihooddecoding;Correlationreceiver,equivalence withmatchedfilter.Generation,detectionandprobabilityoferroranalysisofOOK,BPSK,coherentandnon-coherentFSK,QPSKandDPSK;QAM,MSKandmulticarriermodulation;Comparison ofbandwidthandbitrateofdigitalmodulationschemes.

UNIT 4

IntroductiontoInformationandCodingTheories:InformationTheory:informationmeasures, Shannon entropy, differential entropy, mutual information, capacity theorem for point-to-point channelswith discrete and continuous alphabets. Coding Theory: linear block codes – definitions, properties,bounds on minimum distance (singleton, Hamming, GV, MRRW), soft versus hard decisiondecoding, some specific codes (Hamming, RS, Concatenated); Convolutional codes – structure, decoding (theViterbiandBCJRalgorithms);Turbocodes, LDPCcodes.

References:

S. No.	Title of Book	Author	Publication
1.	Communication Systems	Haykin, S	4th Ed., John Wiley & Sons
2.	Modern Digital and Analog Communication Systems	Lathi, B.P. and Ding, Z	Intl. 4th Ed., Oxford University Press.
3.	Digital Communications	Proakis, J.G. and Saheli, M	5th Ed., McGraw-Hill
4.	Digital Communication: Fundamentals and Applications	Sklar, B., and Ray, P.K	2nd Ed., Dorling Kindersley
5.	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley.
6.	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
7.	A Foundation in Digital Communication	A. Lapidoth	Cambridge Univ. Press
8.	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall.

CourseContent:

1. PulseCodeModulationandDifferentialPulseCodeModulation.
2. DeltaModulationandAdaptiveDeltamodulation.
3. SimulationofBandPassSignalTransmissionandReception•AmplitudeShiftKeying• Frequency
ShiftKeying• Phase ShiftKeying.
4. PerformanceAnalysisofBandPassSignalTransmissionandReception•AmplitudeShiftKeying•Frequency ShiftKeying•PhaseShiftKeying.
5. ImplementationofAmplitudeShiftKeying
6. ImplementationofFrequencyShiftKeying
7. ImplementationofPhaseShiftKeying.
8. TimeDivisionMultiplexing:PLL(CD4046)basedsynch,clockanddataextraction

References:

S. No.	Title of Book	Author	Publication
1.	Communication Systems	Haykin, S	4th Ed., John Wiley & Sons
2.	Modern Digital and Analog Communication Systems	Lathi, B.P. and Ding, Z	Intl. 4th Ed., Oxford University Press.
3.	Digital Communications	Proakis, J.G. and Saheli, M	5th Ed., McGraw-Hill
4.	Digital Communication: Fundamentals and Applications	Sklar, B., and Ray, P.K	2nd Ed., Dorling Kindersley
5.	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley.
6.	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
7.	A Foundation in Digital Communication	A. Lapidoth	Cambridge Univ. Press
8.	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall.

CourseContent:

Unit1: FundamentalTroubleshootingProceduresInsideAnElectronicEquipment:ReadingDrawings AndDiagrams–BlockDiagram,CircuitDiagram,WiringDiagram;Dis-assemblyandre-assembly of equipment, Equipment Failures and causes such as poor design, production deficiencies, carelessstorage and transport, inappropriate operating conditions, Nature of faults, Fault locationprocedure,
Faultfindingaids–Serviceandmaintenance manualsandinstructionmanuals,TestandMeasuringinstruments, special tools Troubleshooting techniques, Approaching components for tests,Ground421
ElectronicsandCommunicationEngineeringCurriculumStructure
ingsystemsinElectronicEquipment,TemperaturesensitiveIntermittentproblemsCorrectiveactions, Situationswhererepairsshouldnotbeattempted.
Unit 2 : Passive Components and Their Testing Passive Components- Resistors, Capacitors,Inductors
Failuresinfixedresistors,testingofresistors,variableresistors,variableresistorsaspotentiometers, failures in potentiometers, testing of potentiometers, servicing potentiometers, LDRs andThermistors Types of capacitors and their performance, Failures in capacitors, testing of capacitorsand precautions therein, variable capacitor types, Testing of inductors and inductancemeasurement
Unit 3 : Testing of Semiconductor Devices Types of semiconductor devices, Causes of failure inSemiconductor Devices, Types of failure Test procedures for Diodes, special types of Diodes, BipolarJunction Transistors, Field Effect Transistors, Thyristors Operational Amplifiers, Fault diagnosis inop-ampcircuits
Unit 4: Logic IC families, Packages in Digital ICs, IC identification, IC pin-outs, Handling ICs, Digitaltroubleshooting methods – typical faults, testing digital ICs with pulse generators Logic clip, LogicProbe, Logic Pulser, Logic Current Tracer, Logic Comparator Special consideration for faultdiagnosis
in digital circuits Handling precautions for ICs sensitive to static electricity Testing flip-flops,counters,
registers,multiplexersandde-multiplexers,encodersanddecoders;Tri-statelogic.
Unit 5: Rework and Repair of Surface Mount Assemblies Surface Mount Technology and surfacemountdevicesSurface MountSemiconductorpackages–
SOIC,SOT,LCCC,LGA,BGA,COB,Flatpacksand Quad Packs, Cylindrical Diode Packages, Packaging of Passive Components as SMDs RepairingSurfaceMountPCBs,Rework Stations.

