

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY UTTAR PRADESH, LUCKNOW



**Evaluation Scheme & Syllabus** 

For

**Bachelor of Technology** 

**Mechanical Engineering** 

Second Year

(Effective from the Session: 2023-24)

## Bachelor of Technology Mechanical Engineering EVALUATION SCHEME SEMESTER -III

Sl.	Subject Codes	Subject	Р	erio	ds	Ev	alua	tion Sche	me	Er Sem r	este	Total	Credit
No.	Codes		L	Т	Р	C T	T A	TOTAL	PS	ТЕ	PE		
1	/ AAS0301 B	Engineering Science Course / Engineering Mathematics-III	3	1	0	30	20	50		100		150	4
2	AME0303	Engineering Mechanics	3	1	0	30	20	50		100		150	4
3	AME0304	Basic Thermodynamics	3	0	0	30	20	50		100		150	3
4	ACSE0303	Design thinking-I	3	0	0	30	20	50		100		150	3
5	AME0302	Materials Science and Engineering	3	0	0	30	20	50		100		150	3
6	AME0301	Manufacturing Technology-I	3	0	0	30	20	50		100		150	3
7	AME0353	Computer Aided Modelling Lab	0	0	2				25		25	50	1
8	AME0352	Material Testing Lab	0	0	2				25		25	50	1
9	AME0351	Manufacturing Technology-I Lab	0	0	2				25		25	50	1
10	AME0359	Internship Assessment-I	0	0	2				50			50	1
11	ANC0301/ ANC0302	Cyber Security/ Environmental Science	2	0	0	30	20	50		50		100	
		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										1100	24

### List of MOOCs (Coursera) Based Recommended Courses for Second Year (Semester-III) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0025	Digital Thread: Implementation.	University at Buffalo, The State University of New York.	20	1.5
2	AMC0029	Introduction to battery- management systems.	University of Colorado Boulder, University of Colorado System.	25	2

#### **PLEASE NOTE:-**

- Internship (3-4 weeks) shall be conducted during summer break after semester-II and will be assessed during semester-III
- Compulsory Audit Courses (Non Credit ANC0301/ANC0302)
  - > All Compulsory Audit Courses (a qualifying exam) has no credit.
  - > Total and obtained marks are not added in the Grand Total.

#### **Abbreviation Used:-**

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

### NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

## Engineering Science Courses for B.Tech.(AICTE Model Curriculum) 2<sup>nd</sup>Year

## (Effective from the session 2022-23)

### Semester-III

Sl.No.	Subject Codes	Subject Name
1	AOE0361	Energy Science & Engineering
2	AOE0362	Sensor Instrumentation
3	AOE0363	Basics Data Structure & Algorithms
4	AOE0364	Introduction to Soft Computing
5	AOE0365	Analog Electronics Circuits
6	AOE0366	Electronics Engineering

## Bachelor of Technology Mechanical Engineering <u>EVALUATION SCHEME</u> SEMESTER -IV

Sl. No	Subject Codes	Subject	Р	erio	ds				Er Sem	leste	Total	Credi t	
•			L	Т	Р	CT	TA	TOTAL	PS	TE	PE		
1	AAS0401B /	Engineering Mathematics-III / Engineering Science Course	3	1	0	30	20	50		10 0		150	4
2	AASL0401	Technical Communication	2	1	0	30	20	50		10 0		150	3
3	AME0402	Fluid Mechanics & Fluid Machines	3	1	0	30	20	50		10 0		150	4
4	AME0404	Applied Thermodynamics	3	0	0	30	20	50		10 0		150	3
5	AME0403	Strength of Materials	3	0	0	30	20	50		10 0		150	3
6	AME0401	Manufacturing Technology-II	3	0	0	30	20	50		10 0		150	3
7	AME0452	Fluid Mechanics Lab	0	0	2				25		25	50	1
8	AME0454	Applied Thermodynamics Lab	0	0	2				25		25	50	1
9	AME0451	Manufacturing Tech –II Lab	0	0	2				25		25	50	1
10	AME0459	Mini Project	0	0	2				50			50	1
11	ANC0402 / ANC0401	Environmental Science/ Cyber Security	2	0	0	30	20	50		50		100	
		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										1100	24

### List of MOOCs (Coursera) Based Recommended Courses for Second Year (Semester-IV) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0040	Advanced Manufacturing Process Analysis.	University at Buffalo, The State University of New York.	13	1
2	AMC0036	Intelligent Machining.	University at Buffalo, The State University of New York.	11	0.5

### PLEASE NOTE:-

### •Compulsory Audit Courses (Non Credit - ANC0401/ANC0402)

- > All Compulsory Audit Courses (a qualifying exam) has no credit.
- > Total and obtained marks are not added in the Grand Total.

#### Abbreviation Used:-

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

## Engineering Science Courses for B.Tech. (AICTE Model Curriculum) 2<sup>nd</sup> Year

# (Effective from the session 2022-23)

Sl.No.	Subject Codes	Subject Name
1	AOE0461	Energy Science & Engineering
2	AOE0462	Sensor Instrumentation
3	AOE0463	Basics Data Structure & Algorithms
4	AOE0464	Introduction to Soft Computing
5	AOE0465	Analog Electronics Circuits
6	AOE0466	Electronics Engineering

### Semester-IV

### **AICTE Guidelines in Model Curriculum:**

A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

- 1. For 6 to 12 Hours =0.5 Credit
- 2. For 13 to18 =1 Credit
- 3. For 19 to 24 =1.5 Credit
- 4. For 25 to 30 =2 Credit
- 5. For 31 to 35 =2.5 Credit
- 6. For 36 to 41 =3 Credit
- 7. For 42 to 47 =3.5 Credit
- 8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only. The students shall be awarded Honours Degree as per following criterion.

- i. If he / she secures 7.50 as above CGPA.
- ii. Passed each subject of that degree program in the single attempt without any grace.
- iii. Successful completion of MOOCs based 20 credits.

# **B.TECH. SECOND YEAR**

Course Code	AAS0301B	L	I	ľ		redits
Course Title	Engineering Mathematics-III	3	1	0		4
Course Objective: The	e student will learn about					
echniques for various	complex variables, Partial differential equations mathematical tasks and numerical aptitude. It ain tools from B. Tech to deal with advanced level of their disciplines.	ms to show	/ cas	se the	students	with
Pre-requisites: Know	ledge of Mathematics I and II of B. Tech or ec	quivalent				
Course Contents / Syl	labus					
UNIT-I	<b>Complex Variable – Differentiation</b>				ours	
equations (Cartesian an	differentiability, Functions of complex variable, ad Polar form), Harmonic function, Method to fin formation and their properties.					
JNIT-II	<b>Complex Variable</b> – <b>Integration</b> ntour integrals, Cauchy- Goursat theorem, Cauch				ours	
functions, Residues, M he type $\int_0^{2\pi} f(\sin \theta) d\theta$	illes's theorem, Singularities, Classification of S ethods of finding residues, Cauchy Residue theorem $(\theta, \cos\theta)d\theta$ and $\int_{-\infty}^{\infty} f(x)dx$ .	orem, Eval		on of 1	real integr	
UNIT-III	<b>Partial Differential Equation and its Applica</b> differential equations, Second order linear partia			_	ours	
	tion of second order partial differential equations erential equations. Solution of one- and two-dime		of s	eparat	ion of var	riables
or solving partial diffe equations. J <b>NIT- IV</b> Complex Fourier transf Applications of Fourier	Integral Transforms form, Inverse Transforms, Convolution Theorem r transform to simple one-dimensional heat trans	ensional w	of s ave	eparat and h 8 H e and o	ion of var eat condu ours cosine tra	riables ction nsform,
for solving partial diffe equations. UNIT- IV Complex Fourier transf Applications of Fourier transform and its applic	Integral Transforms form, Inverse Transforms, Convolution Theorem r transform to simple one-dimensional heat trans cation to solve difference equations.	ensional w	of s ave	eparat and h 8 H e and c and wa	ion of var eat condu ours cosine tra ave equat	riables ction nsform,
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For solving partial differences of the sequations. UNIT-IV Complex Fourier transferences of Fourier transform and its applications of Fourier transform and its applications of the sequences o	Integral Transforms form, Inverse Transforms, Convolution Theorem r transform to simple one-dimensional heat trans cation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Strear	ensional w ns, Fourier afer equation n, Sitting 2 le to	of s ave sincons a Arra	eparat and h       8 H       e and c       and Wa       8 H       ungem	ion of var eat condu ours cosine tra ave equat ours	riables ction nsform, ions, Z- c &
For solving partial difference         Equations.         UNIT- IV         Complex Fourier transformand         Applications of Fourier         ransform and its applications         UNIT-V         Fime & Work, Pipe &         Calendar.         Course Outcomes: Africations         CO 1	Integral Transforms form, Inverse Transforms, Convolution Theorem r transform to simple one-dimensional heat trans cation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Strear fter completion of this course students will be ab	ensional w ns, Fourier fer equation n, Sitting A le to nalytic fun	of s ave sinc ons a Arra	<b>8 H</b> <b>8 H</b> <b>8 H</b> and wa <b>8 H</b> angem	ion of van eat condu ours cosine tra ave equat ours ent, Clocl	riables ction nsform, ions, Z- c & K <sub>3</sub>
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For solving partial difference         Equations.         UNIT-IV         Complex Fourier transformand its applications of Fourier         ransform and its applications of Fourier         ransform and its applications         UNIT-V         Fime & Work, Pipe &         Calendar.         Course Outcomes: Aff         CO 1       Apply the work         Apply the conce         CO 2       evaluation of de         Apply the conce         CO 3       Equations and p         CO 4       Apply the conce         CO 5       Stream, Sitting         Fext Books:       Solve the problements	Integral Transforms form, Inverse Transforms, Convolution Theorem r transform to simple one-dimensional heat trans cation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Strear fter completion of this course students will be ab sing methods of complex functions for finding an epts of complex functions for finding Taylor's se efinite integrals ept of partial differential equation to solve partial problems concerned with partial differential equa ept of Fourier transform and Z-transform to solve ems of Time & Work, Pipe & Cistern, Time, Spe g Arrangement , Clock & Calendar.	ensional w ns, Fourier ofer equation n, Sitting A le to nalytic fun eries, Laur al different ations re difference eed & Dist	of s ave sincons a ons a Arra ctio ent' ial ce eq anc	eparat and h 8 H e and wa and wa s 8 H ngem ns. s serie	ion of var eat condu ours cosine tra ave equat ours ent, Clock es and ns. at &	riables ction nsform, ions, Z- c & K <sub>3</sub> K <sub>3</sub> K <sub>4</sub> K <sub>3</sub> K <sub>3</sub>
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For solving partial diffecountions.UNIT- IVComplex Fourier transformApplications of Fourierransform and its applicUNIT-VTime & Work, Pipe &Course Outcomes: AfCO 1Apply the workApply the workCourse Outcomes: AfCO 1Apply the conceCO 2evaluation of deApply the conceCO 3Equations and pCO 4Apply the conceCO 4Apply the conceCO 4Apply the conceCO 5Stream, SittingText Books:(1) B. V. Ramana, High(2) B. S. Grewal, High	Integral Transforms form, Inverse Transforms, Convolution Theorem r transform to simple one-dimensional heat trans cation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Strear fter completion of this course students will be ab cing methods of complex functions for finding an epts of complex functions for finding Taylor's se efinite integrals ept of partial differential equation to solve partial problems concerned with partial differential equa ept of Fourier transform and Z-transform to solve ems of Time & Work, Pipe & Cistern, Time, Spe g Arrangement , Clock & Calendar.	ensional w ns, Fourier afer equation n, Sitting A le to nalytic fun eries, Laur al different ations re different eed & Dist Il Publishin 2005.	of s ave sincons a Arra ctio ent' ial ce eq anc	eparat and h 8 H e and wa and wa angem ns. s serie quatio e, Bo	ion of var eat condu ours cosine tra ave equat ours ent, Clock es and ns. at &	riables ction nsform ions, Z & & K <sub>3</sub> K <sub>3</sub> K <sub>4</sub> K <sub>3</sub> K <sub>3</sub> 2008.
For solving partial difference         equations.         UNIT-IV         Complex Fourier transform and its applications of Fourier         ransform and its applications of Fourier         Course Outcomes: Affect 1         CO 1       Apply the work         CO 2       evaluation of data         Apply the concert       Solve the problect 1         CO 3       Equations and papely the concert         CO 4       Apply the concert         CO 5       Stream, Sitting         CO 7       B. S. Grewal, High         CO 8       Stream, Stream	Integral Transforms form, Inverse Transforms, Convolution Theorem r transform to simple one-dimensional heat trans cation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Strear fter completion of this course students will be ab- cing methods of complex functions for finding an epts of complex functions for finding Taylor's se effinite integrals ept of partial differential equation to solve partia problems concerned with partial differential equa ept of Fourier transform and Z-transform to solve ems of Time & Work, Pipe & Cistern, Time, Spe Arrangement , Clock & Calendar.	ensional w ns, Fourier afer equation n, Sitting A le to nalytic fun eries, Laur al different ations re different eed & Dist arosa Publ	of s ave sincons a Arra ctio ent' ial ce eq anc	eparat and h 8 H e and wa and wa angem ns. s serie quatio e, Bo	ion of var eat condu ours cosine tra ave equat ours ent, Clock es and ns. at &	riables ction nsform ions, Z c & K <sub>3</sub> K <sub>3</sub> K <sub>4</sub> K <sub>3</sub> K <sub>3</sub> 2008.
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Peter V. O'N	Veil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
Ray Wylie C	C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.
NPTEL/ You	uTube/ Faculty Video Link:
	https://www.youtube.com/playlist?list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL
	https://www.youtube.com/playlist?list=PLbMVogVj5nJS_i8vfVWJG16mPcoEKMuWT
	https://youtu.be/b5VUnapu-qs
Unit 1	https://youtu.be/yV_v6zxADgY
	https://youtu.be/2ZBcbFhrfOg
	https://youtu.be/dlK0E0OG39k
	https://youtu.be/qjpLIIVo_6E
	https://youtu.be/bkzKVsIEjxk
	https://youtu.be/nDD16hiutdc
	https://youtu.be/2kyBOVfflHw
	https://youtu.be/uliv9TzeD6o
Unit 2	https://youtu.be/pulsluT8Uwk
	https://youtu.be/VBAeogiKH2A
	https://youtu.be/Mpmlk1H1aQo
	https://youtu.be/z03usEpsHRU
	https://youtu.be/fXybLUFmQBQ
	https://youtu.be/kZ7Oa7iMiCs
	https://youtu.be/rj2Mb7JGyHk
	https://youtu.be/zpxe5yoB0xg
Unit 3	https://youtu.be/MN4gUtsr0e8
Chit 5	https://youtu.be/Gmlcbqdvlgc
	https://youtu.be/eSKz2N0tKaA
	https://youtu.be/iiTOw0JqQFc
	https://youtu.be/M4U-T9jsNKQ
	https://youtu.be/QH2WL92bzLs
	https://youtu.be/DGmNbs5Cywo
	https://youtu.be/FliKUWUVrEI
	https://youtu.be/7eHuQXMCOvA
	https://youtu.be/ZkvQR3ajm3k
Unit 4	https://youtu.be/zdyUwzOm1zw
	https://youtu.be/BBuV14-isyU
	https://youtu.be/xPr7YFSnmiQ
	https://youtu.be/ajJD0Df5CsY
	https://youtu.be/iviiGB5vxLA
	https://youtu.be/Ym1EUjTWMnE
Unit 5	https://www.youtube.com/playlist?list=PLFqNfk5W2ZuzjUsRqDp1Zj3S8n9yfdmN9
	https://youtu.be/x3SEYdBUGaA

	<b>B.TECH SECOND YEAR</b>				
<b>Course Code</b>	AME0303	L	T	Р	Credits
Course Title	Engineering Mechanics	3	1	0	4

1	<b>jective:</b> To make the students able	VV
1	To understand the effect of the force system on rigid body under static equilibrium condition.	$K_1, K_2$
2	To analyse and solve the problem based on force system	K <sub>3</sub> , K <sub>4</sub>
3	To apply the concept of friction and solve the problem based on friction.	K <sub>3</sub> , K <sub>4</sub>
4	To evaluate the centroid and moment of inertia.	K <sub>4</sub> , k <sub>5</sub>
5	To analyse the effect of force on bodies in motion.	K <sub>4</sub> , K <sub>5</sub> K <sub>3</sub> , K <sub>4</sub>
Pre-requis	· ·	113, 114
<u>110-104015</u>	Course Contents / Syllabus	
		10 h a 10 h
UNIT-I	<b>Force Analysis</b>	10 hours
	prce, types of force systems, principle of transmissibility, analysis of coplanar-co lelogram law, resolution of forces, Lami's theorem) and coplanar non-concurrent	
•	force, moment for coplanar force system, couple, Varignon's theorem), Equilibriu	•
	free body diagrams, determination of reactions. equilibrium of co planar force sy	
-	librium conditions.	, F
UNIT-II	Friction, Virtual Work and Simple Machines	8 hours
connected bod	r friction, applications of friction force, problems involving friction of ladder lies. <b>Virtual Work:</b> Definition of work and virtual work, principle of virtual work f dies, problems on determinate beams. <b>Simple Machines:</b> mechanical advantages, ation among these, efficiency of screw jack.	for a system o
UNIT-III	Beam and Trusses	8 hour
Beam: Introd	uction, shear force and bending moment, different equations of equilibrium, sh	ear force and
	luction, shear force and bending moment, different equations of equilibrium, shear for statically determined beams. <b>Trusses:</b> Introduction, simple truss a	
bending mom	ent diagram for statically determined beams. Trusses: Introduction, simple truss a	
bending momosimple truss, n		and solution o
oending mome simple truss, n UNIT-IV	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections. <b>PROPERTIES OF SURFACES AND SOLIDS</b>	nd solution o
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections. <b>PROPERTIES OF SURFACES AND SOLIDS</b> <b>CS OF SURFACES AND SOLIDS</b> : Centroids and center of mass, Centroids gular, circular, triangular areas by integration, T section, I section, Angle section, H	<b>8 hours</b> of lines and Hollow section
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections. <b>PROPERTIES OF SURFACES AND SOLIDS</b> <b>CS OF SURFACES AND SOLIDS</b> : Centroids and center of mass, Centroids gular, circular, triangular areas by integration, T section, I section, Angle section, H dard formula ,Theorems of Pappus ,Area moments of inertia of plane areas such a gular areas by integration ,T section, Angle section by llel axis theorem and perpendicular axis theorem, Principal moments of inertia of of inertia-Mass moment of inertia, mass moment of inertia for prismatic, cylindrica st principle Relation to area moments of inertia.	<b>8 hours</b> of lines and follow section s Rectangular using standard of plane areas l and spherica
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir UNIT-V	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections. <b>PROPERTIES OF SURFACES AND SOLIDS</b> <b>CS OF SURFACES AND SOLIDS</b> : Centroids and center of mass, Centroids gular, circular, triangular areas by integration, T section, I section, Angle section, H dard formula ,Theorems of Pappus ,Area moments of inertia of plane areas such a gular areas by integration ,T section, I section, Hollow section by llel axis theorem and perpendicular axis theorem, Principal moments of inertia c of inertia-Mass moment of inertia, mass moment of inertia for prismatic, cylindrica rst principle Relation to area moments of inertia. <b>Kinematics and Kinetics of rigid body</b>	8 hours         of lines and         of lines and         of lines and         s Rectangular,         using standard         of plane areas,         1 and spherica         8 hours
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir UNIT-V Kinematics of translational an Kinetics of rig D'Alembert's	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections.	8 hours         of lines and         of lines and         of lines and         s Rectangular         using standard         of plane areas         l and spherica         8 hours         leration under
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir UNIT-V Kinematics of translational an Kinetics of rig D'Alembert's	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections.	8 hours         of lines and         s Rectangular         using standard         of plane areas         l and spherica         8 hours         leration unde
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir UNIT-V Kinematics of translational ar Kinetics of rig D'Alembert's	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections.	8 hours         of lines and         s Rectangular         using standard         of plane areas         l and spherica         8 hours         leration unde
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir UNIT-V Kinematics of translational at Kinetics of ri D'Alembert's Course out	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections.	8 hours         of lines and         s Rectangular         using standard         of plane areas         l and spherica         8 hours         leration unde         ad momentum
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir UNIT-V Kinematics of ranslational ar Kinetics of ri D'Alembert's Course out	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections.	8 hours         of lines and         s Rectangular         using standard         of plane areas         l and spherica         Rectain under         d momentum         K <sub>1</sub> , K <sub>2</sub>
bending mome simple truss, n UNIT-IV PROPERTIE areas ,Rectang by using stand circular, triang formula, Paral Principal axes solids from fir UNIT-V Kinematics of ri D'Alembert's Course out CO 1 CO 2	ent diagram for statically determined beams. <b>Trusses:</b> Introduction, simple truss a nethods of joints and methods of sections.   PROPERTIES OF SURFACES AND SOLIDS  S OF SURFACES AND SOLIDS: Centroids and center of mass, Centroids gular, circular, triangular areas by integration, T section, I section, Angle section, F dard formula ,Theorems of Pappus ,Area moments of inertia of plane areas such a gular areas by integration ,T section, I section, Hollow section by Illel axis theorem and perpendicular axis theorem, Principal moments of inertia c of inertia-Mass moment of inertia, mass moment of inertia for prismatic, cylindrica st principle Relation to area moments of rigid body  of rigid body: Introduction, plane motion of rigid body, velocity and accel nd rotational motion, relative velocity.  gid body: Introduction, force, mass and acceleration, work and energy, impulse ar principle and dynamic equilibrium.  tcome: After completion of this course students will be able to  Understand the effect of force system on static equilibrium of rigid bodies.  Analyse and solve the problems based on equilibrium of force system in presence of frictional forces.  Workout the effect of loads on statically determinate structures i.e. Beams	8 hours         of lines and         of lines and         of lines and         Hollow section         s Rectangular         using standard         of plane areas         l and spherica         Retain under         deration under         kt1, K2         K3, K4

A Textbook of Engineering Mechanics, R.K. Bansal, Laxmi Publications.

Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers,

## **Reference Books**

Beer, F.P and Johnston Jr. E.R., Vector Mechanics for Engineers (In SI Units): Statics and Dynamics, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004)

Vela Murali, Engineering Mechanics, Oxford University Press (2010).

Meriam J.L. and Kraig L.G., Engineering Mechanics-Statics-Volume 1, Dynamics-Volume 2, Third Edition, John Wiley & Sons (1993).

Engineering mechanics by Irving H. Shames, Prentice-Hall.

<b>B.TECH SECOND YEAR</b>									
<b>Course Code</b>	AME0304	L	Τ	Р	Credits				
<b>Course Title</b>	Basic Thermodynamics	3	0	0	3				
Course objectiv	e: The student will learn about								

1 wor	k and heat interactions.	K <sub>1</sub> , K <sub>2</sub>					
	appraised of application of First law to various energy conversion	K <sub>2</sub> , K <sub>3</sub>					
		112,113					
	devices.         Analyse the difference between high grade and low-grade energies and K <sub>3</sub> ,K <sub>4</sub>						
	tations on energy conversion.	** **					
	e them able to evaluate the thermodynamic properties of pure	$K_3, K_5$					
	tance						
5 mak	e them able to analyse the changes in properties of undergoing	$K_2, K_3$					
vari	ous processes.						
<b>Pre-requisites:</b>	Basic knowledge of physics, heat, work and energy.						
	Course Contents / Syllabus						
UNIT-I	Basic Concept, Zeroth law of thermodynamics and	9 hours					
	First Law for thermodynamics						
Introduction- Ba	sic Concepts: Concept of System, Control Volume, Surrounding,	Boundaries,					
Universe, Types	of Systems, Macroscopic and Microscopic viewpoints, Concept of	Continuum,					
State, Property, I	Process, Differentials, Cycle Reversibility Quasi – static Process,	Irreversible					
	ynamic Equilibrium.						
-	thermodynamics: Concept of equality of Temperature and, T	emperature					
measurement.		1					
	modynamics: Thermodynamic definition of work, Displacement wor	k and flow					
	Heat and Work: Units for Work, types of work, Sign Convention. Di						
-	on flow processes, Joules' experiment, First law analysis for closed system	-					
	energy and enthalpy. Limitations of first law of thermodynamics, PMM-I.						
UNIT-II	First law of thermodynamics applied to open systems	9 hours					

## UNIT-II First law of thermodynamics applied to open systems 9 hours and Second law of thermodynamics

**First law of thermodynamics applied to open systems**, Concept of Steady flow system, unsteady flow system, uniform and non uniform system, Steady flow energy equation, Application of SFEE :Boilers, Condensers, Turbine, Throttling process, Pumps etc. Analysis of unsteady processes such as filling and evacuation of vessels with and without heat transfer.

**Second law of thermodynamics:** Thermal reservoirs, Energy conversion, Concept of Heat engines, Efficiency, Reversed heat engine, Heat pump, Refrigerator, Coefficient of Performance, Kelvin Planck and Clausius statement of second law of thermodynamics, Equivalence of the two statements. Reversible and irreversible processes, Carnot cycle and Carnot engine, Reversed Carnot Cycle, Carnot theorem and it's corollaries, Thermodynamic Temperature Scale, PMM-II.

		memory number remperature searce,	1 101101 110
UNIT-III	<b>Entropy and Availability</b>	and Irreversibility	8 hours
Entropy :Clausiu	inequality, Concept of Entrop	y, Entropy change of pure substance	in different
thermodynamic pr	ocesses, Tds equation, Principle	e of entropy increase, T-S diagram, S	Statement of
the third law of the	rmodynamics.		
Availability and	Irreversibility: Available	and unavailable energy, Avail	ability and
Irreversibility, Sec	ond law efficiency, Helmholtz &	& Gibb's function	

UNIT-IV	Pure Substance, Properties and Rankine cycle	9 hours
Properties of ste	am and Rankine cycle: Pure substance, Property of Pure Substan	ice (steam),

TriplePoint, Critical point, Saturation states, Sub-cooled liquid state, Superheated vapour state, Phase transformation process of water, Graphical representation of pressure, volume and temperature, P-T & PV diagrams, T-S and H-S diagrams, use of property diagram, Steam-Tables &Mollier chart, Dryness fraction and it's measurement, processes involving steam in closed and open systems. Simple Rankine cycle.

1 2		
UNIT-V	Thermodynamic Relations and thermodynamic Cycles	7 hours
Thermody	namic Relations: Maxwell relations, Joule-Thomson coefficient, coefficien	t of volume
expansion,	adiabatic and isothermal compressibility, Clapeyron and Clapeyron-Clausius	s equations.
	namic Cycles: Air-standard cycles: Otto, Diesel and Dual cycle	
Course o	utcome: After completion of this course students will be able to	
CO 1	Understand energy balance to systems and control volumes, in situation	K <sub>1</sub> , K <sub>2</sub>
	involving heat and work interactions.	
CO 2	Apply the performance of energy conversion devices.	K <sub>2</sub> , K <sub>3</sub>
CO 3	Analyse the Difference between high grade and low grade energies.	K <sub>3</sub> ,K <sub>4</sub>
CO 4	Evaluate the properties of pure substances and properties of steam and	K4, K5
	basic steam cycle.	
CO 5	Analyse the changes in properties of various processes.	$K_2, K_3$
Text boo	ks	
Power Plan Reference	t Engineering–P.K. Nag, Tata McGraw-Hill Education. e Books	
	als of Thermodynamics Sonntag R.E., Borgnakke C. & Van Wylen C.J.	
	als of Engineering Thermodynamics Moran M. J. & Shapiro H.N	
	amics: Fundamentals for Applications – J P O'connell& J MJaile	
•	als of Engineering Thermodynamics Howell J.R.	
LINK		
	https://youtu.be/9GMBpZZtjXM?list=PLD8E646BAB3366BC8	
UNIT 1	https://youtu.be/xQwi9fveGTQ?list=PLD8E646BAB3366BC8	
UNIT 2	https://youtu.be/lvy8h-yWhRQ?list=PLD8E646BAB3366BC8	
UNIT 2	https://youtu.be/5q_MMdGINgQ?list=PLD8E646BAB3366BC8	
UNIT 3	https://youtu.be/WFZCmGXJhYY?list=PLD8E646BAB3366BC8	
51111 5	https://youtu.be/bvqyQB9_N8M?list=PLD8E646BAB3366BC8	
UNIT 4	https://youtu.be/pJM9Fh9Fp-I?list=PLD8E646BAB3366BC8	
	https://youtu.be/5HuZtOVJKB0?list=PLD8E646BAB3366BC8	
UNIT 5	https://youtu.be/x9yirfC8nil	

	<b>B.TECH. SECOND YEAR</b>		
<b>Course Code</b>	ACSE0303	LTP	Credits
<b>Course Title</b>	Design Thinking-I	3 0 0	3
<b>Course Objec</b>	tives:		

https://youtu.be/4w3Obp8ILpA

UNIT 5

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems

Pre-requisites: None

	Course Contents / Syllabus	
UNIT-I	Introduction	8 HOURS
Introduction	to design thinking, traditional problem solving versus design	thinking, history of design thinking,
wicked probl	ems. Innovation and creativity, the role of innovation and creativity	eativity in organizations, creativity in
teams and th	eir environments, design mindset. Introduction to elements a	and principles of design, 13 Musical
Notes for De	sign Mindset, Examples of Great Design, Design Approaches a	cross the world
UNIT-II	<b>Ethical Values and Empathy</b>	8 HOURS
Understandin	g humans as a combination of I (self) and body, basic physica	l needs up to actualization, prosperity,
the gap betw	ween desires and actualization. Understanding culture in	family, society, institution, startup,
socialization	process. Ethical behavior: effects on self, society, understandi	ing core values and feelings, negative
sentiments a	nd how to overcome them, definite human conduct: unive	rsal human goal, developing human
consciousnes	s in values, policy, and character. Understand stakeholders, t	techniques to empathize, identify key
user problem	ns. Empathy tools- Interviews, empathy maps, emotional ma	apping, immersion and observations,
customer jou	rney maps, and brainstorming, Classifying insights after Ob	oservations, Classifying Stakeholders,
Do's &Don't	s for Brainstorming, Individual activity- 'Moccasin walk'	
UNIT-III	Problem Statement and Ideation	10 HOURS
Defining the	problem statement, creating personas, Point of View (PO	V) statements. Research- identifying
drivers, infor	mation gathering, target groups, samples, and feedbacks. Ide	a Generation-basic design directions,
Themes of T	hinking, inspirations and references, brainstorming, inclusion,	, sketching and presenting ideas, idea
evaluation, d	ouble diamond approach, analyze - four W's, 5 why's, "Ho	w Might We", Defining the problem
using Ice-Cre	eam Sticks, Metaphor & Random Association Technique, Min	nd-Map, ideation activity games - six
thinking hats	, million-dollar idea, introduction to visual collaboration and br	ainstorming tools - Mural, Jam Board
UNIT-IV	Critical Thinking	6 HOURS
Fundamental	concepts of critical thinking, the difference between critical ar	nd ordinary thinking, characteristics of
critical think	ers, critical thinking skills- linking ideas, structuring argume	ents, recognizing incongruences, five
pillars of cri	tical thinking, argumentation versus rhetoric, cognitive bias,	tribalism, and politics. Case study on
applying criti	cal thinking on different scenarios.	
UNIT-V	Logic and Argumentation	8 HOURS
The argumen	t, claim, and statement, identifying premises and conclusion, tr	uth and logic conditions, valid/invalid
-	strong/weak arguments, deductive argument, argument dia	-
reasoning, lo	gical fallacies, propositional logic, probability, and judgment	, obstacles to critical thinking. Group
-	blays on evaluating arguments	
Course ou	<b>Itcome:</b> After completion of this course, students will be	able to
CO 1	Develop a strong understanding of the design process an	
COT	business settings	id apply it in a variety of K2,K5
CO 2	Analyze self, culture, teamwork to work in a multidisci	plinary environment and K3
	exhibit empathetic behavior	
CO 3	Formulate specific problem statements of real time	e issues and generate K3,K6
	innovative ideas using design tools	
CO 4	Apply critical thinking skills in order to arrive at the r likely causes	root cause from a set of K3

CO 5	Demonstrate an enhanced ability to apply design thinking skills for evaluation of K3,K4 claims and arguments
Textbo	oks
1. A	Arun Jain, UnMukt : Science & Art of Design Thinking, 2020, Polaris
	eanne Liedta, Andrew King and Kevin Benett, Solving Problems with Design Thinking – Ten Stories of What Works, 2013, Columbia Business School Publishing
	RR Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, First Edition, 2009, Excel Books: New Delhi
Refere	nce Books
	/ijay Kumar, 101 Design Methods: A Structured Approach for Driving Innovation in Your Drganization, 2013, John Wiley and Sons Inc, New Jersey
2. H	3P Banerjee, Foundations of Ethics and Management, 2005, Excel Books
3. (	Gavin Ambrose and Paul Harris, Basics Design 08: Design Thinking, 2010, AVA Publishing SA
	Roger L. Martin, Design of Business: Why Design Thinking is the Next Competitive Advantage, 009, Harvard Business Press, Boston MA
NPTE	L/ YouTube/ Web Link
Unit I	https://nptel.ac.in/courses/110/106/110106124/ https://nptel.ac.in/courses/109/104/109104109/ https://designthinking.ideo.com/ https://blog.hypeinnovation.com/an-introduction-to-design-thinking-for-innovation-managers https://www.creativityatwork.com/design-thinking-strategy-for-innovation/ https://www.youtube.com/watch?v=GFffb2H-gK0
Unit II	https://aktu.ac.in/hvpe/ http://aktu.uhv.org.in/ https://nptel.ac.in/courses/110/106/110106124/ https://swayam.gov.in/nd1_noc19_mg60/preview_
Unit III	https://nptel.ac.in/courses/110/106/110106124/ https://swayam.gov.in/nd1_noc19_mg60/preview https://www.udemy.com/course/design-thinking-for-beginners/ https://www.designthinking-methods.com/en/ https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them
Unit IV	https://www.forbes.com/sites/sap/2016/08/25/innovation-with-design-thinking-demands-critical-thinking/ #340511486908 https://www.criticalthinking.org/pages/defining-critical-thinking/766
Unit V	https://www.udemy.com/course/critical-thinker-academy/ https://swayam.gov.in/nd2_aic19_ma06/preview

	<b>B.TECH SECOND YEAR</b>	Ł			
<b>Course Code</b>	AME0302	L	Т	Р	Credits
<b>Course Title</b>	<b>Materials Science and Engineering</b>	3	0	0	3
Course objectiv	ve: The student will learn about				