References:

S. No.	Title of Book	Author	Publication
1.	Modern Electronic Equipment: Trouble-shooting, Repair and Maintenance	Khandpur	TMH 2006
2.	Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting	R. G. Gupta	Tata McGraw Hill Edition 2001
3.	Student Reference Manual for Electronic Instrumentation Laboratories	David L Terrell	Butterworth-Heinemann
4.	Electronic Testing and Fault Diagnosis	G. C. Loveday, A. H	Wheeler Publishing

CourseContents:
UNITI-ICFabrication andCircuitConfigurationforLinearIC

AdvantagesofICsoverdiscrete components–ManufacturingprocessofmonolithicIcsConstruction ofmonolithicbipolartransistor –Monolithicdiodes –IntegratedResistorsMonolithicCapacitors –Inductors.Currentmirrorandcurrentsources,Currentsourcesasactive loads,Voltagesources,Voltage References, BJT Differential amplifier with active loads, General operational amplifierstages -andinternalcircuitdiagramsofIC741,DCandACperformance characteristics,slewrate,Openand closedloopconfigurations.

UNITII ApplicationsOfOperationalAmplifiers

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters,adder, subtractor,Instrumentationamplifier,Integrator,Differentiator,Logarithmicamplifier, Antilogarithmic amplifier,Comparators,Schmitttrigger,Precisionrectifier,peakdetector,clipperandclamper,Low-pass, high-passandband-passButterworthfilters.

UNITIIIAnalogMultiplierandPLL

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variabletransconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closedloopanalysis,Voltagecontrolledoscillator,Monolithic PLLIC565,applicationofPLLforAMdetection, FMdetection,FSKmodulation anddemodulationandFrequencysynthesizing.

UNITIVAnalogto digitalanddigitaltoanalogconverters

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2RLadder type, Voltage Mode and Current-Mode R2R Ladder types switches for D/A converters, highspeed sample-and-hold circuits, A/D Converters specifications - Flash type - SuccessiveApproximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-samplingA/DConverters.

UNITVWaveformgeneratorsandspecialfunction ICs

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator,ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed andadjustable voltage regulators - IC 723 general purpose regulator Monolithic switching regulator, SwitchedcapacitorfilterICMF10,FrequencytoVoltageandVoltagetoFrequencyconverters,AudioPoweramplifier,VideoAmplifier, IsolationAmplifier,Opto-couplers andfibreopticIC.

SUGGESTED TEXT/REFERENCE BOOKS:

S. No.	Title of Book	Author	Publication
1.	Design with operational amplifiers and analog integrated circuits, 3rd Edition	Sergio Franco	Tata McGraw-Hill, 2007
2.	Linear Integrated Circuits,	. D.Roy Choudhry, Shail Jain	New Age International Pvt. Ltd
3.	System design using Integrated Circuits	. B.S.Sonde	New Age Pub, 2nd Edition, 2001
4.	Analysis and Design of Analog Integrated Circuits	Gray and Meyer	Wiley International, 2005.
5.	OP-AMP and Linear ICs	Ramakant A.Gayakwad	Prentice Hall / Pearson Education, 4th Edition, 2001
6.	Operational Amplifier and Linear Integrated Circuits	K Lal Kishore	, Pearson Education, 2006

1. OperationalAmplifiers(IC741)-CharacteristicsandApplication.
2. WaveformGenerationusingOp-Amp(IC741).
3. ApplicationsofTimerIC555.
4. DesignofActivefilters.
5. Studyandapplication ofPLLIC's
6. Designofbinaryadderandsubtractor.
7. Design ofcounters.
8. Studyofmultiplexeranddemultiplexer/decoders.
9. Implementationofcombinationallogiccircuits.

CourseContent:

UnitI-

EmbeddedCbasicsoperatorsforArduinoFamiliarizingwiththe ArduinoIDE.
Sketch designing for ArduinoCommunicationinterfaceusingser ialport
Basicunderstandingofthecodewithbooleanoperations,pointeraccessoperations,bitwiseoperations, compoundedoperations.

UnitII-

EmbeddedCcontrolstructureblocksLooping mechanism – for, doandwhile.
Thebranchingoperationsbasedonconditionsexpression

UnitIIIIntroductiontoArduinoMega
ArduinoMegaspecificationsincludingpowerratings,digitalandanalogperipherals.Differencebet weentheClanguageandEmbeddedClanguage
ArduinoMegaPorts,Pins,DigitalandAnalogPeripherals

UnitIVCommunicationwithArduino
Different communication modules available with their real-life applicationCommunicationinterface

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Arduino Projects For Dummies (For Dummies Series)	Kennedy George; Davis Bernard; Prasanna SRM	Wiley (5 July 2013) ISBN : 978-1118551479
2.	Make: Getting Started With Arduino - The Open Source Electronics Prototyping Platform	Massimo Banzi and Michael Shiloh	Shroff/Maker Media; Third edition (27 December 2014) ISBN : 978-9351109075

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:

d. https://www.arduino.cc/reference/en/

e. https://learn.adafruit.com/category/learn-arduino

CourseContent:

SUGGESTEDPRACTICALS/EXERCISES

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	Built-in LED state control by push button sketch implementation	I	02*
2.	Built-in LED blinking sketch implementation	I	02
3.	Built-in LED blinking by toggling states based on binary operation	I	02
4.	Built-in LED state control by user interface through serial port	I	02*
5.	User interface for boolean operation and bit wise operation through serial port	I	02
6.	User interface for compounded operation through serial port	I	02
7.	Looping mechanism to check the state of pin and if change print its status on serial port	II	02
8.	Controlling multiple LEDs with a loop and an array	II	02
9.	Use a potentiometer to control the blinking of an LED	III	02*
10.	Uses an analog output (PWM pin) to fade an LED.	III	02
11.	Servo Motor Control using PWM	III	02
12.	Temperature sensor interfacing and sending its reading over serial port	IV	04
13.	I2C light sensor interfacing and sending its reading over serial port	IV	04*
	Total		**30**

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Arduino Projects For Dummies (For Dummies Series)	Kennedy George; Davis Bernard; Prasanna SRM	Wiley (5 July 2013) ISBN : 978-1118551479
2.	Make: Getting Started With Arduino - The Open Source Electronics Prototyping Platform	Massimo Banzi and Michael Shiloh	Shroff/Maker Media; Third edition (27 December 2014) ISBN : 978-9351109075

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:

f. https://www.arduino.cc/reference/en/

g. https://learn.adafruit.com/category/learn-arduino

CourseContent:

Unit I - Overview of Cellular SystemsEvolution2g/3G/4G/5G CellularConcepts–Frequencyreuse,CochannelandAdjacentchannelInterference

UnitII-Wirelesspropagation

Link budget, Free-space path loss, Noise figure of receiverMultipathfading,Shadowing,Fadingmargin,Shadowingmargin**Unit III** Antenna diversity, wireless channel capacity and MIMO**UnitIV**Overview ofCDMA,OFDMandLTE

SUGGESTEDLEARNINGRESOURCES:

S. No.	Title of Book	Author	Publication
1	Wireless Communications – Principles and Practice	T. S. Rappaport,	(2nd edition) Pearson ISBN 9788131731864
2	Modern Wireless Communications	Haykin & Moher	Pearson 2011 (Indian Edition) ISBN : 978-8131704431