1	To study basic engineering materials, their structure-propert performance.	y- K <sub>1</sub> , K <sub>2</sub>
2	To study strengthening processes including heat treatment processes order to enhance properties.	in $K_{2}, K_{3}$
3	To study new materials and their applications.	K <sub>3</sub>
4	To study about Phase diagram	K2,k3
5	To study about Material characterization and Metallography	K <sub>2</sub>
Pre-req	uisites: students have the knowledge of basics of science	
	Course Contents / Syllabus	
UNIT-I		10 hours
Crystal s	tructure of materials, crystal systems, unit cells and space lattices, of	determination o
	of simple crystals, miller indices of planes and directions, packing geon	
	l covalent solids. Concept of amorphous, single and polycrystalline stru	-
	properties of materials. Crystal growth techniques. Imperfections in cryst	
	e in influencing various properties. Mechanical Properties, Stress-str	-
metallic,	ceramic and polymer materials, yield strength, tensile strength and modu	ulus of elasticity
toughness	s, plastic deformation, hardenability, fatigue, creep and fracture.	
TTN TTO -		
<b>UNIT-I</b>	I Phase Diagram	8 hours
	8	
Solid so	lutions, solubility limit, Gibb's phase rule, binary phase diagram	
Solid so compoun	lutions, solubility limit, Gibb's phase rule, binary phase diagran ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo	ns, intermetallio orking of metals
Solid so compoun recrystall	lutions, solubility limit, Gibb's phase rule, binary phase diagram ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo ization and grain growth. Microstructure, properties and applications of	ns, intermetallio orking of metals
Solid so compoun recrystall ferrous al	lutions, solubility limit, Gibb's phase rule, binary phase diagram ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo ization and grain growth. Microstructure, properties and applications of loys.	ns, intermetallio orking of metals ferrous and non
Solid so compoun recrystall ferrous al UNIT-I	Iutions, solubility limit, Gibb's phase rule, binary phase diagramds, iron-carbon and iron-iron carbide phase diagram, cold and hot woization and grain growth. Microstructure, properties and applications ofloys.IIDiffusion and Heat Treatment	ns, intermetallio orking of metals ferrous and non <b>6 hour</b>
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s	Iutions, solubility limit, Gibb's phase rule, binary phase diagram         ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo         ization and grain growth. Microstructure, properties and applications of         loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-properties	ns, intermetallio orking of metals ferrous and non <u>6 hours</u> particles and thin
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s films. Fic	Iutions, solubility limit, Gibb's phase rule, binary phase diagram         ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo         ization and grain growth. Microstructure, properties and applications of         loys.         II         Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-pek's laws and application of diffusion in sintering, doping of semiconduction	ns, intermetallic orking of metals ferrous and non <b>6 hour</b> particles and thin ctors and surface
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s films. Fic hardening	Interfacelutions, solubility limit, Gibb's phase rule, binary phase diagramds, iron-carbon and iron-iron carbide phase diagram, cold and hot woization and grain growth. Microstructure, properties and applications ofloys.IIDiffusion and Heat Treatmentynthesis, sintering, chemical methods, zone refining, preparation of nano-percesk's laws and application of diffusion in sintering, doping of semiconduceg of metals. Various types of heat treatments such as Annealing, Normaliz	ns, intermetallie orking of metals ferrous and non <b>6 hour</b> particles and thin ctors and surface zing, Quenching
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s films. Fic hardening Temperin	Iutions, solubility limit, Gibb's phase rule, binary phase diagram         ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo         ization and grain growth. Microstructure, properties and applications of         loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-pek's laws and application of diffusion in sintering, doping of semiconduct         g of metals. Various types of heat treatments such as Annealing, Normalization         ng (Aus-tempering, Martempering), and various case hardening provide the set of the set	ns, intermetallie orking of metals ferrous and non <b>6 hour</b> particles and thin ctors and surface zing, Quenching
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s films. Fic hardening Temperin	Iutions, solubility limit, Gibb's phase rule, binary phase diagram         ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo         ization and grain growth. Microstructure, properties and applications of         loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-period         g of metals. Various types of heat treatments such as Annealing, Normalizing         ug (Aus-tempering, Martempering), and various case hardening prove Transformation (TTT) diagram.	ns, intermetallic orking of metals ferrous and non <b>6 hours</b> particles and thin ctors and surface zing, Quenching
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s films. Fic hardening Temperin	Iutions, solubility limit, Gibb's phase rule, binary phase diagram         ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo         ization and grain growth. Microstructure, properties and applications of         loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-period         g of metals. Various types of heat treatments such as Annealing, Normalizing         ug (Aus-tempering, Martempering), and various case hardening prove Transformation (TTT) diagram.	ns, intermetallic orking of metals ferrous and non <b>6 hours</b> particles and thin ctors and surface zing, Quenching processes. Time
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder sy films. Fic hardening Temperin Temperat	Iutions, solubility limit, Gibb's phase rule, binary phase diagram         ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo         ization and grain growth. Microstructure, properties and applications of         loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-period         g of metals. Various types of heat treatments such as Annealing, Normalizing         ug (Aus-tempering, Martempering), and various case hardening prove Transformation (TTT) diagram.	ns, intermetallic orking of metals ferrous and non <b>6 hours</b> particles and thin ctors and surface zing, Quenching processes. Time <b>8 hours</b>
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder sy films. Fic hardening Temperin Temperat <b>UNIT-I</b> Smart ma	Initial and the second secon	ns, intermetallic orking of metals ferrous and non <b>6 hours</b> particles and thin ctors and surface zing, Quenching processes. Time <b>8 hours</b> art gets, chromic
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s films. Fic hardening Temperin Temperat <b>UNIT-I</b> Smart ma materials	Initial stateInitInitGibb's phase rule, binary phase diagramInitial stateInitial stateInitial stateInitial stateIIDiffusion and Heat TreatmentIIIInitial stateInitial stateInitial stateIIIInitial stateInitial stateInitial stateIIIIInitial stateInitial stateInitial stateIIIIInitial stateInitial stateInitial stateIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	ns, intermetallie orking of metals ferrous and non <b>6 hours</b> particles and this ctors and surface zing, Quenching processes. Time <b>8 hours</b> art gets, chromic icitve materials
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder s films. Fic hardening Temperin Temperat <b>UNIT-I</b> Smart ma materials nanotech	InitInitGibb's phase rule, binary phase diagramlutions, solubility limit, Gibb's phase rule, binary phase diagramds, iron-carbon and iron-iron carbide phase diagram, cold and hot woization and grain growth. Microstructure, properties and applications ofloys.IIDiffusion and Heat Treatmentynthesis, sintering, chemical methods, zone refining, preparation of nano-paration of diffusion in sintering, doping of semiconduceg of metals. Various types of heat treatments such as Annealing, Normalizing(Aus-tempering, Martempering), and various case hardening pare Transformation (TTT) diagram.VSmart and Advanced Materialsterials: classification, piezo electric materials, Rheological materials, smart, thermo-responsive materials magneto strictive materials, elertrostrenology materials synthesis, properties, carbon nanotechnology tubes a	ns, intermetallie orking of metals ferrous and non <b>6 hours</b> particles and this ctors and surface zing, Quenching processes. Time <b>8 hours</b> art gets, chromie icitve materials
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Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder sy films. Fic hardening Temperin Temperat <b>UNIT-I</b> Smart ma materials nanotech Biomater fibres, ex supercond composite	Initions, solubility limit, Gibb's phase rule, binary phase diagram         Intions, solubility limit, Gibb's phase rule, binary phase diagram         ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo         ization and grain growth. Microstructure, properties and applications of         loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-period and application of diffusion in sintering, doping of semiconduce         g of metals. Various types of heat treatments such as Annealing, Normalizing (Aus-tempering, Martempering), and various case hardening prover Transformation (TTT) diagram.         V       Smart and Advanced Materials         neterials: classification, piezo electric materials, Rheological materials, since inclogy materials synthesis, properties, carbon nanotechnology tubes a ials and applications, super-alloys, shape memory alloys, nanomaterials, I thibiting ferroelectric, piezoelectric, opto-electric, semi-conductive, phot ductive properties and applications, composite materials, classification an e materials.	ns, intermetallic orking of metals ferrous and non- <b>6 hours</b> particles and thin ctors and surface zing, Quenching processes. Time <b>8 hours</b> art gets, chromic icitve materials and applications lasers and optica toconductive and applications o
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Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder sy films. Fice hardening Temperin Temperat <b>UNIT-I</b> Smart ma materials, nanotechn Biomater fibres, ex supercond composite <b>UNIT-V</b> Materials	Initions, solubility limit, Gibb's phase rule, binary phase diagram ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo ization and grain growth. Microstructure, properties and applications of loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-pack's laws and application of diffusion in sintering, doping of semiconduce of metals. Various types of heat treatments such as Annealing, Normalizing (Aus-tempering, Martempering), and various case hardening prover Transformation (TTT) diagram.         V       Smart and Advanced Materials         terrials: classification, piezo electric materials, Rheological materials, smalials and applications, super-alloys, shape memory alloys, nanomaterials, I hibiting ferroelectric, piezoelectric, opto-electric, semi-conductive, phot ductive properties and applications, composite materials, classification and ematerials.         V       Material characterization and Metallography         characterization and Metallography       Characterization and Metallography	ns, intermetallic orking of metals ferrous and non <b>6 hours</b> particles and thin ctors and surface zing, Quenching processes. Time <b>8 hours</b> art gets, chromic icitve materials and applications lasers and optica toconductive and ad applications o <b>8 hours</b> raction, scanning
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder sy films. Fice hardening Temperin Temperat <b>UNIT-I</b> Smart ma materials, nanotechn Biomater fibres, ex supercond composite <b>UNIT-V</b> Materials	Initial and application of diffusion in sintering, doping of semiconduc g of metals. Various types of heat treatments such as Annealing, Normaliz g (Aus-tempering, Martempering), and various case hardening pro- transformation (TTT) diagram.VSmart and Advanced Materials itals and applications, super-alloys, shape memory alloys, nanomaterials, properties, carbon nanotechnology tubes a ials and applications, super-alloys, shape memory alloys, nanomaterials, likibiling ferroelectric, piezoelectric, opto-electric, semi-conductive, phot ductive properties and applications, composite materials, classification and erials and applications, super-alloys, shape memory alloys, nanomaterials, and applications, super-alloys, shape memory alloys, nanomaterials, and application and applications, composite materials, classification and emetrials.Material characterization and Metallography	ns, intermetallic orking of metals ferrous and non- <b>6 hours</b> particles and thin ctors and surface zing, Quenching processes. Time <b>8 hours</b> art gets, chromic icitve materials and applications lasers and optica toconductive and ad applications o <b>8 hours</b> raction, scanning
Solid so compoun recrystall ferrous al <b>UNIT-I</b> Powder sy films. Fic hardening Temperin Temperat <b>UNIT-I</b> Smart ma materials nanotech Biomater fibres, ex supercond composite <b>UNIT-V</b> Materials electron	Initions, solubility limit, Gibb's phase rule, binary phase diagram ds, iron-carbon and iron-iron carbide phase diagram, cold and hot wo ization and grain growth. Microstructure, properties and applications of loys.         II       Diffusion and Heat Treatment         ynthesis, sintering, chemical methods, zone refining, preparation of nano-pack's laws and application of diffusion in sintering, doping of semiconduce of metals. Various types of heat treatments such as Annealing, Normalizing (Aus-tempering, Martempering), and various case hardening prover Transformation (TTT) diagram.         V       Smart and Advanced Materials         terrials: classification, piezo electric materials, Rheological materials, smalials and applications, super-alloys, shape memory alloys, nanomaterials, I hibiting ferroelectric, piezoelectric, opto-electric, semi-conductive, phot ductive properties and applications, composite materials, classification and ematerials.         V       Material characterization and Metallography         characterization and Metallography       Characterization and Metallography	ns, intermetallic orking of metals ferrous and non- <b>6 hours</b> particles and thin ctors and surface zing, Quenching processes. Time <b>8 hours</b> art gets, chromid icitve materials and applications lasers and optica toconductive and at applications of <b>8 hours</b> action, scanning scopy, scanning

	Understand the Structure of materials at different levels, basic concepts of	K2,K3
CO1	crystalline materials like unit cell, FCC, BCC, HCP, APF (Atomic Packing	
	Factor), Co-ordination Number etc.	
CO2	Analyse the concept of phase & phase diagram & understand the basic	K <sub>2</sub>
	terminologies associated with metallurgy.	
CO3	Comply and suggest the heat treatment process & types. Significance of	K2, K <sub>3</sub>
	properties Vs microstructure. Surface hardening & its types.	
	Interpret features, classification, applications of newer class materials like	K <sub>3</sub>
CO4	smart materials, piezoelectric materials, biomaterials, composite materials	
	etc.	
CO5	Interpret Materials characterization and Metallographic techniques such as	$K_2$
	X-Ray diffraction, scanning electron microscopy.	
Text bo	oks	
William	D., Jr. Callister and David G. Rethwisch, "Materials Science and Engine	eering: An
Introduct	tion". Wiley and Sons; 8th edition (December 30, 2009); Language: English	n; ISBN-10:
0470419	970.	
R. K. Rajp	out, "A Textbook of Material Science". S.K. Kataria& Sons, 2013, ISBN 13: 97893	50144183
James F.	Shackelford, "Introduction to Material Science for Engineers". Pearson Educa	tion, 2014,
ISBN 13:	9780133826654	
Reference	e Books	
1.Tariq A	. Khraishi and Marwan S. Al-Haik, "Experiments in Materials Science and Engine	ering".

2.V. Raghavan, "Materials Science and Engineering: A First Course". PHI Learning, ISBN 13: 9788120350922

	<b>B.TECH SECOND YEAR</b>				
Course Code	AME0301	L	Т	Р	Credits
Course Title	Manufacturing Technology – I	3	0	0	3
Course Objective	es: The students should be able to	•			

Classify manufacturing processes: understand the significance and steps involved in metal casting processes         Design, analyze gating systems for casting and explain different special casting processes to solve forming problems.         Identify, evaluate different sheet metal forming operations, sheet metal dies, arc welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I         Metal casting processes: introduction and Classification of Manufacturing Processes.         Metal-Casting Processes: introduction and Classification of Manufacturing Processes.         Metal-Casting Processes: introduction and Classification of Manufacturing Processes.         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding Sands -Properties of moulding sands. Types of Sand Moulds -Green-sand, Dry-sand and Skin-dried Moulds. Cores -Functions and Desired Characteristics of Cores, Core sands, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Appiration Effect (Derivations and Numerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes       8 hours         Special       Casting Processes: Col2Moulding, Shell Moulding, Investment Casting, Defects in Casting Processes: Contrifugal casting, Continuous Casting Defects - Types, Causes and Remedies.         Advances in Casting Processes: Sheet Mould casting				
metal casting processes         Design, analyze gating systems for casting and explain different special casting processes         Understand and apply principles concerned with metal forming processes to solve forming problems.         Identify, evaluate different sheet metal forming operations, sheet metal dies, arc welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I       Metal casting processes:         Manufacturing processes: introduction and Classification of Manufacturing Processes.         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds - Green-sand, Dry-sand and Skin-dried Moulds. Cores -Functions and Desired Characteristics of Cores, Core sands, Types of Casting and Spiration Effect (Derivations and Mumerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes       8 hours         Special       Casting Processes: Continuing casting; Continuous Casting Defects - Types, Causes and Remdels.       8 hours         Advances in Casting Processes: Continuing casting, design for plaster Mould casting design ing, USE of CAD/CAM in foundries, Casting simulation and analysis       10 hours         Manufacturing       Processes: Continuing casting, design for plaster Mould casting design ing, USE of CAD/CAM in foundries, Casting simulation and analysis	_	-		ince and
Design, analyze gating systems for casting and explain different special casting processes         a       Understand and apply principles concerned with metal forming processes to solve forming problems.         Identify, evaluate different sheet metal forming operations, sheet metal dies, arc       Welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science       Course Contents / Syllabus         UNIT-I       Metal casting processes       10 hours         Manufacturing processes: introduction and Classification of Manufacturing Processes.       Pre-reguisites: Studentshave the knowledge of science         VINIT-I       Metal casting processes: introduction and Classification of Manufacturing Processes.       10 hours         Manufacturing processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands. Types of Cores, Core sands, Types of Cores, Core sands, Types of Gating and Riser Design for Casting: Elements of Gating System, Types of Rating in Condition, to Avoid Aspiration Effect (Derivations and Numerical)Design of Risers: Types of Rating Processes       8 hours         Special Casting Processes: Sheet Moulding, casting, Unvestment Casting, and Cold Chamber Processes: Sheet Mould casting, design for plaster Mould casting undividually accuracy, uniformity and other considerations in casting and Moulding. Recent developments in pattern and casting design for plaster Mould casting desi	1			
2       casting processes         3       Understand and apply principles concerned with metal forming processes to solve forming problems.         4       Identify, evaluate different sheet metal forming operations, sheet metal dies, arc welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science Course Contents / Syllabus         UNIT-I       Metal casting processes         Manufacturing processes: introduction and Classification of Manufacturing Processes.         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds -Green-sand, Dry-sand and Skin-dried Moulds. Cores -Functions and Desired Chracteristics of Cores, Core sands, Types of Gating System, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect (Derivations and Numerical) Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes       8 hours         Special       Casting Processes: Centrifugal casting, Continuous Casting Defects - Types, Causes and Remedies.       Advance casting processes         Advances in Casting Processe: Sheet Moulding, casting, V-process, flask less Moulding, evaporative casting, plaster Mould casting, design for plaster Mould casting quality accuracy, uniformity and other considerations in casting and Moulding. Recent developments in pattern and casting designing. Use of CAD/CAM in forundries, Casting simulation and analysi			• •	<u> </u>
processes         3       Understand and apply principles concerned with metal forming processes to solve forming problems.         4       Identify, evaluate different sheet metal forming operations, sheet metal dies, arc welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I         Metal casting processes:         Metal casting processes         10 hours         Manufacturing processes:       Introduction and Classification of Manufacturing Processes.         Metal-Casting Processes:       Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds - Green-sand, Dry-sand and Skin-dried Moulds.         Core -Functions and Desired Characteristics of Cores, Core sands, Types of Gating System, Types of Gating and Riser Design for Casting: Elements of Gating System, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect (Derivations and Numerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Cold Chamber Processes: Contrilugal casting; Continuous Casting Defects - Types, Causes and Remedies.         Advance casting Processes: Sheet Moulding, casting, V-process, flask less Moulding, evaporative casting plaster Mould casting design for plaster Mould casting quality accuracy, uniformity and other considerations in casting and Mould	2		analyze gating systems for casting and explain diff	rerent special
3       Understand and apply principles concerned with metal forming processes to solve forming problems.         4       Identify, evaluate different sheet metal forming operations, sheet metal dies, arc welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I         Metal casting processes:         Metal casting processes         Introduction and Classification of Manufacturing Processes:         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds - Green-sand, Dry-sand and Skin-dried Moulds.         Core - Functions and Desired Characteristics of Cores, Core sands, Types of Casting and Riser Design for Casting: Elements of Gating System, Types of Risers. Directional Solidification, Chorinov's Rule and Caine's method (Numerical).         UNIT-II         Advance casting processes:       8 hours         Special Casting Processe: COMulding, Shell Moulding, Investment Casting, Casting, Hot and Cold Chamber Processes; Sheet Mould casting, design for plaster Mould casting quality accuracy, uniformity and other considerations in casting and Mould' - Considerations in casting and Mould' - Casting Sing and Relation in Metal forming Operations.         Advance casting Processes: Sheet Mould casting, design for plaster Mould casting quality accuracy, uniformity and other c	2			
3       processes to solve forming problems.         4       Identify, evaluate different sheet metal forming operations, sheet metal dies, arc         welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I         Metal casting processes       10 hours         Manufacturing processes: introduction and Classification of Manufacturing Processes.       10 hours         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds -Green-sand, Dry-sand and Skin-dried Moulds.         Cores - Functions and Desired Characteristics of Cores, Core sands, Types of Gating Systems. Pouring time calculations, Top Gating, Bottom Gating and Riser Design for Casting: Elements of Gating System. Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Riser Design for Casting: Continuous Casting Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes       8 hours         Special Casting Processe: Co2Moulding, Shell Moulding, Investment Casting, Die Casting, Hot and Cold Chamber Processe; Centrifugal casting; Continuous Casting Defects - Types, Causes and Remedies.       Advances in Casting Processe: Sheet Moulding, casting, V-process, flask less Moulding, evaporative casting, plaster Mould casting, design for plaster Mould Casting quality accuracy, u		•		
Identify, evaluate different sheet metal forming operations, sheet metal dies, arc         welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I       Metal casting processes         Manufacturing processes: introduction and Classification of Manufacturing Processes.         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds -Green-sand, Dry-sand and Skin-dried Moulds.         Cores -Functions and Desired Characteristics of Cores, Core sands, Types of Cores, Core Prints and Chaplets. Gating and Riser Design for Casting: Elements of Gating System, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect (Derivations and Numerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes: Sheet Moulding, Investment Casting, Die Casting Processes: Col2Moulding, Shell Moulding, Investment Casting, Die Casting quality accuracy, uniformity and other considerations in casting and Moulding. Recent developments in pattern and casting designing, Use of CAD/CAM in foundries, Casting simulation and analysis         UNIT-III       Metal forming processes       10 hours         Advances and Cold Chamber Processes; Chertifugal casting, design for plaster Mould casting quality accuracy, uniformity and other considerations in casting and Moulding. Recent developments in pattern and	3			ning
4       dies, arc welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science Course Contents / Syllabus         UNIT-I       Metal casting processes       10 hours         Manufacturing processes: introduction and Classification of Manufacturing Processes.       10 hours         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds -Green-Sand, Dry-sand and Skin-dried Moulds.         Cores -Functions and Desired Characteristics of Cores, Core sands, Types of Cores, Core Prints and Chaplets. Gating and Riser Design for Casting: Elements of Gating System, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect (Derivations and Numerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes       8 hours         Special       Casting Processes: Co2Moulding, Shell Moulding, Investment Casting, Die Casting, Hot and Cold Chamber Processes; Centrifugal casting; Continuous Casting Defects - Types, Causes and Remedies.       Advances in Casting Processes: Sheet Moulding, casting, V-process, flask less Moulding, evaporative casting, plaster Mould casting, design for plaster Mould casting quality accuracy, uniformity and other considerations in casting and Moulding. Recent developments in pattern and casting designing, Use of CAD/CAM in foundries, Casting simulation and analysis         UNIT-III       Metal forming Operati				sheet metal
welding processes and welding defects         Pre-requisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I         Metal casting processes:       10 hours         Manufacturing processes: introduction and Classification of Manufacturing Processes.       Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds -Green-sand, Dry-sand and Skin-dried Moulds. Cores -Functions and Desired Characteristics of Cores, Core sands, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect (Derivations and Numerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes       8 hours         Special       Casting Processes: Co2Moulding, Shell Moulding, Investment Casting, Die Casting, Hot and Cold Chamber Processes: Continuous Casting, V-process, flask less Moulding, evaporative casting, plaster Mould casting, design for plaster Mould casting quality accuracy, uniformity and other considerations in casting and Moulding. Recent developments in pattern and casting designing. Use of CAD/CAM in foundries, Casting simulation and analysis         UNIT-III       Metal forming Operations.         Forging:       Processes         Metal forming: Classification of Metal Forming Operations.         Forging:       Processes and operations, Lubrication	4	-		, sheet metai
Pre-erequisites:Studentshave the knowledge of science         Course Contents / Syllabus         UNIT-I       Metal casting processes       10 hours         Manufacturing processes: introduction and Classification of Manufacturing processes.         Metal-Casting Processes: Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds -Green-sand, Dry-sand and Skin-dried Moulds.         Cores -Functions and Desired Characteristics of Cores, Core sands, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect (Derivations and Numerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).         UNIT-II       Advance casting processes       8 hours         Special Casting Processes: Co2Moulding, Shell Moulding, Investment Casting, Die Casting, UNIT-II       Advances in Casting Processes: Co2Moulding, Casting, Orpinuous Casting Defects - Types, Causes and Remedies.         Advances in Casting Processes: Co2Moulding, Shell Moulding, Investment Casting, Die Casting, Pattern and Cold Chamber Processes; Contrigual casting, Continuous Casting Defects - Types, Causes and Remedies.         Advances in Casting Processes: Sheet Moulding, casting, V-process, flask less Moulding, evaporative casting, plaster Mould casting, design for plaster Mould casting quality accuracy, uniformity and	-			
Course Contents / Syllabus           UNIT-I         Metal casting processes         10 hours           Manufacturing         processes:         Introduction         Introduction         Introduction           Processes.         Metal-Casting Processes:         Advantages, Limitations and Applications. Patterns, Pattern allowances, Core prints, Types of patterns. Types of Moulding sands -Properties of moulding sands. Types of Sand Moulds -Green-sand, Dry-sand and Skin-dried Moulds.           Cores -Functions and Desired Characteristics of Cores, Core sands, Types of Cores, Core Prints and Chaplets. Gating and Riser Design for Casting: Elements of Gating System, Types of Gates and gating systems. Pouring time calculations, Top Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect (Derivations and Numerical)Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method (Numerical).           UNIT-II         Advance casting processes         8 hours           Special         Casting         Processes: Continuous Casting, Unitations in casting, Die Casting, Hot and Cold Chamber Processes; Centrifugal casting, Continuous Casting Defects - Types, Causes and Remedies.         Moulding, casting Process: Sheet Moulding, casting, V-process, flask less Moulding, evaporative casting, plaster Mould casting, design for plaster Mould casting quality accuracy, uniformity and other considerations in casting and Moulding, Recent developments in pattern and casting designing, Use of CAD/CAM in foundries, Casting simulation and analysis           UNIT-III         Metal forming Operations.           Forging:	Pre-rea	-		
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Flat Rolling and Terminology: Draft (Reduction), Forward and Backward