CourseContent:

SUGGESTEDPRACTICALS/EXERCISES

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	To understand the cellular frequency reuse concept to find the co-channel cells for a particular cell.	I	04
2.	To understand the path loss	II	04
3.	Understand the path loss with shadowing	II	04

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
4.	Understanding the Flat fading	II	04
5.	Understanding the Frequency selective fading	II	04
6.	Understanding the Multipath channel for the following objectives 1. No Fading 2. Flat Fading 3. Dispersive Fading	II	04
7.	To simulate a dipole antenna (λ, $\lambda/4$, $\lambda/2$, $3\lambda/2$) for a particular frequency using 4NEC2	III	04
8.	Perform following experiments using CDMA trainer kit 1. PSK modulation and demodulation experiment 2. Bit synchronization extraction experiment 3. Error correction encoding experiment	IV	04
	Total		32

REFERENCES/SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1	Wireless Communications – Principles and Practice	T. S. Rappaport,	(2nd edition) Pearson ISBN 9788131731864
2	Modern Wireless Communications	Haykin & Moher	Pearson 2011 (Indian Edition) ISBN : 978-8131704431

CourseContent:

UnitI-Industrialautomationoverviewanddata acquisitionArchitectureofIndustrial AutomationSystems. MeasurementSystemsCharacteristics DataAcquisitionSystems

Unit II - Control GenerationIntroductiontoAutoma ticControlP-I-DControl FeedforwardControlRatioControl Thebranchingoperationsbasedonconditionsexpression

Unit III Sequential control and PLCIntroductiontoSequenceControl,PLC,RLL

427ElectronicsandCommunicationEngineeringCurriculumStructure

PLCHardwareEnvironment

Unit IV Industrial control applicationHydraulic Control SystemsPneumaticControl Systems EnergySavingswithVariableSpeedDrivesIn troductionToCNCMachines

REFERENCES/SUGGESTEDLEARNINGRESOURCES:

S. No.	Title of Book	Author	Publication
1.	Industrial Instrumentation, Control and Automation	S. Mukhopadhyay, S. Sen and A. K. Deb	Jaico Publishing House, 2013 ISBN : 978-8184954098
2.	Electric Motor Drives, Modelling, Analysis and Control	R. Krishnan	Prentice Hall India, 2002 ISBN : 978-0130910141

CourseContent:

SUGGESTEDPRACTICALS/EXERCISES

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	Develop a data acquisition system using arduino	I	04
2.	Temperature control system using PID	II	04
3.	Level control system based on error feedback	II	04
4.	PLC programming using Relay ladder Logic for AND , OR XOR and NOR gate	III	04
5.	PLC, RLL programming using CASCADE method	III	04
6.	PLC timer, counter, registers and analog input/output functions	III	04
7.	Variable Speed drive of an induction motor	IV	04
8.	PLC/ microcontroller based computer numerical control machine job completion	IV	04
	Total		32

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1	Industrial Instrumentation, Control and Automation	S. Mukhopadhyay, S. Sen and A. K. Deb	Jaico Publishing House, 2013 ISBN : 978-8184954098
2	Electric Motor Drives, Modelling, Analysis and Control	R. Krishnan	Prentice Hall India, 2002 ISBN : 978-0130910141

CourseContent:

SUGGESTEDPRACTICALS/EXERCISES

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	Develop a data acquisition system using arduino	I	04
2.	Temperature control system using PID	II	04
3.	Level control system based on error feedback	II	04
4.	PLC programming using Relay ladder Logic for AND , OR XOR and NOR gate	III	04
5.	PLC, RLL programming using CASCADE method	III	04
6.	PLC timer, counter, registers and analog input/output functions	III	04
7.	Variable Speed drive of an induction motor	IV	04
8.	PLC/ microcontroller based computer numerical control machine job completion	IV	04
	Total		32

CourseContent:

Unit I - Introduction to MicrowavesHistoryandapplicationsofMicrowaves

Mathematical Model of Microwave Transmission-Microwave transmission modes, waveguidesandtransmissionlines,ImpedanceMatching MicrowaveNetworkAnalysis

UnitII- PassiveandActiveMicrowaveDevices

Directional Coupler, Power Divider, Attenuator, Resonator.Microwaveactivecomponents:Diodes,Transistors,MicrowaveTubes

Unit III -Microwave Design Principles- Microwave Filter Design, Microwave Amplifier Design,MicrowaveMixer Design,MicrowaveOscillatorDesign. MicrowaveAntennas

UnitIV-Microwave Measurements,MicrowaveSystems,EffectofMicrowaveson humanbody.

SUGGESTEDLEARNINGRESOURCES:

S. No.	Title of Book	Author	Publication
1	Microwave Engineering	D.M. Pozar	Wiley; Fourth edition (2013) ISBN 978-8126541904
2	Foundation for Microwave Engineering	R.E. Collins	Wiley; Second edition (2007) ISBN : 978-8126515288

Course Code	:	ECPE307
Course Title	:	Microwave and RADAR Lab
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	NIL
Course Category	:	PE

CourseContent:

SUGGESTEDPRACTICALS/EXERCISES

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	To study wave guide components.	I	04
2.	To study the characteristics of Gunn oscillator Gun diode as modulated source.	I	04
3.	Introduction to Smith chart and its application for the unknown impedance measurement.	I	04
4.	Study the behavior of impedance matching for passive networks using Smith chart.	II	04
5.	To study loss and attenuation measurement of attenuator	II	04
6.	Construct a cavity resonator in waveguide and study its characteristics using the network analyzer and a frequency counter.	III	04
7.	To determine the frequency and wavelength in a rectangular waveguide working in TE10 mode	IV	04
	Total		**28**

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1	Microwave Engineering	D.M. Pozar	Wiley; Fourth edition (2013) ISBN 978-8126541904
2	Foundation for Microwave Engineering	R.E. Collins	Wiley; Second edition (2007) ISBN : 978-8126515288

CourseContent:

Unit1-Introduction todata communication.
Conceptofanalogganddigitalsignals.Bandwidth.Networkarchitecture.Basics ofOSIandTCP/IPreferencemodels.
Types of Computer Networks – Personal Area Network, Local Area Netwrk, MetropolitanAreaNetwork, WideAreaNetwork, Internetwork.
ComputerNetworkTopologies– PointtoPoint,Bustopology,Startopology,ringtopology,meshtopology, treetopology, Daisy Chain,HybridTopology,
ComputerNetworkModel.Transmissionmedia.Wiredandwirelessconnectivity.

Unit2–Digital&Analog Transmission.
DigitalTransmission–DigitaltoDigitalConversion,LineCoding,UnipolarEncoding,PolarEncoding, Bipolar Encoding,blockCoding
Analog Transmission - Analog-to-Digital Conversion, Digital to analog Conversion, Analog toAnalogConversion.
Sampling,Quantization,Encoding,TransmissionModes.

Unit3– WirelessCommunication.
Radio,Micowave,Infra-red,LightTransmission.
WirelessCommunicationStandards,CharacterizationoftheWirelessChannel,ReceiverTechniques for FadingDispersiveChannels,
MobilityManagementinWirelessNetworks,Mobile IP,Mobile AdhocNetworks,AdhocRoutingProtocols,PerformanceAnalysis ofDSR andCBRP,

ClusterTechniques,IncrementalClusterMaintenanceScheme,SpacetimeCodingforWirelessCommunication.
Unit4–DataLinkLayerTechnologies.
TypesofNetworkRouting,NetworkLayerProtocols.FDM,TDMandCDMA.
Circuitandpacketswitching.FramerelayandATMswitching.ISDN.Localareanetworkprotocols.Fibreopti cnetworks.Satellitenetworks.
Datalinklayerdesignissues:itsfunctionsandprotocols.Internetprotocol.Routingalgorithms.Congestionco ntrol algorithms.IP addressing schemes.Internetworkingandsub-netting.
ErrorDetectionandCorrection-
TypesofErrors,Detection,CorrectionSwitchingandDatalinklayer,datalink control andprotocols
431ElectronicsandCommunicationEngineeringCurriculumStructure
Unit5- TransmissionMedia &TransmissionControlprotocol.
MagneticMedia,TwistedPairCable,CoaxialCable,PowerLines,FiberOptics.
Protocol–
Features,Header,Addressing,ConnectionManagement,ErrorControlandFlowControl,Multi plexing,CongestionControl,TimerManagement,CrashRecover**REFERENCES/SUGGESTEDLEA RNING RESOURCES:**