Numerica	rip contact length, Bite angle, Ragging, Neutral Plane and Angle c	
UNIT-IV		8 hours
	Manufacturing processes	
		<u> </u>
	tal Forming: Classification of press tool operations; Pu	
Clearances		ng, Spinning
Stretch for	5	
	al Drawing: Drawing, Cupping and Deep drawing Draw Die D	-
considered	5 5	(Simple
	. Defects in drawing. Sheet Metal Dies: Progressive, Compound ar	nd Combinatior
	ng and Bending Allowance, Rubber Forming.	
	etallurgy: P/M process, different methods of producing pow	ders, differen
	to form the shape, advantages, disadvantages,	
	anufacturing: Product development cycle and importance of prot	
	, principles and advantages, different types of generative	manufacturing
process, vi	z. stereolithography, FDM, and SLS	
UNIT-V	Metal Joining Processes	8 hours
electrodes,	<ul> <li>consumable and non-consumable electrodes, Functions of c Arc blow.</li> <li>ng Processes - Shielded metal arc welding (SMAW), Inert Gas</li> </ul>	-
electrodes, Arc Weldi Tungsten I welding (S/ Resistanc welding: structure, V	<ul> <li>Arc blow.</li> <li>ng Processes - Shielded metal arc welding (SMAW), Inert Gas nert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, SAW), Atomic Hydrogen welding (AHW), Plasma arc welding (PAW).</li> <li>e welding: Principle and types of resistance welding. Meta Principal zones in the joint and ty Welding defects.</li> </ul>	Arc Welding Submerged arc Ilurgy of Arc pical grain
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electrodes, Arc Weldi Tungsten I welding (SA Resistanc welding: structure, V Course ou	<ul> <li>Arc blow.</li> <li>ng Processes - Shielded metal arc welding (SMAW), Inert Gas nert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, SAW), Atomic Hydrogen welding (AHW), Plasma arc welding (PAW).</li> <li>e welding: Principle and types of resistance welding. Meta Principal zones in the joint and ty Welding defects.</li> <li>Atter completion of this course students will be able to Attended to the statement of th</li></ul>	Arc Welding Submerged arc Ilurgy of Arc pical grain
electrodes, Arc Weldi Tungsten I welding (S/ Resistanc welding: structure, V Course ou CO 1	Arc blow. <b>ng Processes</b> - Shielded metal arc welding (SMAW), Inert Gas nert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, S AW), Atomic Hydrogen welding (AHW), Plasma arc welding (PAW). <b>e welding:</b> Principle and types of resistance welding. <b>Meta</b> Principal zones in the joint and ty Velding defects. <b>Itcome:</b> After completion of this course students will be able to Understand the concept of manufacturing processes	Arc Welding Submerged are Ilurgy of Are pical grain
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electrodes, Arc Weldi Tungsten I welding (S/ Resistanc welding: structure, V Course ou CO 1 CO 2 CO 3 CO 4 CO 5 Text book	Arc blow. <b>ng Processes</b> - Shielded metal arc welding (SMAW), Inert Gas nert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, S AW), Atomic Hydrogen welding (AHW), Plasma arc welding (PAW). <b>e welding:</b> Principle and types of resistance welding. <b>Meta</b> Principal zones in the joint and ty Welding defects. <b>Itcome:</b> After completion of this course students will be able to Understand the concept of manufacturing processes Analyse and solve the problems based on Metal forming processes. Analyze and solve the problems based on Gating Design Understand the metal joining processes Understand the concept of powder metallurgy. <b>S</b>	Arc Welding Submerged are Ilurgy of Are pical grain K <sub>1</sub> , K <sub>2</sub> K <sub>3</sub> , K <sub>4</sub> K <sub>4</sub> K <sub>4</sub> K <sub>2</sub>
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electrodes, Arc Weldi Tungsten I welding (S/ Resistanc welding: structure, V Course ou CO 1 CO 2 CO 3 CO 4 CO 5 Text book P N Rao, McGraw Hi	Arc blow. ng Processes - Shielded metal arc welding (SMAW), Inert Gas nert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, S AW), Atomic Hydrogen welding (AHW), Plasma arc welding (PAW). e welding: Principle and types of resistance welding. Meta Principal zones in the joint and ty Welding defects. Itcome: After completion of this course students will be able to Understand the concept of manufacturing processes Analyse and solve the problems based on Metal forming processes. Analyze and solve the problems based on Gating Design Understand the concept of powder metallurgy. S Manufacturing Technology – Foundry, Forming, and Welding II Education (India) Private Limited.	Arc Welding Submerged ar Ilurgy of Ar pical grain K <sub>1</sub> , K <sub>2</sub> K <sub>3</sub> , K <sub>4</sub> K <sub>4</sub> K <sub>4</sub> K <sub>2</sub> G, 4th edition
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electrodes, Arc Weldi Tungsten I welding (S/ Resistanc welding: structure, V Course ou CO 1 CO 2 CO 3 CO 4 CO 5 Text book P N Rao, McGraw Hi Kalpakjian& Manufacturi	Arc blow. ng Processes - Shielded metal arc welding (SMAW), Inert Gas nert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, S AW), Atomic Hydrogen welding (AHW), Plasma arc welding (PAW). e welding: Principle and types of resistance welding. Meta Principal zones in the joint and ty Welding defects. tcome: After completion of this course students will be able to Understand the concept of manufacturing processes Analyse and solve the problems based on Metal forming processes. Analyze and solve the problems based on Gating Design Understand the concept of powder metallurgy. is Manufacturing Technology – Foundry, Forming, and Welding I Education (India) Private Limited. Schmid, "Manufacturing Engineering & Technology", 6th Edition, Pearson ng science by A. Ghosh and AK Mallick Eat and west publishing house	Arc Welding Submerged ar Ilurgy of Ar pical grain K <sub>1</sub> , K <sub>2</sub> K <sub>3</sub> , K <sub>4</sub> K <sub>4</sub> K <sub>2</sub> g, 4th edition on.
electrodes, Arc Weldi Tungsten I welding (S/ Resistanc welding: structure, V Course ou CO 1 CO 2 CO 3 CO 4 CO 5 Text book P N Rao, McGraw Hi Kalpakjian& Manufacturi Reference	Arc blow. ng Processes - Shielded metal arc welding (SMAW), Inert Gas nert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, S AW), Atomic Hydrogen welding (AHW), Plasma arc welding (PAW). e welding: Principle and types of resistance welding. Meta Principal zones in the joint and ty Welding defects. tcome: After completion of this course students will be able to Understand the concept of manufacturing processes Analyse and solve the problems based on Metal forming processes. Analyze and solve the problems based on Gating Design Understand the concept of powder metallurgy. is Manufacturing Technology – Foundry, Forming, and Welding I Education (India) Private Limited. Schmid, "Manufacturing Engineering & Technology", 6th Edition, Pearson ng science by A. Ghosh and AK Mallick Eat and west publishing house	Arc Welding Submerged ar Ilurgy of Ar pical grain K <sub>1</sub> , K <sub>2</sub> K <sub>3</sub> , K <sub>4</sub> K <sub>4</sub> K <sub>2</sub> g, 4th edition on.

B. L. Juneja Sekhon, Fundamentals of Metal Cutting and Machine Tools, New Age Intl.

W A J Chapman, Workshop Technology Part 1,2,&3 , Edward Arnold,

Course	Code	AME0353	L	Τ	Р	Credits				
Course	Title	0	0	2	1					
On Completion of the lab, the students will be able: -										
CO1	To apply some basic concepts and methods from design engineering to explore creative									
CO2		parts, assemblies, flexible & sheet metal modelling, d ed engineering concept drawings.	iagrar	n com	plex	systems				
CO3	To apply industry standards in the sketching 3D modelling validation and visualization of									
List of experiment: There are fourteen experiments out of which minimum ten experiments are to be carried out.										

- 1. To draw polygons using a modeling software.
- 2. To draw isometric projections of a given solid using a modeling software.
- 3. Modeling of simple machine components (bracket, flange, nut and bolt).
- 4. Modeling of carburetor parts I: body and plate.
- 5. Modeling of carburetor parts II: shaft, arm and cover.
- 6. Modeling of I.C. engine components I: connecting rod and cylinder block.
- 7. Modeling of I.C. engine components II: piston and crankshaft.
- 8. To assemble pre modelled carburetor parts that are body, plate, shaft, arm and cover in a CAD/Solid works /CREO software.
- 9. To assemble pre modelled internal combustion engine components that are connecting rod, cylinder block, piston and crankshaft in a CAD/Solid works /CREO software.
- 10. To place a punch and die form on a Sheetmetal using a CAD/Solid works /CREO software.
- 11. To model a structural component using welding in a CAD/Solid works /CREO software.
- 12. To modeling and force simulation of a structural component.
- 13. Flow simulation of a fan using a CAD/Saladworks /CREO software.
- 14. To create a drawing with different views of a 3D modeled component.

					B	B.T	ГЕ	C	H	SI	EC	CC	DN	D	Y	Έ	A	R										
Course Co	ode	AN	ME03	352																	L	T		Р		C	rec	lits
Course Ti	itle	Material Testing Lab					0	0		2			1															
On Complet	ion of the l	lab,	, the	stud	der	nts	s v	will	l be	e al	ble	e: -	-															
CO1	Demons microstr								-			•					pre	ера	are s	san	nple	s for	st	udyi	ng			
CO2	Interpre	et d	liffere	ent	pha	ase	ses	; pr	rese	ent	t ir	۱d	iffe	ere	ent	: pl	air	ו ca	arbo	on	ste	els a	nc	l cas	t i	ron	IS.	
CO3	Perform these co				hea	at t	tre	eat	tme	ent	t p	roo	ces	se	es f	or	a s	ste	el a	nd	ob	serv	e	micr	os	tru	ctu	res ir
CO4	Identify carbon			of A	۹nn	nea	ali	ing	<del></del> <i>,</i> Ν	lorr	ma	əliz	ing	g a	ind	H	arc	der	ning	; or	ח m	cro	str	uctu	ire	e of	me	diun
List of expended be carried o		re a	are fo	ourt	tee	en e	ex	(pe	erin	mer	nts	s o	ut	of	fw	hic	:h i	mi	nim	un	n te	n ex	(pe	erim	en	nts	are	to
S. No										]	Li	st	of	Pr	ac	tic	al'	S										
1	To determ	nine	e the 1	mic	ro s	str	ruc	ctu	ires	s of	fa	pr	ep	are	ed	spe	eci	me	en u	sin	g o	ptica	al 1	micr	os	cop	ру.	
2	To study I	Bra	vais	latti	ices	s w	wit	th t	the	e he	elp	of	m	loc	lels	s.												
3	To perform	m h	neat tr	reati	me	ent	t pi	roc	cess	ses	s (ł	nar	de	ni	ng	an	d t	em	per	ing	g) o	f ste	el	spec	in	nen	l <b>.</b>	
4	To study t	the	creep	p be	ehav	vic	or	of	a g	give	en	sp	ec	im	nen	l <b>.</b>												
5	To perform	m tl	he mo	olec	cula	ar	siı	mu	ılat	tior	n u	isit	ng	op	en	fo	rm	n so	oftw	vare	е							
6	To study t	the	mech	hani	ism	n o:	of	che	emi	ical	l c	or	ros	sio	n a	ınd	lits	s p	rote	cti	on.							
7	To study c	crys	stal st	truc	etur	res	s ai	nd	l cry	ysta	als	s ir	np	er	fec	tio	ns	us	ing	ba	ll m	ode	ls.					
8	To find the	e h	ardne	ess o	of r	ma	ate	eria	als	usi	ing	g R	oc	kv	vel	1 a	nd	Bı	rine	11 ł	nard	ness	s te	est.				
9	Determina tests on ur							-	-	-	tie	es f	ro	m	str	ess	s-st	trai	in c	urv	ves	obta	in	ed fr	on	n te	ensi	le
10	Determina	atio	on of t	fatig	gue	e st	stre	eng	gth	of	a	me	etal	llio	c sj	pec	cim	ner	l.									
11	Determina	atio	on of i	imp	bact	t s	str	en	gth	n of	fa	m	eta	lli	c s	spe	cin	nei	n us	sing	g Iz	od a	nd	l Cha	arp	oy 1	net	hods.
12	Determina machine.	atio	on of 1	tors	sion	nal	1 st	tre	engt	th c	of	a r	net	tal	lic	sp	eci	im	en ı	ısiı	ng t	he to	ors	sion	tes	stin	g	
13	To perform	m s	hear	test	t an	nd o	co	omj	pre	essi	ive	e te	st	on	l U	niv	ver	sal	tes	tin	g N	lach	in	e (U	TN	(N		

		<b>B.TECH SECOND YE</b>	AR	
Course	Code	AME0351	LTP	Credits
Course	Title	Manufacturing Technology-I Lab	0 0 2	1
S. No		LIST OF EXPERI		
1	To stu Castir	dy and observe various stages of casting the process.	nrough demonstrati	ion of Sand
2		n making with proper allowance.		
3		ng a Mould (with core) and casting.		
4	well a	udy Various Characteristics of copper Pow s Strength Characteristics (hardness) of Co ventional) compact.		
5	Forgi	ng - power hammer study & operation		
6	-	epare a sheet metal product (Funnel) and R is passes during the rolling of the given me	1 1	parameters for the
7		ake a corner joint using Gas welding experi		
8	To pro	epare Lap joint using spot welding.		
9	To pro	epare a butt joint with mild steel strip using	g MAG& MMAW	technique.
10	Devel	opment of a designed model with given pa	rameters on FDM	RP System
11	Devel	opment of a designed model with given pa	rameters on SLA H	RP System
12	Devel	opment of a designed model with given pa	rameters on LDM	RP System
Course Out	comes:	The students would be able to		
CO 1	knowl	e making Moulds using different types of patt edge involved in designing prototypes/compo	nents	
CO 2	Know physic	and practice the skill of smithy and learn to me ally	odify the shapes of h	nard metal
CO 3	Know	how to perform welding operations and how t	o join different met	als.
CO 4	Under	stand and implement the concept of rapid pro	ototyping	

		B. TH	ECH. SI	ECONI	D YEA	AR				
Course C	ode	ANC0301					L	Т	Р	Credit
Course T	itle	Cyber Se	curity				2	0	0	0
and vulnera	<b>Djective:</b> Dwledge about S bility in various lata from cyber-	scenarios, ur	nderstand c	concept of	f cryptog	raphy a	nd e	encry		•
-	<b>sites:</b> Basics re cept of network Comman	and operatin ds of program	g system.	guage.	-					
UNIT-I	Introductio				y nabu	3				<b>9</b> Цоция
Introduction Systems, N Guidelines	to Informatio feed for Inform for Secure Pass for, and Risk Ma	n Systems: nation Secur word and W	ity, Threa	ts to Inf	ormation	n Syster	ms,	Info	ormati	on Assurance,
UNIT-II	Application	0	curity							8 Hours
Trapdoors,	trusion Detectio Spoofs, E-mail urity, Threats to	Viruses, Mac	ero Viruses	s, Malicio	us Softw	vare,Net	WO	rk an	d Der	ial of Services
UNIT-III	Secure Syst	em Develo	pment							8 Hours
and Downle Security of Measures.	Development S oadable Device TT Assets, Ac	Security, Arc s, Mobile P ccess Contro	hitecture & rotection,S	Security T and Intru	Threats i usion D	nvolvin	g iı	n soc	cial m	edia, Physical ckup Security
UNIT-IV	Cryptograp	•		v						8 Hours
Functions,P Symmetric I Secure hash Real World	cryptography: R ublic Key Distri key cryptograph algorithm(SHA Protocols: Basi urity, DNS Secu	bution. y: DES (Data 1). c Terminolog	a Encryptic	on Standa	rd), AES	5 (Adva	nce	d Eno	eryptio	on Standard),
UNIT-V	Security Po	•								8 Hours
•	gn Task, WW nple Security I	W Policies,				•				-

Policies. Resent trer	nds in security.	
Course o	-	
CO 1	Analyze the cyber security needs of an organization.	K4
CO 2	Identify and examine software vulnerabilities and security solutions.	K1,K3
CO 3	Comprehend IT Assets security (hardware and Software) and performance indicators	K2
CO 4	Measure the performance and encoding strategies of security systems.	K3, K5
CO 5	Understand and apply cyber security methods and policies to enhance current scenario security.	K2, K3
Text boo	ks:	
1) Charles	P. Pfleeger, Shari Lawerance Pfleeger, "Analyzing Computer Security", Pearson I	Education India
2) V.K.Pa	chghare, "Cryptography and information Security", PHI Learning Private Limited,	Delhi India
3) Sarika (	Gupta & Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing	House
4) Michae	E.Whitman and Herbert J Mattord "Principle of Information Security" Cengage	
Reference	Books:	
1) Schou,	Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.	
2) CHANI	DER, HARISH," Cyber Laws and It Protection", PHI Learning Private Limited, De	elhi
3) V.K. Ja	in, Cryptography and Network Security, Khanna Publishing House, Delhi	
4) William	n Stallings, Network Security Essentials: Applications and Standards, Prentice Hall	, 4th edition, 2010
E-books&	E-Contents:	
1) https://p	prutor.ai/welcome/	
2) https://c	crypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf	
3) https://c	zybermap.kaspersky.com/stats	
4) https://v	www.fireeye.com/cyber-map/threat-map.html	
Reference	Links:	
1) https://c	erypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf	
2) https://c	es155.stanford.edu/lectures/03-isolation.pdf	
3) http://u	ru.ac.in/uruonlinelibrary/Cyber_Security/Cryptography_and_Network_Security.pd	f
NPTEL/ Y	outube/ Faculty Video Link:	
1) <u>https://v</u>	www.youtube.com/watch?v=vv1ODDhXW8Q	
2) <u>https://v</u>	www.youtube.com/watch?v=fQ3ESFfvchg&list=PLUtfVcb-iqn834VGI9faVXGIC	SDXZMGp8
3) <u>https://v</u>	www.youtube.com/watch?v=iTVyKbDCJrA&list=PLgMDNELGJ1CbdGLyn7OrV	VAP-IKg-0q2U2
4) <u>https://v</u>	www.youtube.com/watch?v=1plMO7ChXMU&list=PLJ5C_6qdAvBFAuGoLC2w	FGruY E2gYtev