S. No.	Title of Book	Author	Publication
1.	Computer Networking A top down Ap-proach:	J.F.Kurose	Pearson
2.	Computer Networks and Internet	D.E. Comer	Pearson
3.	Wireless Communications: Principles and Practice, 2nd edition	T. Rappaport	Prentice Hall, 2002
4.	Wireless Communication and Networking	John W. Mark, Weihua Zhuang	
5.	Modelling and Analysis of Computer Com-munication Networks	Jeremiah F. Hayes	
6.	Data communication & Networking	Stallings	

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:
a) www.tutorialspoint.com/data_communication_computer_network/data_communication_ computer_network_tutorial.pdf
b) www.turbofuture.com/industrial/Elements-of-Electronic-Communications-System
c) www.st-andrews.ac.uk/~www_pa/Scots_Guide/iandm/part3/page1.html
d) www.antenna-theory.com/basics/main.php
e) www.explainthatstuff.com/antennas.html
f) www.circuitdiagram.org/am-radio-receiver-with-mk484.html
g) www.circuitstoday.com/single-chip-fm-radio-circuit

Course Code	:	ECPC304
Course Title	:	Computer Networking and Data Communication Lab
Number of Credits	:	1 (L : 0 , T : 0, P : 2)
Prerequisites	:	NIL
Course Category	:	PC

CourseContent:
SUGGESTEDPRACTICALS/EXERCISES
The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessedinthestudent for theattainment ofthecompetency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	To study the different physical equipment used for networking		02*
2.	Study the different internetworking devices in a computer network		02*
3.	Study the working of basic networking commands		02*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
4.	To study PC to PC communication using parallel port		02
5.	Study of LAN in Star Topology		02
6.	Study of LAN in Bus Topology		02
7.	Study of LAN in Tree Topology		02
8.	Study and configuration of modem of computer		02
9.	Study of wireless communication		02*
10.	Studying PC Communication using LAN		02
	Total		**20**

Reference Books:

S. No.	Title of Book	Author	Publication
1.	Basic Electrical Engineering	Mittle and Mittal	McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
2.	Basic Electrical Engineering	Ritu Sahdev	Khanna Publishing House, Delhi 2018, ISBN: 978-93-86173-49-2
3.	Fundamentals of Electrical Engineering	Saxena, S. B. Lal	Cambridge University Press, latest edition ISBN : 9781107464353
4.	Electrical Technology Vol – I	Theraja, B. L.	S. Chand publications, New Delhi, 2015, ISBN: 9788121924405
5.	Basic Electronics	S. Biswas	Khanna Publishing House, Delhi ISBN: 978-81-87522-164
6.	Electrical Technology Vol – II	Theraja, B. L.	S. Chand publications, New Delhi, 2015, ISBN: 9788121924375
7.	Basic Electrical and Electronics Engineering	Jegathesan, V.	Wiley India, New Delhi, 2015 ISBN : 97881236529513
8.	A text book of Applied Electronics	Sedha, R.S.	S.Chand ,New Delhi, 2008 ISBN-13: 978-8121927833
9.	Electronics Principles	Malvino, Albert Paul, David	McGraw Hill Eduction, New Delhi,2015, ISBN-13: ٠٠٧٠٦٣٤٢٤٤_٩٧٨
10.	Principles of Electronics	Mehta, V.K. Mehta, Rohit	S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504
11.	Fundamental of Electronic Devices and Circuits	Bell Devid	Oxford University Press, New Delhi 2015 ISBN : 9780195425239

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:

a. en.wikipedia.org/wiki/Transformer

b. www.animations.physics.unsw.edu.au//jw/AC.html
c. www.alpharubicon.com/altenergy/understandingAC.htm
d. www.electronics-tutorials
e. learn.sparkfun.com/tutorials/transistors
f. www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
g. www.technologystudent.com/elec1/transis1.htm
h. www.learningaboutelectronics.com
i. www.electrical4u.com