Cour	rse Code	ANC0302	L T P	Credits
Cour	rse Title	Environmental Science	2 0 0	0
Cour	rse objectiv	ve: The student will learn about		
1	the inter-rel	ationship between man and environment. and		
		dents in acquiring basic knowledge about environment		
2		areness among the students about environment and its	various problems.	
3	~	tude about environment among the student.		
4	_	proper skill required for the fulfilment of the aims	of environmental educa	tion and educationa
	evaluations			
5	-	the capability of using skills to fulfil the required aims	s, to realize and solve env	rironmental problems
		ial, political, cultural and educational processes		
Pre-	requisites:	Basic knowledge of nature.		
		Course Contents / Syllabu	18	
UNI	T-I Bas	sic Principle of Ecology		8 Hours
		bhur Cycles.		-
Basic	concepts of su	stainable development, SDGs, Ecosystem services, Ul		
Basic UNI	concepts of su <b>T-II Na</b> t	stainable development, SDGs, Ecosystem services, UI tural Resources and Associated Problem	18	n. <b>8 Hours</b>
Basic UNI Natura dams a using r agricul Land ro Non-R	concepts of su <b>T-II Na</b> I resources and       and their effects         nineral resources       ture, fertilizer-pesources: Land         enewable       Energy	stainable development, SDGs, Ecosystem services, Ul	<b>IS</b> oitation, deforestation. Tim sploitation, environmental en- by agriculture and over-graz uitable use of resources for a ergy, types, uses and effect	n. <b>8 Hours</b> ber extraction, mining ffects of extracting and zing, effects of modern sustainable lifestyles. ets, Renewable Energy
Basic UNI Natura dams a using r agricul Land ro Non-R Resour	concepts of su <b>T-II Na</b> I resources and and their effects nineral resource ture, fertilizer-p esources: Land enewable Energy rees: hydropowe	stainable development, SDGs, Ecosystem services, Un tural Resources and Associated Problem associated problems. Forest resources: Use and over-expl on forest and tribal people. Mineral resources: Use and ex es. Food resources: World food problems, changes caused besticide problems, water logging, salinity. as a resource, land degradation, man induced landslides. Eq gy Resources: Fossil fuels and their reserves, Nuclear en	oitation, deforestation. Time ploitation, environmental en by agriculture and over-graz uitable use of resources for ergy, types, uses and effect as energy, biogas and its adva	n. <b>8 Hours</b> ber extraction, mining ffects of extracting and zing, effects of modern sustainable lifestyles. ets, Renewable Energy antages.
Basic UNI Natura dams a using r agricul Land ro Non-R Resour UNI Biodiv extinct Strateg Succes	concepts of su <b>T-IINat</b> I resources andInd their effectsnineral resourceture, fertilizer-peesources: Landenewable Energingces: hydropowe <b>T-IIIBio</b> versity and thetion, IUCN thegies for biodgies Mega divession: Concept	stainable development, SDGs, Ecosystem services, Un tural Resources and Associated Problem associated problems. Forest resources: Use and over-expl on forest and tribal people. Mineral resources: Use and ex ess. Food resources: World food problems, changes caused besticide problems, water logging, salinity. as a resource, land degradation, man induced landslides. Eq gy Resources: Fossil fuels and their reserves, Nuclear en er, Solar energy, geothermal, tidal and wind energy, Biomas diversity Succession and Non-Renewabl eir importance, Threats to biodiversity, major cause teat categories, Red data book. iversity conservation, principles of biodiversity con- ersity zones and Hot spots, concepts, distribution and in the of succession, Types of Succession. Trends in succes	oitation, deforestation. Time ploitation, environmental en- by agriculture and over-graz- uitable use of resources for a ergy, types, uses and effect as energy, biogas and its adva- le Energy Resource ses, extinction's, vulneration onservation in-situ and mportance.	n. <b>8 Hours</b> ber extraction, mining ffects of extracting and zing, effects of modern sustainable lifestyles. ets, Renewable Energy antages. <b>8 Hours</b> ability of species to ex-situ conservation y.
Basic UNI Natura dams a using r agricul Land ro Non-R Resour UNI Biodiv extinct Strateg Strateg Succes UNI	concepts of su <b>T-IINa</b> I resources andInd their effectsnineral resourcesture, fertilizer-penewableEnergesces: hydropower <b>T-IIIBio</b> versity and thtion, IUCN thegies for biodgies Mega divession: Concept <b>T-IVPol</b>	stainable development, SDGs, Ecosystem services, Un tural Resources and Associated Problem associated problems. Forest resources: Use and over-expl on forest and tribal people. Mineral resources: Use and ex es. Food resources: World food problems, changes caused besticide problems, water logging, salinity. as a resource, land degradation, man induced landslides. Eq gy Resources: Fossil fuels and their reserves, Nuclear en er, Solar energy, geothermal, tidal and wind energy, Biomas diversity Succession and Non-Renewabl eir importance, Threats to biodiversity, major cause reat categories, Red data book. iversity conservation, principles of biodiversity con- gristy zones and Hot spots, concepts, distribution and in the of succession, Types of Succession. Trends in succe lution and Solid Waste Management	oitation, deforestation. Time coltation, environmental en- by agriculture and over-graz uitable use of resources for a nergy, types, uses and effect as energy, biogas and its advant le Energy Resource ses, extinction's, vulneration onservation in-situ and mportance. assion. Climax and stabilit	n.          8 Hours         ber extraction, mining         ffects of extracting and         zing, effects of modern         sustainable lifestyles.         sustainable lifestyles.         ets, Renewable Energy         antages.         es         8 Hours         ability of species to         ex-situ conservation         y.         8 Hours
Basic UNI Natura dams a using r agricul Land ro Non-R Resour UNI Biodiv extinct Strateg Succes Strateg Succes UNI Air po Hydroo Eutrop	concepts of su <b>T-IINa</b> I resources andIn tresources andand their effectsnineral resourceture, fertilizer-pesources: LandenewableEnergyress: hydropower <b>T-IIIBio</b> versity and thtion, IUCN thegies for biodgies Mega divession: Concept <b>T-IVPol</b> Ulution: sourcecarbon, controlhication, Soil p	stainable development, SDGs, Ecosystem services, Un tural Resources and Associated Problem associated problems. Forest resources: Use and over-expl on forest and tribal people. Mineral resources: Use and ex ess. Food resources: World food problems, changes caused besticide problems, water logging, salinity. as a resource, land degradation, man induced landslides. Eq gy Resources: Fossil fuels and their reserves, Nuclear en er, Solar energy, geothermal, tidal and wind energy, Biomas diversity Succession and Non-Renewabl eir importance, Threats to biodiversity, major cause teat categories, Red data book. iversity conservation, principles of biodiversity con- ersity zones and Hot spots, concepts, distribution and in the of succession, Types of Succession. Trends in succes	oitation, deforestation. Time coltation, environmental en- by agriculture and over-graz uitable use of resources for ergy, types, uses and effect is energy, biogas and its adva- te <b>Energy Resource</b> ses, extinction's, vulneration onservation in-situ and mportance. ession. Climax and stabilit . Origin and effects of SC of water pollution, Effect Major sources of and effect	n.          8 Hours         ber extraction, mining         ffects of extracting and         zing, effects of moder         sustainable lifestyles.         sustainable lifestyles.         sts, Renewable Energy         antages.         solution         sustainable lifestyles.         ex.         sustainable lifestyles.         ability of species to         ex-situ conservation         y.         8 Hours         DX, NOX, Cox, CFC         ts of water pollution
Basic UNI Natura dams a using r agricul Land ro Non-R Resour UNI Biodiv extinct Strateg Succes UNI Air po Hydroo Eutrop health,	concepts of su <b>T-IINa</b> I resources andInd their effectsnineral resourceture, fertilizer-penewableEnergices: LandenewableEnergices: hydropowe <b>T-IIIBio</b> versity and thtion, IUCN thegies for biodgies Mega divession: Concept <b>T-IVPol</b> ulution: sourcecarbon, controlhication, Soil pRadioactive an	stainable development, SDGs, Ecosystem services, Un tural Resources and Associated Problem associated problems. Forest resources: Use and over-expl on forest and tribal people. Mineral resources: Use and ex es. Food resources: World food problems, changes caused be esticide problems, water logging, salinity. as a resource, land degradation, man induced landslides. Eq gy Resources: Fossil fuels and their reserves, Nuclear en er, Solar energy, geothermal, tidal and wind energy, Biomas diversity Succession and Non-Renewabl eir importance, Threats to biodiversity, major cause teat categories, Red data book. iversity conservation, principles of biodiversity con- strates and Hot spots, concepts, distribution and in the of succession, Types of Succession. Trends in succes lution and Solid Waste Management s of air pollution, Primary and secondary air pollutants. of air pollution. Water pollution: sources and types ollution: Causes of soil pollution, Effects of soil pollution,	oitation, deforestation. Time toploitation, environmental en- by agriculture and over-graz- uitable use of resources for a tergy, types, uses and effect as energy, biogas and its adva- te <b>Energy Resource</b> ses, extinction's, vulneration onservation in-situ and mportance. ession. Climax and stabilit . Origin and effects of SC of water pollution, Effect Major sources of and effect genvironment.	n.          8 Hours         ber extraction, mining         ffects of extracting an         zing, effects of moder         sustainable lifestyles.         sustainable lifestyles.         ets, Renewable Energy         antages.         sts         8 Hours         ability of species to         ex-situ conservation         y.         8 Hours         OX, NOX, Cox, CFC         ts of water pollution of

Role of community, women and NGOs in environmental protection, Bioindicators and their role, Natural hazards, Chemical accidents and disasters risk management, Environmental Impact Assessment (EIA), Salient features of following Acts: a. Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972.b. Water (Prevention and control of pollution) Act, 1974.c. Air (Prevention and control of pollution) Act, 1981. Forest (Conservation) Act, 1980.d. Wetlands (Conservation and Management) Rules, 2017; e. Chemical safety and Disaster Management law. F. District Environmental Action Plan. Climate action plans.

**Course outcome:** After completion of this course students will be able to

CO 1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts,	K2
	components of ecosystem., food chains and food webs. Ecological pyramids	
CO 2	Understand the different types of natural recourses like food, forest, minerals and energy and their	K2
	conservation	
CO 3	Understand the importance of biodiversity, Threats of biodiversity and different methods of	K2
	biodiversity conservation.	
CO 4	Understand the different types of pollution, pollutants, their sources, effects and their control	K3
	methods	
CO 5	Understand the basic concepts of sustainable development, Environmental Impact Assessment	K3
	(EIA) and different acts related to environment	

### **Text books:**

1. Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.

- 2. Botkin, D.B and Kodler E.A., 2000, Environmental Studies: The earth as a living planet. John Wiley and Sons Inc.
- 3. Rao M.N. and H.V.N. Rao, 1989: Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi

4. Singh J.S., Singh S.P. and Gupta S.R., 2006, Ecology Environment and Resource Conservation, Anamaya Publishers, New Delhi. 5.Environmental Studies -Benny Joseph-Tata McgrawHill-2005

6. Environmental Studies- Dr. D.L. Manjunath, Pearson Education-2006.

7. Environmental studies- R, Rajagopalan -Oxford Publiotion2005.

### **Reference Books:**

1.Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.

- 2.Dash, M.C. (1994), Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.
- 3. Sharma P. D. (1996). Environmental Biology, Rastogi Publications, Meerut.
- 4. Verma P.S. and V.K. Agarwal. (1985). Principles of Ecology. S. Chand and Company (Pub.), New Delhi.
- 5. Principles of Environmental Sciences and Engineering -P. Venugopalan Rao, Prenitice Hall of India.

6. Environmental Science and Engineering Meenakshi, Prentice Hall India.

## NPTEL/ YouTube/ Faculty Video Link:

	https://www.youtube.com/watch?v=T21OO0sBBfc,	https://www.youtube.com/watch?
Unit 1	v=qt8AMjKKPDohttps://www.youtube.com/watch?v=yAK-m91	Nxrshttps://www.youtube.com/watch?v=ha_O-
	<u>1uOWkk</u> , <u>https://www.youtube.com/watch?v=brF0RWJyx9w</u>	
Unit 2	https://www.youtube.com/watch?v=mOwyPENHhbc,	https://www.youtube.com/watch?v=yqev1G2iy20,
Unit 2	https://www.youtube.com/watch?v=_74S3z3IO_I, https://watch?v=_7S4Z3Z3IO_I, https://www.youtube.com/watch?v=_7S3z3IO_I, h	youtube.com/watch?v=jXVw6M6m2g0
	https://www.youtube.com/watch?v=GK_vRtHJZu4,	https://www.youtube.com/watch?v=b6Ua_zWDH6U,
Unit 3	https://www.youtube.com/watch?v=7tgNamjTRkk,	https://www.youtube.com/watch?v=ErATB1aMiSU,
Unit 5	https://www.khanacademy.org/science/high-school-biology/hs-e	cology/hs-human-impact-on-ecosystems/v/
	conservation-and-the-race-to-save-biodiversity	
	https://www.youtube.com/watch?v=7qkaz8Chell,	https://www.youtube.com/watch?v=NuQE5fKmfME,
Unit 4	https://www.youtube.com/watch?v=9CpAjOVLHII,	https://www.youtube.com/watch?v=yEci6iDkXYw,
	https://www.youtube.com/watch?v=yEci6iDkXYw	
	https://www.youtube.com/watch?v=ad9KhgGw5iA,	https://www.youtube.com/watch?v=nW5g83NSH9M,
Unit 5	https://www.youtube.com/watch?v=xqSZL4Ka8xo,	https://www.youtube.com/watch?v=WAI-hPRoBqs,
	https://www.youtube.com/watch?v=o-WpeyGlV9Y, https://www	v.youtube.com/watch?v=EDmtawhADnY

Course	Cada		LТР	Cuadit
		AOE0361		Credit
Course		Energy Science and Engineering	3 1 0	4
	0	Students will able to learn		
1		to energy systems and renewable energy resources, with		K2, K3
		of the energy field and an emphasis on alternative ener	gy sources	
	and their tech	nnology and application •		
2	society's pres	sent needs and future energy demands, examine convention	onal energy	K2, K3
	sources and s	systems, including fossil fuels and nuclear energy, and the	en focus on	
	alternatives,	renewable energy sources such as solar, biomass (conversi	ions), wind	
	power, wave	s and tidal, geothermal, ocean thermal, hydro and nuclear.		
3	Energy conse	ervation methods will be emphasized from Mechanical E	Engineering	K2, K3
	perspective.			
Pre-req	quisites:		·	
•				
		<b>Course Content / Syllabus</b>		
UNIT-I	r			
• Units betw and 1 proce	s and scales yeen heat and radiation, Int esses, flow	<b>Energy and its Usage</b> of energy use, Mechanical energy, and transport, mechanical energy, Electromagnetic energy: Storage roduction to the quantum, energy quantization, Energy of CO2, Entropy, and temperature, Carnot and St inversion, refrigeration and heat pumps, Internal com-	e, conversion gy in chemic cirling heat	gy: Conversion n, transmission cal systems and engines, Phase
• Units betw and 1 proce chan gas p	s and scales yeen heat and radiation, Int esses, flow age energy co	of energy use, Mechanical energy, and transport, mechanical energy, Electromagnetic energy: Storag roduction to the quantum, energy quantization, Energy of CO2, Entropy, and temperature, Carnot and St proversion, refrigeration and heat pumps, Internal com s, the physics of power plants. Solid-state phenomen	e, conversion gy in chemic firling heat bustion engi	n, transmission cal systems and engines, Phase nes, Steam and
• Units betw and r proce chan gas r and e	s and scales yeen heat and radiation, Int esses, flow age energy co power cycles electrical asp	of energy use, Mechanical energy, and transport, mechanical energy, Electromagnetic energy: Storag roduction to the quantum, energy quantization, Energy of CO2, Entropy, and temperature, Carnot and St proversion, refrigeration and heat pumps, Internal com s, the physics of power plants. Solid-state phenomen	e, conversion gy in chemic firling heat bustion engi	gy: Conversion n, transmission cal systems and engines, Phase nes, Steam and photo, therma
<ul> <li>Units betw and t proce chan gas p and c</li> <li>UNIT-I</li> <li>Fund force Nucl</li> </ul>	s and scales yeen heat and radiation, Int esses, flow age energy co power cycles electrical asp II damental ford es, energy sc lear fusion, N	of energy use, Mechanical energy, and transport, mechanical energy, Electromagnetic energy: Storag- roduction to the quantum, energy quantization, Energy of CO2, Entropy, and temperature, Carnot and St enversion, refrigeration and heat pumps, Internal com- s, the physics of power plants. Solid-state phenomen- ects <b>Nuclear Energy</b> ces in the universe, Quantum mechanics relevant for cales and structure, Nuclear binding energy systema Nuclear fission and fission reactor physics, Nuclear fis	e, conversion gy in chemic irling heat of bustion engina including or nuclear pratics, reaction	gy: Conversion n, transmission eal systems and engines, Phase nes, Steam and photo, therma 7 Hour hysics, nuclea ns and decays
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<ul> <li>Units betw and t proce chan gas p and e</li> <li>Fund force Nucl opera</li> <li>Intro phys Semi of so Gene</li> </ul>	s and scales reen heat and radiation, Int esses, flow age energy co power cycles electrical asp II damental ford es, energy sc lear fusion, N ation and fue III oduction to so sics of semic iconductor ju blar photovol eration Solar IV	of energy use, Mechanical energy, and transport,         mechanical energy, Electromagnetic energy: Storage         roduction to the quantum, energy quantization, Energy         of CO2, Entropy, and temperature, Carnot and St         onversion, refrigeration and heat pumps, Internal comits,         the physics of power plants. Solid-state phenomene         ects         Nuclear Energy         ces in the universe, Quantum mechanics relevant for         cales and structure, Nuclear binding energy systema         uclear fission and fission reactor physics, Nuclear fission         solar Energy         olar energy, fundamentals of solar radiation and its n         onductors, Carrier transport, generation and recomb         unctions: metal-semiconductor junction & p-n junction         taic devices, First Generation Solar Cells, Second Genergy         Conventional & non-conventional energy source	e, conversion gy in chemic irrling heat of bustion engina including or nuclear platics, reaction ssion reactor measurement bination in so on, Essential eneration Sol	gy: Conversion n, transmission cal systems and engines, Phase nes, Steam and photo, therma <b>7 Hour</b> hysics, nuclea ns and decays design, safety <b>9 Hour</b> aspects, Basic emiconductors characteristics lar Cells, Third <b>8 Hour</b>
<ul> <li>Units betw and the procession of the procesis of the procession of the procession of the procession of the</li></ul>	s and scales reen heat and radiation, Int esses, flow ge energy co power cycles electrical asp II damental ford es, energy sc lear fusion, N ation and fue III oduction to so sics of semic iconductor ju olar photovol eration Solar IV ogical energy urces, fluids,	of energy use, Mechanical energy, and transport, mechanical energy, Electromagnetic energy: Storag- roduction to the quantum, energy quantization, Energy of CO2, Entropy, and temperature, Carnot and St onversion, refrigeration and heat pumps, Internal com- s, the physics of power plants. Solid-state phenomen- ects Nuclear Energy ces in the universe, Quantum mechanics relevant for cales and structure, Nuclear binding energy systema fuclear fission and fission reactor physics, Nuclear fis- cycles Solar Energy olar energy, fundamentals of solar radiation and its n onductors, Carrier transport, generation and recomb- unctions: metal-semiconductor junction & p-n junction taic devices, First Generation Solar Cells, Second Ge Cells Conventional & non-conventional energy source y sources and fossil fuels, Fluid dynamics and pov- viscosity, types of fluid flow, lift, Wind turbine d	e, conversion gy in chemic irrling heat of bustion engina including or nuclear protection ssion reactor measurement bination in secon, Essential eneration Sol	gy: Conversion n, transmission cal systems and engines, Phase nes, Steam and photo, therma <b>7 Hour</b> hysics, nuclea ns and decays design, safety <b>9 Hour</b> aspects, Basic emiconductors characteristics lar Cells, Third <b>8 Hour</b> vind, available d design, wind
<ul> <li>Units betw and t proce chan gas r and e</li> <li>UNIT-I</li> <li>Fund force Nucl opera</li> <li>UNIT-I</li> <li>Intro phys Semi of so Gene</li> <li>UNIT-I</li> </ul>	s and scales veen heat and radiation, Int esses, flow age energy co power cycles electrical asp II damental forces, energy sc lear fusion, N ation and fue III oduction to so ics of semic iconductor ju olar photovol eration Solar IV ogical energy urces, fluids, as, Geotherma	of energy use, Mechanical energy, and transport, mechanical energy, Electromagnetic energy: Storag- roduction to the quantum, energy quantization, Energy of CO2, Entropy, and temperature, Carnot and St onversion, refrigeration and heat pumps, Internal com- s, the physics of power plants. Solid-state phenomen- ects <b>Nuclear Energy</b> ces in the universe, Quantum mechanics relevant for cales and structure, Nuclear binding energy systema Nuclear fission and fission reactor physics, Nuclear fis- el cycles <b>Solar Energy</b> plar energy, fundamentals of solar radiation and its n onductors, Carrier transport, generation and recomb- unctions: metal-semiconductor junction & p-n junctio taic devices, First Generation Solar Cells, Second Ge Cells <b>Conventional &amp; non-conventional energy source</b> y sources and fossil fuels, Fluid dynamics and pow	e, conversion gy in chemic irrling heat of bustion engina including or nuclear protection ssion reactor measurement bination in secon, Essential eneration Sol	gy: Conversion n, transmission cal systems and engines, Phase nes, Steam and photo, therma <b>7 Hour</b> hysics, nuclea ns and decays design, safety <b>9 Hour</b> aspects, Basic emiconductors characteristics lar Cells, Third <b>8 Hour</b> vind, available d design, wind

Climate change, Energy storage, Energy conservation. Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts, LEED ratings; Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption.

### **Course outcome:**

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

Levels

CO 1	Understand the various types of energy resources and their	L2
	applications.	
CO 2	Understand the concept of nuclear energy and its applications	L3
CO 3	Understand the fundamentals of solar energy and their applications	L2
CO 4	Describe the conventional and non-conventional energy resources.	L3
CO 5	Apply the energy conservation methods.	L3

## Text books

1. Energy and the Challenge of Sustainability, World Energy Assessment, UNDP, New York, (2000).

**Reference Books** 

1. Perspective of Modern Physics, A. Beiser, McGraw-Hill International Editions (1968).

2. Introduction to Modern Physics, H.S. Mani and G.K.Mehta, East-West Press (1988)

3. Introduction to Electrodynamics, D. J. Griffiths, Fourth Edition, Prentice Hall (2013).

4. Introductory Nuclear Physics, R. K. Puri and V.K. Babbar, Narosa Publishing House (1996).

5. Physics of Solar Cells: From Basic Principles to Advanced Concepts by Peter Wurfel, John Wiley & Sons, 2016

6. Principles of Solar Engineering, D.Y. Goswami, F.Kreith and J.F. Kreider, Taylor and Francis, Philadelphia, 2000.

7. Perspective of Modern Physics, A. Beiser, McGraw-Hill International Editions (1968)

	<b>B. TECH SECOND YEAR</b>			
Course Code	AOE0362	LI	P	Credit
Course Title	Sensor and Instrumentation	3 1	0	4
<b>Course objective:</b>	Student will able to learn			
CO1	The use of sensors for measurement of displacement	, force	K3	
	and pressure.			
CO2	commonly used sensors in industry for measuremen	t of	K3	
	temperature, position, accelerometer, vibration sense	or,		
	flow and level.			
CO3	The Demonstrate the use of virtual instrumentation in	n	K2	
	automation industries.			
<b>CO4</b>	Identify and use data acquisition methods.		K3	
CO5	Comprehend intelligent instrumentation in industrial		K2	
	automation.			
Pre-requisites:				
	Course Content / Syllabus			
UNIT-I				10 Hours
Sensors & Tr	ansducer: Definition, Classification & selection of	sensors	, Meas	urement of
displacement us	sing Potentiometer, LVDT & Optical Encoder, Measure	ement o	f force	using strain
gauge, Measure	ment of pressure using LVDT based diaphragm & piezo	electric	sensor	
UNIT-II				7 Hours
Measurement of	Temperature: Measurement of temperature using The	ermistor	, Thern	nocouple &
RTD, Concept of	thermal imaging, Measurement of position using Hall	effect	sensors	, Proximity
sensors: Inductive	& Capacitive, Use of proximity sensor as accelerom	eter an	d vibra	tion sensor,
Flow Sensors: Ultr	rasonic & Laser, Level Sensors: Ultrasonic & Capacitive			
UNIT-III				9 Hours
Instrumentation	<b>mentation:</b> Graphical programming techniques, Data ty techniques, Concept of WHILE & FOR loops, An e, Sequence & Formula nodes, Need of software based	rays, C	Clusters	& graphs,
UNIT-IV				8 Hours
Types of ADC:	ion Methods: Basic block diagram, Analog and Digi successive approximation and sigma-delta, Types of DA pe, Use of Data Sockets for Networked Communication.	AC: We		
UNIT-V				8 Hours
• Intelligent Se	<b>nsors:</b> General Structure of smart sensors & its com	ponents	, Chara	acteristic of
smart sensors:	Self calibration, Self-testing & self-communicating, Ap ot control & automobile engine control			
<b>Course outcome:</b>				

At the end of the cou	rse the students will be able to	Levels
CO 1	Apply the use of sensors for measurement of displacement,	K2
	force and pressure.	
CO 2	Employ commonly used sensors in industry for measurement	K4
	of temperature, position, accelerometer, vibration sensor,	
	flow and level.	
CO 3	Demonstrate the use of virtual instrumentation in automation	K2
	industries.	
CO 4	Identify and use data acquisition methods.	K3
CO 5	Comprehend intelligent instrumentation in industrial	К3
	automation.	
Text books		
	insducers and Instrumentation, PHI 2nd Edition 2013	
Reference Books		
2. D Patranabis, Ser	nsors and Transducers, PHI 2nd Edition 2013	
3. S. Gupta, J.P. G	Supta / PC interfacing for Data Acquisition & Process Co	ntrol, 2nd ED /
Instrument Society of	f America, 1994.	
4. Gary Johnson / L	ab VIEW Graphical Programming II Edition / McGraw Hill 19	97.

		<b>B. TECH SECOND YEAR</b>				
Course Code	;	AOE0363	L	Т	Р	Credit
<b>Course Title</b>		Basics Data Structure and Algorithms	3	1	0	4
<b>Course objec</b>	tive: S	tudents will able to				
CO1	Aanalyze the time and space complexity of an algorithm		K2,K4			
CO2	understand and implement fundamental algorithms (including		K3			
	sorti	ing algorithms, graph algorithms, and dynam	ic prog	ran	ımin	g)
CO3		Discuss various algorithm design techniques for developing algorithms		K2		
CO4	Discuss various algorithm design techniques for developing		K3			
	algorithms					
CO5	Disc	uss various algorithm design techniques for d	levelopi	ing		K2
	algo	rithms				
Pre-requisite	es:					
		Course Content / Syllabus				
UNIT-I						10 Hours
Introducti	ion to	data structure and Algorithms: Performan	nce ana	lysi	s of	Algorithm, time
complexity	y, Big	-oh notation, Elementary data organizati	ion dat	ta s	struc	ture operations,
Recurrent			_			
ixecui i elle	ces, Al	rrays, Operation on arrays, representation	ı of ar	ray	s in	memory, single
		rrays, Operation on arrays, representation I multidimensional arrays, spare matrices,		-		
	al and			-		
dimension	al and			-		
dimension operations UNIT-II	al and s.		Charac	cter	stor	ing in C, String 7 Hours
dimension operations UNIT-II Stack And	al and s. d Queu	l multidimensional arrays, spare matrices,	Charao d POP,	Ar	stor	ing in C, String 7 Hours representation of
dimension operations UNIT-II Stack And stacks, Op Represent	al and s. d Queu peratio	I multidimensional arrays, spare matrices, le and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue, Priority Queue,	Charac d POP, cs, Recu	cter Ar	stor ray 1 on, P	ing in C, String 7 Hours representation of olish expression,
dimension operations UNIT-II Stack And stacks, Op Represent	al and s. d Queu peratio	l multidimensional arrays, spare matrices, ne and Link List: Stack operation, PUSH an n associated with stacks Application of stack	Charac d POP, cs, Recu	cter Ar	stor ray 1 on, P	ing in C, String 7 Hours representation of olish expression,
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III	al and s. I Queu peratio cation ( , List o	I multidimensional arrays, spare matrices, he and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue , Priority Queue , operations Lists implementations	Charac d POP, cs, Recu D-Que	Ar Ar ursio ue ,	stor ray 1 on, P Sing	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III	al and s. I Queu peratio cation ( , List o	I multidimensional arrays, spare matrices, le and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue, Priority Queue,	Charac d POP, cs, Recu D-Que	Ar Ar ursio ue ,	stor ray 1 on, P Sing	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III Trees : Ba	al and s. l Queu peratio cation ( , List o asic ten	I multidimensional arrays, spare matrices, he and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue , Priority Queue , operations Lists implementations	Charac d POP, cs, Recu D-Que	Ar Ar ursid ue ,	stor ray 1 on, P Sing	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours praic/expressions,
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III Trees : Ba Complete	al and s. d Queu peratio cation ( , List o Asic ten Binar	l multidimensional arrays, spare matrices, le and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue , Priority Queue , operations Lists implementations rminology, Binary Trees, Binary tree repres	Charac d POP, as, Recu D-Que centatio binary	Ar Ar arsid ue , n, A tre	stor ray 1 on, P Sing Algeb ss in	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours praic/expressions, memory, linked
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III Trees : Ba Complete representa	al and s. I Queu peratio cation ( , List o asic ten Binary ation o	I multidimensional arrays, spare matrices, he and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue, Priority Queue, perations Lists implementations rminology, Binary Trees, Binary tree repress y Trees, Extended binary tree, representing	Charac d POP, cs, Recu D-Que sentatio binary urching	cter Ar ursid ue , n, A tre in b	stor ray 1 on, P Sing Algeb ss in oinar	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours praic/expressions, memory, linked y trees, Inserting
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III Trees : Ba Complete representa	al and s. l Queu peratio cation ( , List o asic ten Binary ation o search	I multidimensional arrays, spare matrices, le and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue , Priority Queue , operations Lists implementations rminology, Binary Trees, Binary tree repress y Trees, Extended binary tree, representing f Binary trees, Traversing binary trees & Sea	Charac d POP, cs, Recu D-Que sentatio binary urching	cter Ar ursid ue , n, A tre in b	stor ray 1 on, P Sing Algeb ss in oinar	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours praic/expressions, memory, linked y trees, Inserting
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III Trees : Ba Complete representa in binary	al and s. l Queu peratio cation ( , List o asic ten Binary ation o search	I multidimensional arrays, spare matrices, le and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue , Priority Queue , operations Lists implementations rminology, Binary Trees, Binary tree repress y Trees, Extended binary tree, representing f Binary trees, Traversing binary trees & Sea	Charac d POP, cs, Recu D-Que sentatio binary urching	cter Ar ursid ue , n, A tre in b	stor ray 1 on, P Sing Algeb ss in oinar	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours praic/expressions, memory, linked y trees, Inserting
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III Trees : Ba Complete representa in binary binary tre UNIT-IV • Graphs: Sequential and spann	al and s. d Queu peratio cation ( , List o asic ter Binary ation o search ce. Termi l repre-	I multidimensional arrays, spare matrices, le and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue , Priority Queue , operations Lists implementations rminology, Binary Trees, Binary tree repress y Trees, Extended binary tree, representing f Binary trees, Traversing binary trees & Sea	Charac d POP, as, Recu D-Que eentatio binary urching Heaps, Iultigra ansvers I Krusk	cter Ar ursid ue, fn, A tre in b gen uphs al, c al A	stor ray 1 on, P Sing Algeb ss in binar binar beral s, Di conne Algor	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours 9 Hours 9 Hours 9 raic/expressions, memory, linked y trees, Inserting trees, Threaded 8 Hours irected Graphs, ected component ithm, BFS, DFS,
dimension operations UNIT-II Stack And stacks, Op Represent linked list, UNIT-III Trees : Ba Complete representa in binary binary tre UNIT-IV • Graphs: Sequential and spann	al and s. d Queu peratio cation ( , List o asic ter Binary ation o search e. Termi l repre-	I multidimensional arrays, spare matrices, he and Link List: Stack operation, PUSH an n associated with stacks Application of stack Queue, operation on Queue, Priority Queue, operations Lists implementations rminology, Binary Trees, Binary tree repress y Trees, Extended binary tree, representing f Binary trees, Traversing binary trees & Sea trees, Complexity of searching algorithm, nology & representations, Graphs & Mesentation of graphs, adjacency Matrices, Tra- ees, Minimum Cost spanning tree, Prims and	Charac d POP, as, Recu D-Que eentatio binary urching Heaps, Iultigra ansvers I Krusk	cter Ar ursid ue, fn, A tre in b gen uphs al, c al A	stor ray 1 on, P Sing Algeb ss in binar binar beral s, Di conne Algor	ing in C, String 7 Hours representation of Polish expression, gly and circularly 9 Hours 9 Hours 9 Hours 9 raic/expressions, memory, linked y trees, Inserting trees, Threaded 8 Hours irected Graphs, ected component ithm, BFS, DFS,

sorting, selection sort, Insertion sort, quick sort, Two-way merge sort, Heap sort, sorting on different keys, practical consideration for internal sorting, External Sorting, Storage Devices : Magnetic tapes, Disk Storage, Sorting with disks and Indexing techniques, introduction to B tree and B+ tree, File organization and storage management, Introduction to hoisting.

Course outcome		<b>T 1</b>
At the end of the	e course the students will be able to	Levels
<b>CO 1</b>	Understand and Aanalyze the time and space complexity of	K2
	an algorithm	
CO 2	understand and implement fundamental algorithms	K4
	(including sorting algorithms, graph algorithms, and	
	dynamic programming)	
CO 3	Discribe various algorithm design techniques for developing	K2
	algorithms	
CO 4	Explain various algorithm design techniques for developing	K3
	algorithms	
CO 5	Discuss various algorithm design techniques for developing	K3
	algorithms	

## Text books

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, Introduction to Algorithms, PHI.

2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication.

3. Weiss, "Data Structure & Algorithm Analysis in C", Addision Wesley.

4. Basse, "computer Algorithms: Introduction to Design & Analysis", Addision Wesley.

5. Lipschutz, "Data structure, "Schaum series.

6. Aho, hopcropt, Ullman, "Data Structure & Algorithm", Addision Wesley.

**7. Aho, Hopcraft, Ullman,** "The Design and Analysis of Computer Algorithms" Pearson Education, 2008

Course C	ode	B. TECH SECOND YEAR AOE0364	LTP		Credit
Course T		Introduction to Soft Computing	3 1 0		4
		e:Student will able to	510		-
Course o CO1	- <b>-</b>		zzinag involu	ad in	K2
COI		prehend the fuzzy logic and the concept of fuz ous systems and fuzzy set theory.	ZZIIIESS IIIVOIVO	a m	KZ
CO2		Understand the concepts of fuzzy sets, knowledge representation using			K3
02	fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy				KJ
	logic				
CO3				K4	
00	useful while seeking global optimum in self-learning situations.			IX-T	
<b>CO4</b>		Understand appropriate learning rules for each of the			
001		itectures and learn several neural network	paradigms and	1 its	K3
		ications.	8		
CO5					K5
		ods in Soft Computing Techniques			
Pre-requ					
•					
		Course Content / Syllabus			
UNIT-I					10 Hour
		to Soft Computing			
		L NEURAL NETWORKS	Companying of an	1 T	
	-	s - Single layer perception - Multilayer Perception - ck propagation networks - Kohen's self-organizing i			-
UNIT-II	g – Da	Kohen s sen-organizing i	networks - mop		
	Veve				
		TFMS			
		TEMS	tions - Decom	positie	7 Hour
Fuzzy	sets, F	uzzy Relations and Fuzzy reasoning, Fuzzy func		positio	7 Hour
Fuzzy automa	sets, F ata and			positio	7 Hour
Fuzzy automa	sets, F ata and	Tuzzy Relations and Fuzzy reasoning, Fuzzy func languages - Fuzzy control methods - Fuzzy decision		positio	7 Hour
Fuzzy automa UNIT-III NEUR	sets, F ata and <b>O - FU</b>	Tuzzy Relations and Fuzzy reasoning, Fuzzy func languages - Fuzzy control methods - Fuzzy decision <b>ZZY MODELING</b>	n making.		7 Hour on - Fuzzy 9 Hour
Fuzzy automa UNIT-III NEUR Adapti	sets, F ata and <b>O - FU</b> ve netv	Tuzzy Relations and Fuzzy reasoning, Fuzzy func languages - Fuzzy control methods - Fuzzy decision UZZY MODELING works based Fuzzy interface systems - Classification	n making.	sion T	<b>7 Hour</b> on - Fuzz <u>- <b>9 Hour</b></u> rees - Data
Fuzzy automa UNIT-III NEUR Adapti cluster	sets, F ata and <b>O - FU</b> ve netv ing alg	Puzzy Relations and Fuzzy reasoning, Fuzzy function         languages - Fuzzy control methods - Fuzzy decision         VZZY MODELING         works based Fuzzy interface systems - Classification         orithms - Rule based structure identification - Network	n making.	sion T	7 Hour on - Fuzz <u>-</u> 9 Hour rees - Data
Fuzzy automa UNIT-III NEUR Adapti cluster	sets, F ata and <b>O - FU</b> ve netv ing alg	Tuzzy Relations and Fuzzy reasoning, Fuzzy func languages - Fuzzy control methods - Fuzzy decision UZZY MODELING works based Fuzzy interface systems - Classification	n making.	sion T	7 Hour on - Fuzzy 9 Hour rees - Data Simulated
Fuzzy automa UNIT-III NEUR Adapti cluster anneal UNIT-IV	sets, F ata and <b>O - FU</b> ve netv ing alg ing – E	Puzzy Relations and Fuzzy reasoning, Fuzzy function         languages - Fuzzy control methods - Fuzzy decision         VZZY MODELING         works based Fuzzy interface systems - Classification         orithms - Rule based structure identification - Network	n making.	sion T	7 Hour on - Fuzzy 9 Hour rees - Data Simulated
Fuzzy automa UNIT-III NEUR Adapti cluster anneal UNIT-IV GENE	sets, F ata and O - FU ve netv ing alg ing – E	Puzzy Relations and Fuzzy reasoning, Fuzzy function         languages - Fuzzy control methods - Fuzzy decision         VZZY MODELING         works based Fuzzy interface systems - Classification         orithms - Rule based structure identification - Netwolutionary computation	n making. on and Regress ouro-Fuzzy con	sion Tr trols -	7 Hour on - Fuzzy 9 Hour rees - Data Simulated 8 Hour
Fuzzy automa UNIT-III Adapti cluster anneal UNIT-IV GENE Surviv	sets, F ata and <b>O - FU</b> ve netv ing alg ing – E <b>TIC A</b> al of th	Puzzy Relations and Fuzzy reasoning, Fuzzy function         languages - Fuzzy control methods - Fuzzy decision         VZZY MODELING         vorks based Fuzzy interface systems - Classification         orithms - Rule based structure identification - Netwolutionary computation         LGORITHMS	n making. on and Regress ouro-Fuzzy con	sion Tr trols -	7 Hour on - Fuzz <u></u> 9 Hour rees - Data Simulated 8 Hour
Fuzzy automa UNIT-III Adapti cluster anneal UNIT-IV GENE Surviv	sets, F ata and <b>O - FU</b> ve netv ing alg ing – E <b>TIC A</b> al of th	Puzzy Relations and Fuzzy reasoning, Fuzzy function         languages - Fuzzy control methods - Fuzzy decision         VZZY MODELING         works based Fuzzy interface systems - Classification         orithms - Rule based structure identification - Netwolutionary computation         LGORITHMS         ne Fittest - Fitness Computations - Cross over - Network	n making. on and Regress ouro-Fuzzy con	sion Tr trols -	7 Hour on - Fuzzy 9 Hour rees - Data Simulated 8 Hour
Fuzzy automa UNIT-III Adapti cluster anneal UNIT-IV GENE Surviv methoo	sets, F ata and <b>O - FU</b> ve netwing alg ing – E <b>TIC A</b> al of th d - Ran	Puzzy Relations and Fuzzy reasoning, Fuzzy function         languages - Fuzzy control methods - Fuzzy decision         VZZY MODELING         works based Fuzzy interface systems - Classification         orithms - Rule based structure identification - Netwolutionary computation         LGORITHMS         ne Fittest - Fitness Computations - Cross over - Network	n making. on and Regress ouro-Fuzzy con	sion Tr trols -	7 Hour on - Fuzzy 9 Hour rees - Data Simulated 8 Hour ion - Ranl

Internet Search Techniques, Soft computing-based hybrid fuzzy controller, Introduction to MATLAB Environment for Soft computing Techniques.

**Course outcome:** At the end of thecourse the students will be able to Levels **CO1** Describe fuzzy logic and the concept of fuzziness involved in K2 various systems and fuzzy set theory. **CO 2** Apply the concepts of fuzzy sets, knowledge representation K4 using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic **CO3** Apply the concept of genetic algorithms and other random K2 search procedures useful while seeking global optimum in selflearning situations. **CO**4 Understand appropriate learning rules for each of the K3 architectures and learn several neural network paradigms and its applications. Develop familiarity with current research problems . K3 **CO 5** 

**Text books** 

1. An Introduction to Genetic Algorithm Melanic Mitchell (MIT Press)

2. Evolutionary Algorithm for Solving Multi-objective, Optimization Problems (2nd Edition), Collelo, Lament, Veldhnizer (Springer)

3. Fuzzy Logic with Engineering Applications Timothy J. Ross (Wiley)

4. Neural Networks and Learning Machines Simon Haykin (PHI)

5. Sivanandam, Deepa, "Principles of Soft Computing", Wiley

6. Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall

7. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill

8. Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall

9. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley

10. Wang, "Fuzzy Logic", Springer

	<b>B. TECH SECOND YEAR</b>			
Course Code	AOE0365	LTP	Credit	
Course Title	Analog Electronics Circuits	3 1 0	4	
Course objectiv	e: Students will learn	L I		
CO1	The characteristics of diodes and transistors.		K2	
CO2	various rectifier and amplifier circuits		К3	
CO3	sinusoidal and non-sinusoidal oscillators.		K4	
CO4	The functioning of OP-AMP and design OP-AMP based circuits.		К3	
CO5	LPF, HPF, BPF, BSF.		K5	
Pre-requisites:				
•				
	Course Content / Syllabus		-	
UNIT-I	its, amplifier models: Voltage amplifier, cu		10 Hours	
stability, vari analysis, low	I trans-resistance amplifier. biasing schemes for ous configurations (such as CE/CS, CB/CG, CC/C frequency transistor models, estimation of vol c., design procedure for particular-specification pulifiers.	CD) and their fea tage gain, input	tures, small signal resistance, output	
UNIT-II			7 Hours	
efficiency and current shunt	scade amplifier, various classes of operation (Cl d linearity issues, feedback topologies: Voltage s c, effect of feedback on gain, bandwidth etc., o	eries, current sei	ries, voltage shunt,	
-	bility, gain margin and phase margin		0.11	
UNIT-III			9 Hours	
	Review of the basic concept, Barkhuizen criterior		-	
	LC oscillators (Hartley, Colpitts, Clapp etc.), non-	sinusoidal oscill		
UNIT-IV		· · .· .	8 Hours	
minimum sustai and principle of	<b>r:</b> Basic topology and its variants, V-I chan nable voltage (VON), maximum usable load, dif operation, calculation of differential gain, comm : Design of differential amplifier for a given spec ompensation	ferential amplifi on mode gain, (	er: Basic structure CMRR and ICMR,	
UNIT-V	1		8 Hours	
differentiator, su filters: Low pass <b>Course outcom</b> At the end of the	course the students will be able to	rigger and its a elines.	pplications, active Levels	
CO 1	Understand the characteristics of diodes and transist	ors.	K2	

CO 2	Design and analyze various rectifier and amplifier circuits	K4
CO 3	Design sinusoidal and non-sinusoidal oscillators.	K2
CO 4	Understand the functioning of OP-AMP and design OP-AMP based	K3
	circuits.	
CO 5	Design LPF, HPF, BPF, BSF.	K3

### **Text books**

1. J.V. Wait, L.P. Huelsman and GA Korn, "Introduction to Operational Amplifier theory and applications," McGraw Hill, 1992.

2. J. Millman and A. Grabel, "Microelectronics," 2ndedition, McGraw Hill, 1988.

3.P. Horowitz and W. Hill, "The Art of Electronics," 2ndedition, Cambridge University Press, 1989.

4. A.S. Sedra and K.C. Smith, "Microelectronic Circuits, "Saunder's College11 Publishing, 4th edition.

5. Paul R. Gray and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits," John Wiley, 3rd edition

6. Muhammad H. Rashid, "Electronic Devices and Circuits," Cengage publication, 2014.

	B TECH SECOND YEAR			
Course Code	AOE0366	LT	P	Credit
<b>Course Title</b>	Electronics Engineering	3 1	0	4
Course objectiv	e:Students will learn			
CO1	the concept of PN junction and special purpose	diodes		K2
CO2	The application of conventional diode and	semicond	luctor	K3
	diode.			
CO3	The I-V characteristics of BJT and FET			K4
CO4	The of Op-Amp, amplifiers, integrator, and diffe	erentiator		K3
CO5	The concept of digital storage oscilloscope ar	nd compa	are of	K5
	DSO with analog oscilloscope			
Pre-requisites:				
•				
	Course Content / Syllabus			
UNIT-I				10 Hours
P-N junctior	diode: Introduction of semiconductor materials	; Semico	nducto	r diode: Depletion
layer, V-I ch	aracteristics, ideal and practical, diode resistan	ice, capa	citance	, diode equivalen
circuits, trans	ition and diffusion capacitance, Zener diodes b	reakdow	n mecł	nanism (Zener and
avalanche)				
UNIT-II				7 Hours
purpose two	clippers, clampers, Zener diode as shunt regulator,	voltage-	multin	
	terminal devices : light-emitting diodes, Varactor	-	-	
liquidcrystal		-	-	des, tunnel diodes,
UNIT-III	lisplays.	r (Varica	p) dioo	des, tunnel diodes
UNIT-III Bipolar junc	displays. tion transistors and field effect transistor: Bip	r (Varica olar junc	p) dioo	des, tunnel diodes 9 Hours ansistor: Transistor
UNIT-III Bipolar junc construction,	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co	r (Varica olar junc	tion tra	des, tunnel diodes 9 Hours ansistor: Transistor common collector
UNIT-III Bipolar junc construction, configuration	tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias,	r (Varica olar junc ommon e emitter b	tion tra mitter,	des, tunnel diodes 9 Hours ansistor: Transistor common collector oltage-divider bias
UNIT-III Bipolar junc construction, configuration configuration	tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, . Collector feedback, emitter-follower configuration	r (Varica olar junc ommon e emitter b on. Bias s	tion tra mitter, pias, vo	des, tunnel diodes 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC
UNIT-III Bipolar junc construction, configuration configuration amplifiers an	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, . Collector feedback, emitter-follower configuration d AC analysis of single stage CE amplifier (reference)	r (Varica olar junc ommon e emitter b on. Bias s e Model)	tion tra mitter, bias, vo stabiliz	des, tunnel diodes 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC d effect transistor
UNIT-III Bipolar junc construction, configuration configuration amplifiers an Construction	tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configuration d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a	r (Varica olar junc ommon e emitter b on. Bias s e Model)	tion tra mitter, bias, vo stabiliz	des, tunnel diodes, 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC d effect transistor
UNIT-III Bipolar junc construction, configuration configuration amplifiers an Construction enhancement	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, . Collector feedback, emitter-follower configuration d AC analysis of single stage CE amplifier (reference)	r (Varica olar junc ommon e emitter b on. Bias s e Model)	tion tra mitter, bias, vo stabiliz	des, tunnel diodes, 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC 1 effect transistor: FET (depletion and
UNIT-III Bipolar junc construction, configuration configuration amplifiers an Construction enhancement UNIT-IV	tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configuration d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic.	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier,	p) diod tion tra mitter, bias, vo stabiliz ), Field MOSF	des, tunnel diodes 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC 1 effect transistor FET (depletion and 8 Hours
UNIT-III Bipolar junc construction, configuration configuration amplifiers an Construction enhancement UNIT-IV Operational a	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configurations d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic. mplifiers: Introduction and block diagram	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier,	tion tra mitter, bias, vo stabiliz ), Fielo MOSF	des, tunnel diodes           9 Hours           ansistor: Transistor           common collector           oltage-divider bias           ation. CE, CB, CC           d effect transistor           FET (depletion and           8 Hours           deal & practical
UNIT-III Bipolar junc construction, configuration amplifiers an Construction enhancement UNIT-IV Operational a characteristics of	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configurations d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic. mplifiers: Introduction and block diagram of of Op-Amp, differential amplifier circuits, prace	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier, of Op-A tical Op	tion tra mitter, bias, vo stabiliz ), Fielo MOSF	des, tunnel diodes 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC d effect transistor FET (depletion and 8 Hours deal & practica circuits (inverting
UNIT-III Bipolar junc construction, configuration amplifiers an Construction enhancement UNIT-IV Operational a characteristics of amplifier, non-	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configurations d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic. mplifiers: Introduction and block diagram of of Op-Amp, differential amplifier circuits, prac- inverting amplifier, unity gain amplifier,	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier, of Op-A tical Op summing	tion tra mitter, bias, vo stabiliz ), Fielo MOSF MOSF	des, tunnel diodes 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC d effect transistor FET (depletion and 8 Hours deal & practica circuits (inverting olifier, integrator
UNIT-III Bipolar junc construction, configuration amplifiers an Construction enhancement UNIT-IV Operational a characteristics of amplifier, non- differentiator), (	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configurations d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic. mplifiers: Introduction and block diagram of of Op-Amp, differential amplifier circuits, prac- inverting amplifier, unity gain amplifier, DpAmp parameters: input offset voltage, output of	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier, of Op-A tical Op summing	tion tra mitter, bias, vo stabiliz ), Fielo MOSF MOSF	des, tunnel diodes 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC d effect transistor FET (depletion and 8 Hours deal & practica circuits (inverting olifier, integrator
UNIT-III Bipolar junc construction, configuration amplifiers an Construction enhancement UNIT-IV Operational a characteristics of amplifier, non- differentiator), O input offset curre	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configurations d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic. mplifiers: Introduction and block diagram of of Op-Amp, differential amplifier circuits, prac- inverting amplifier, unity gain amplifier,	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier, of Op-A tical Op summing	tion tra mitter, bias, vo stabiliz ), Fielo MOSF MOSF	des, tunnel diodes, 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC d effect transistor: FET (depletion and 8 Hours deal & practical circuits (inverting olifier, integrator, put biased current,
UNIT-III Bipolar junc construction, configuration amplifiers an Construction enhancement UNIT-IV Operational a characteristics of amplifier, non- differentiator), C input offset curre UNIT-V	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configurations d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic. mplifiers: Introduction and block diagram of Op-Amp, differential amplifier circuits, prace inverting amplifier, unity gain amplifier, DpAmp parameters: input offset voltage, output of ent differential and common-mode operation.	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier, of Op-A tical Op summing ffset volt	p) diod tion tra mitter, bias, vo stabiliz ), Field MOSF MOSF amp, i -Amp g amp age, in	des, tunnel diodes, 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC 1 effect transistor: FET (depletion and 8 Hours deal & practical circuits (inverting olifier, integrator; put biased current; 8 Hours
UNIT-III Bipolar junc construction, configuration amplifiers an Construction enhancement UNIT-IV Operational a characteristics of amplifier, non- differentiator), O input offset curre UNIT-V Electronic instr	displays. tion transistors and field effect transistor: Bip operation, amplification action, common base, co dc biasing BJTs: operating point, fixed-bias, Collector feedback, emitter-follower configurations d AC analysis of single stage CE amplifier (re and characteristic of JFETs. AC analysis of CS a type, transfer characteristic. mplifiers: Introduction and block diagram of of Op-Amp, differential amplifier circuits, prac- inverting amplifier, unity gain amplifier, DpAmp parameters: input offset voltage, output of	r (Varica olar junc ommon e emitter b on. Bias s e Model) mplifier, of Op-A tical Op summing ffset volt er: Introd	p) diod tion tra mitter, oias, vo stabiliz ), Field MOSF mp, i -Amp g amp age, in uction,	des, tunnel diodes, 9 Hours ansistor: Transistor common collector oltage-divider bias ation. CE, CB, CC 1 effect transistor: FET (depletion and 8 Hours deal & practical circuits (inverting olifier, integrator; put biased current; 8 Hours RAMP techniques

oscilloscope, simple, measurement of voltage, current phase and frequency using CRO, introduction of digital storage oscilloscope and comparison of DSO with analog oscilloscope.

### **Course outcome:**

At the end of the	course the students will be able to	Levels
CO 1	Understand the concept of PN junction and special purpose	K2
	diodes	
CO 2	Study the application of conventional diode and semiconductor	K4
	diode.	
CO 3	Analyse the I-V characteristics of BJT and FET	K2
<b>CO 4</b>	Analyze the of Op-Amp, amplifiers, integrator, and differentiator.	К3
CO 5	Understand the concept of digital storage oscilloscope and compare of DSO with analog oscilloscope	К3
Text books		•
1 Dohowt I Dovi	estand / Lovis Nacholaby, "Electronic Devices and Circuit Theory	"Latast Edition

1. Robert L. Boylestand / Louis Nashelsky, "Electronic Devices and Circuit Theory," Latest Edition, Pearson Education

2. H.S Kalsi, "Electronic Instrumentation", Latest Edition, TMH Publication.

3. Meetidehran/ A.K. singh "fundamental of electronics Engineering", New age international publisher.

	B.TECH. SECOND YEAR			
Course Code	AAS0401B		)	Credits
Course Title	Engineering Mathematics-III	3 1 0		4
Course Objective: The	student will learn about			
	complex variables, Partial differential equations			
	nathematical tasks and numerical aptitude. It ain			
	ools from B. Tech to deal with advanced level of	f mathematics	and applic	ations that
would be essential for th	1			
	edge of Mathematics I and II of B. Tech or eq	luivalent		
Course Contents / Syll				
UNIT-I	<b>Complex Variable – Differentiation</b>		8 Hours	
	ifferentiability, Functions of complex variable, A			
	d Polar form), Harmonic function, Method to fir	nd Analytic fun	ctions, Co	onformal
	formation and their properties.			
	Complex Variable –Integration		8 Hours	
	tour integrals, Cauchy- Goursat theorem, Cauch			
	lles's theorem, Singularities, Classification of S			
	ethods of finding residues, Cauchy Residue theory	rem, Evaluation	n of real ir	ntegrals of
the type $\int_0^{2\pi} f(\sin \theta)$	$\theta, \cos \theta) d\theta$ and $\int_{-\infty}^{\infty} f(x) dx$ .			
	Partial Differential Equation and its Applica		8 Hours	
Introduction of partial d	ifferential equations, Second order linear partial	l differential eq	uations w	
Introduction of partial d coefficients. Classificati	lifferential equations, Second order linear partial ion of second order partial differential equations	l differential eq s, Method of se	uations wi	f variables
Introduction of partial d coefficients. Classificati for solving partial differ	ifferential equations, Second order linear partial	l differential eq s, Method of se	uations wi	f variables
Introduction of partial d coefficients. Classificati for solving partial differ equations.	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen	l differential eq s, Method of se	uations wiparation of heat con	f variables
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen Integral Transforms	l differential eq s, Method of se nsional wave ar	uations w paration o nd heat cor <b>8 Hours</b>	f variables nduction
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfe	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem	l differential eq s, Method of se nsional wave ar s, Fourier sine	parations with paration of the paration of the paration of the paratic of the par	f variables iduction e transform
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfe Applications of Fourier	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf	l differential eq s, Method of se nsional wave ar s, Fourier sine	parations with paration of the paration of the paration of the paratic of the par	f variables iduction e transform
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applica	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations.	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar	parations with paration of ad heat con <b>8 Hours</b> and cosine and wave ec	f variables iduction e transform
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applic. UNIT-V	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen Integral Transforms orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. Aptitude-III	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar	parations wiparation of heat conditions wiparation of heat conditions and cosine and cosine and wave ecos <b>8 Hours</b>	f variables nduction e transform quations, Z-
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applic UNIT-V Time & Work, Pipe & C	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations.	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar	parations wiparation of heat conditions wiparation of heat conditions and cosine and cosine and wave ecos <b>8 Hours</b>	f variables nduction e transform quations, Z-
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applications UNIT-V Time & Work, Pipe & C Calendar.	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen Integral Transforms orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Stream	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar n, Sitting Arrar	parations wiparation of heat conditions wiparation of heat conditions and cosine and cosine and wave ecos <b>8 Hours</b>	f variables nduction e transform quations, Z-
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applic UNIT-V Time & Work, Pipe & C Calendar. Course Outcomes: Aft	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen Integral Transforms orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Stream er completion of this course students will be abl	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar n, Sitting Arrar	uations wiparation on the definition of the defi	f variables nduction e transform quations, Z- Clock &
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applic UNIT-V Time & Work, Pipe & C Calendar. Course Outcomes: Aft	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen Integral Transforms orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Stream	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar n, Sitting Arrar	uations wiparation on the definition of the defi	f variables nduction e transform quations, Z-
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applic UNIT-V Time & Work, Pipe & C Calendar. Course Outcomes: Aft CO Apply the worki 1	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen Integral Transforms orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. Aptitude-III Cistern, Time, Speed & Distance, Boat & Stream er completion of this course students will be abl ing methods of complex functions for finding an	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar n, Sitting Arrar le to nalytic function	uations wiparation on the total of total o	f variables nduction e transform quations, Z- Clock & K <sub>3</sub>
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Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applic UNIT-V Time & Work, Pipe & C Calendar. Course Outcomes: Aft CO Apply the worki 1 CO Apply the conce 2 evaluation of de	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. <b>Aptitude-III</b> Cistern, Time, Speed & Distance, Boat & Stream er completion of this course students will be abl ing methods of complex functions for finding an epts of complex functions for finding Taylor's se finite integrals	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar n, Sitting Arran le to nalytic function eries, Laurent's	uations wiparation on the total of total o	f variables nduction e transform quations, Z- Clock & K <sub>3</sub>
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Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applications UNIT-V Time & Work, Pipe & C Calendar. Course Outcomes: Aft CO Apply the worki 1 CO Apply the conce 2 evaluation of de CO 3 Equations and p	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. <b>Aptitude-III</b> Cistern, Time, Speed & Distance, Boat & Strean er completion of this course students will be abl ing methods of complex functions for finding an epts of complex functions for finding Taylor's se finite integrals ept of partial differential equation to solve partial roblems concerned with partial differential equa	l differential eq s, Method of se nsional wave ar s, Fourier sine fer equations ar n, Sitting Arran le to nalytic function eries, Laurent's l differential ations	uations wiparation on the total of to	f variables nduction e transform quations, Z- Clock & K <sub>3</sub> I K <sub>3</sub> K <sub>4</sub>
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Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applica UNIT-V Time & Work, Pipe & C Calendar. Course Outcomes: Aft CO Apply the worki 1 CO Apply the conce 2 evaluation of de CO Apply the conce 3 Equations and p CO Apply the conce 4	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two diment <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. <b>Aptitude-III</b> Cistern, Time, Speed & Distance, Boat & Stream er completion of this course students will be abl ing methods of complex functions for finding an epts of complex functions for finding Taylor's se finite integrals ept of partial differential equation to solve partial roblems concerned with partial differential equa- ept of fourier transform and Z-transform to solve	l differential eq s, Method of se asional wave ar s, Fourier sine fer equations ar n, Sitting Arran le to alytic function eries, Laurent's l differential ations e difference equ	uations wiparation on the total of to	f variables nduction e transform quations, Z Clock & K <sub>3</sub> 1 K <sub>3</sub> 1 K <sub>4</sub> K <sub>4</sub>
Introduction of partial d coefficients. Classificati for solving partial differ equations. UNIT- IV Complex Fourier transfor Applications of Fourier transform and its applic. UNIT-V Time & Work, Pipe & C Calendar. Course Outcomes: Aft CO Apply the worki 1 CO Apply the worki 1 CO Apply the conce 2 evaluation of de CO Apply the conce 3 Equations and p CO Apply the proble	ifferential equations, Second order linear partial ion of second order partial differential equations rential equations, Solution of one and two dimen <b>Integral Transforms</b> orm, Inverse Transforms, Convolution Theorem transform to simple one dimensional heat transf ation to solve difference equations. <b>Aptitude-III</b> Cistern, Time, Speed & Distance, Boat & Strean er completion of this course students will be abl ing methods of complex functions for finding an epts of complex functions for finding Taylor's se finite integrals ept of partial differential equation to solve partial roblems concerned with partial differential equa	l differential eq s, Method of se asional wave ar s, Fourier sine fer equations ar n, Sitting Arran le to alytic function eries, Laurent's l differential ations e difference equ	uations wiparation on the total of to	f variables nduction e transform quations, Z- Clock & K <sub>3</sub> I K <sub>3</sub> K <sub>4</sub>

(1) D V D	Jamene Higher Engineering Methametics Tota McCrew Hill Publishing Company Ltd. 2008
	Lamana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
	rewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
	in & S R K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House 2002.
(4) E. Krey	vszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.
Reference	
Peter V. O	'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
Ray Wylie	C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.
NPTEL/ Y	ouTube/ Faculty Video Link:
	https://www.youtube.com/playlist?list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL
	https://www.youtube.com/playlist?list=PLbMVogVj5nJS_i8vfVWJG16mPcoEKMuWT
	https://youtu.be/b5VUnapu-qs
Unit 1	https://youtu.be/yV_v6zxADgY
	https://youtu.be/2ZBcbFhrfOg
	https://youtu.be/dlK0E0OG39k
	https://youtu.be/qjpLIIVo_6E
	https://youtu.be/bkzKVsIEjxk
	https://youtu.be/nDD16hiutdc
	https://youtu.be/2kyBOVfflHw
	https://youtu.be/uliv9TzeD6o
Unit 2	https://youtu.be/pulsluT8Uwk
	https://youtu.be/VBAeogiKH2A
	https://youtu.be/Mpmlk1H1aQo
	https://youtu.be/z03usEpsHRU
	https://youtu.be/fXybLUFmQBQ
	https://youtu.be/kZ7Oa7iMiCs
	https://youtu.be/rj2Mb7JGyHk
	https://youtu.be/zpxe5yoB0xg
Unit 3	https://youtu.be/MN4gUtsr0e8
om 5	https://youtu.be/Gmlcbqdvlgc
	https://youtu.be/eSKz2N0tKaA
	https://youtu.be/iiTOw0JqQFc
	https://youtu.be/M4U-T9jsNKQ
	https://youtu.be/QH2WL92bzLs
	https://youtu.be/DGmNbs5Cywo
	https://youtu.be/FliKUWUVrEI
	https://youtu.be/7eHuQXMCOvA
	https://youtu.be/ZkvQR3ajm3k
Unit 4	https://youtu.be/zdyUwzOm1zw
	https://youtu.be/BBuV14-isyU
	https://youtu.be/xPr7YFSnmiQ
	https://youtu.be/ajJD0Df5CsY
	https://youtu.be/iviiGB5vxLA
	https://youtu.be/Ym1EUjTWMnE
Unit 5	https://www.youtube.com/playlist?list=PLFqNfk5W2ZuzjUsRqDp1Zj3S8n9yfdmN9
	https://youtu.be/x3SEYdBUGaA

	<b>B. TECH. SECOND YEAR</b>		
Course Co	ode AASL0401	LTP	Credit
Course Ti	tle Technical Communication	2 1 0	3
Course ob	jective: The student will learn		l
1 com	nunication and critical thinking skills necessary for securing a job rese and ever-changing workplace of the twenty first century	o, and succeed	ing in the
2 To en	nable students to communicate effectively in English at the workp	olace.	
Pre-requis	sites:		
•	The student must have a good degree of control over simple g omplex grammatical forms of English language. The student should be able to speak English intelligibly.	grammatical f	orms and some
	<b>Course Content / Syllabus</b>		
UNIT-I	Introduction to Technical Communication and	l Reading	4 Hours
•	Fundamentals of technical communication Role of technical communication Reading Comprehension - central idea, tone, and intention Critical reading strategies		
UNIT-II	Technical Writing 1		5 Hours
•	Characteristics of technical writing; technical vocabulary, etyn Business letters /emails – types, format, style and language Notices, agenda and minutes Job application, CV and resume		
UNIT-III	Technical Writing 2		5 Hours
•	Technical reports – types & formats Structure of a report Technical Proposal - structure and types Technical/ Scientific paper writing		
UNIT-IV	Public Speaking		5 Hours
•	Components of effective speaking (emphasis on voice dynamic Seminar and conference presentation Conducting/ participating in meetings Appearing for a job interview Mobile etiquettes	cs)	
UNIT-V	Manuscript Preparation		5 Hours
•	Short report writing Copy editing and referencing Developing writing style – Jargons, Abbreviations Ethical writing	1	
Course ou	tcome: At the end of the course the students will be able to Lev	/els.	
	omprehend the fundamental principles of technical com secial reference to reading.	munication	with K2

CO 2	Write various kinds of professional correspondence.	K5
CO 3	Recognise and produce different kinds of technical documents.	K2
CO 4	Apply effective speaking skills to communicate at the workplace.	К3
CO 5	Demonstrate their understanding of various ethical concerns in written communication.	К3

#### Textbook:

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.

### **Reference Books:**

1. Personality Development and Soft Skills by Barun K Mitra, Oxford Univ. Press, 2012, New Delhi.

2. Spoken English- A Manual of Speech and Phonetics by R K Bansal & J B Harrison, Orient Blackswan, 2013, New Delhi.

3. Business Correspondence and Report Writing by Prof. R C Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.

4. Practical Communication: Process and Practice by L U B Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.

5. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; USA.

6. A Textbook of Scientific and Technical Writing by S D Sharma; Vikas Publication, Delhi.

7. Skills for Effective Business Communication by Michael Murphy, Harvard University, USA.

8. A Complete Guide to Write Right by Agarwal, Deepa. Scholastic, 1<sup>st</sup> edition.

9. Technical writing and communication, R S Sharma, V.P. Publication, 1<sup>st</sup> edition.

10. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

		<b>B. TECH. SECOND YEAR</b>					
Course Co	ode	AME0402	L	Т	Р	Credit	
Course Ti	tle	Fluid Mechanics & Machines	3	1	0	4	
Course ob	jectiv	e: The student will learn about					
1 the a	pplicat	ion of mass and momentum conservation laws for fluid flo	ows.				
2 the in							
3 the velocity and pressure variations in various types of simple flows.							
4 the t	flow in	water pumps and turbines.					
Pre-requis	sites:						
	studen ulation	t should have basic knowledge of general laws of S s.	Scienc	e a	nd M	lathematical	
		<b>Course Content / Syllabus</b>					
UNIT-I		Fluid properties				10 Hours	
specific vol Pressure Sca	ume, s ale, ma	Newton's law of viscosity, Units and dimensions-Propert pecific gravity, viscosity, compressibility and surface mometers, buoyancy, Bernoulli's equation and its applic er and bend meter, Magnus effect, notches and weirs, Hydr	tensio ations	n, C 5 - F	Capill Pitot 1	arity effect, tube, orifice	
UNIT-II		Fluid Flow Analysis				8 Hours	
sonic and su flows, stream circulation	person mlines, and vo	tational and irrotational flows, compressible and incom ic flows, sub-critical, critical and supercritical flows, one, path lines, streak lines and flow net, continuity equat prticity, stream function and velocity potential function orem, important dimensionless numbers and their significa	two- a ion ar 1. Dra	nd t nd a	hree- pplica	dimensional ations (3D),	
UNIT-III	<u> </u>	Pipe Flow and Boundary Layer Analysis				8 Hours	
scale and int losses, pipe reservoir pr laminar bou	tensity in ser oblems indary	n for laminar flow through pipes, turbulent flow, isotropi of turbulence, measurement of turbulence, eddy viscosity ies and parallel, power transmission through a pipe, sip and pipe networks. Boundary layer thickness, bounda layer, application of momentum equation, turbulent bo d its control.	v, resis bhon, ry lay	stand wate	ce to er hai over	flow, minor mmer, three a flat plate,	
UNIT-IV		Prime Movers and Thrust Analysis				8 Hours	
surface, hing details, Velo Kaplan turbi Unit and spe <b>UNIT-V</b> Classificatio centrifugal p	ged sur pocity tr ines, Co ecific sp ons of pumps,	on and its applications, Introduction to hydrodynamic thru face and series of vanes, Classification of turbines, Impul iangles, Power and efficiency calculations, Governing of onstructional details, Velocity triangles, Power and efficience peed, Performance characteristics, Selection of water turbin Fluid Pumps and devices centrifugal pumps, Vector diagram, Work done by Specific speed, Cavitation & separation, Performance ch	lse tur Pelto ncy Pr nes. impe aracte	bine n w inci llor, risti	es, Co heel. ples o Eff cs. R	<ul> <li>A structional Francis and of similarity,</li> <li>A structure of similarity,</li> <li>B structure of single of similarity,</li> </ul>	
reciprocating Vacuum pur	g pum nps, Pr	Indicator diagram, Effect of acceleration, air vessels, Corps, Performance characteristics, Hydraulic lifts, torque essure regulators, Introduction to Compressors	conv				
Course ou		e: At the end of the course the students will be able to Le	veis.				

CO 1	Define the fluid properties, types of flow and to apply Bernoulli's equation in	K2
	different devices.	
CO 2	Mathematically analyze simple flow problems and dimensional analysis.	K4
CO 3	Apply the Equation of Motion for laminar and turbulent flow, to calculate loss of	K2
	head in pipe flows and to analyze the Boundary Layer Phenomena.	
CO 4	Calculate impact of jet, classify different turbines and to evaluate the performance	К3
	of Turbines.	
CO 5	Distinguish different pumps and to evaluate the performance of Pumps.	К3
Referen	nce Books:	
1. Introdu	action to fluid mechanics and Fluid machines by S.K. Som, Gautam Biswas, S Chakrab	oorty.
2. F. M. '	White, Fluid Mechanics, 6th Ed., Tata McGraw-Hill, 2008.	
3. Fluid I	Mechanics and Its Applications by V.K.Gupta et.al.	
4. Fluid I	Mechanics by YunusCengel.	
5. Batche	elor, G. K. (1999). Introduction to fluid dynamics. New Delhi, India: Cambridge U	niversity
Press.	7. Acheson, D. J. (1990). Elementary fluid dynamics. New York, USA: Oxford U	niversity
Press.		
6. R.W. 1	Fox, A.T. McDonald and P.J. Pritchard, Introduction to Fluid Mechanics, 6th Ed., Joh	n Wiley,
2004.		

7. Fluid mechanics and machines by R.K Bansal.

Cou	rse Code	AME0404	LTP	Credit
Cou	rse Title	Applied Thermodynamics	300	3
Cou	rse objecti	ve: The student will		
1	To learn al	bout of fuels and heating value of fuels.		
2	To learn al	bout the components and working of boilers and conden	isers,	
3	To learn al	bout gas and vapor cycles and their first law and second	law efficiencies.	
4	To learn al	bout gas dynamics of air flow and steam through nozzle	s and analyze the	performance
	of steam tu	urbines.		
5	To learn al	bout the analysis of the reciprocating compressors and	gas turbines.	
Pre-	-requisites:			
		Course Content / Syllabus		
UNI	[ <b>T-I</b>	Fuels and combustions Analysis		10 Hours
analy temp	sis and vice	vsis, analysis of combustion reactions (conversion of versa), Calorific value, Combustion efficiency, standard andard heat of reaction, heat of formation, Fuel prop	d heat of reaction	and effect o
flam				ry, Adiabatio
UNI Boile	e temperature [ <b>T-II</b> e <b>rs</b> : Classifi	Alternative fuels, blended fuels. Introduction to nuclea Boilers and condensers cations and working of boilers, High pressure and s	ar fuels. uper critical boild	8 Hours ers: spiral
UNI Boile Verti calcu Boile	e temperature [ <b>T-II</b> ers : Classific ical tube v ilations, air p er trial and he	Alternative fuels, blended fuels. Introduction to nuclea Boilers and condensers cations and working of boilers, High pressure and s universal pressure boilers, boilers mountings and re-heater, feed water heater, super heater. Boiler effic at balance.	ar fuels. uper critical boild accessories, Drau iency, Equivalent	8 Hours ers: spiral aght and its
UNI Boile Verti calcu Boile Cone	e temperature [ <b>T-II</b> ers : Classific ical tube v ilations, air p er trial and he	Alternative fuels, blended fuels. Introduction to nuclea Boilers and condensers cations and working of boilers, High pressure and s universal pressure boilers, boilers mountings and re-heater, feed water heater, super heater. Boiler effic	ar fuels. uper critical boild accessories, Drau iency, Equivalent	8 Hours ers: spiral aght and its
UNI Boild Verti calcu Boild Cond UNI Vapo exerg Gas rehea Aero their	e temperature <b>IT-II</b> ers : Classifi- ical tube unitations, air presented and head denser: Classifi- <b>IT-III</b> our Power classifier gy analysis . Market and regener oplane and I processes, Pr	Alternative fuels, blended fuels. Introduction to nuclea         Boilers and condensers         cations and working of boilers, High pressure and surversal pressure boilers, boilers mountings and re-heater, feed water heater, super heater. Boiler efficient balance.         ification of condenser, air leakage, condenser performant         Gas and Vapour Power cycles         ycles: Vapor power cycles Rankine cycle with super Modification in Rankine cycles for efficiency improvements: Brayton cycle, open and closed cycle analysis, Gas to ration and their combinations, Stage efficiency, Polytrop Rocket propulsion: principles of jet propulsion, Turbot inciple of rocket propulsion.	ar fuels. uper critical boild accessories, Drau iency, Equivalent nce parameters. theat, reheat and ents urbine cycles with bic efficiency.	8 Hours ers: spiral aght and its evaporation 8 Hours regeneration intercooling
UNI Boild Verti calcu Boild Cond UNI Vapo exerg Gas rehea Aero their UNI	e temperature <b>IT-II</b> ers : Classific ical tube v ilations, air p er trial and her denser: Class <b>IT-III</b> our Power c gy analysis .M power cycles at and regener plane and I processes, Pr <b>IT-IV</b>	<ul> <li>Alternative fuels, blended fuels. Introduction to nuclea</li> <li>Boilers and condensers</li> <li>cations and working of boilers, High pressure and surversal pressure boilers, boilers mountings and re-heater, feed water heater, super heater. Boiler efficient balance.</li> <li>ification of condenser, air leakage, condenser performant Gas and Vapour Power cycles</li> <li>ycles: Vapor power cycles Rankine cycle with super fordification in Rankine cycles for efficiency improvements: Brayton cycle, open and closed cycle analysis, Gas to ration and their combinations, Stage efficiency, Polytrop Rocket propulsion: principles of jet propulsion, Turbotinciple of rocket propulsion.</li> <li>Nozzles and Steam Turbines</li> </ul>	ar fuels. uper critical boild accessories, Drau iency, Equivalent nce parameters. theat, reheat and ents urbine cycles with bic efficiency. ojet and turboprop	8 Hours ers: spiral ight and its evaporation 8 Hours regeneration intercooling engines and 8 Hours
UNI Boild Verti calcu Boild Cond UNI Vapo exerg Gas rehea Aero their UNI Stean veloc of no flow. Stean effici turbi	e temperature <b>IT-II</b> ers : Classific ical tube ut ilations, air p er trial and head denser: Class <b>IT-III</b> our Power c gy analysis .M power cycles at and regener o plane and I processes, Pr <b>IT-IV</b> m and Gas M city, area and ozzle, Shock w m Turbines: iency, reheat nes, Velocity	<ul> <li>Alternative fuels, blended fuels. Introduction to nuclea</li> <li>Boilers and condensers</li> <li>cations and working of boilers, High pressure and surversal pressure boilers, boilers mountings and re-heater, feed water heater, super heater. Boiler efficient balance.</li> <li>ification of condenser, air leakage, condenser performant of condenser, air leakage, condenser performant of diffication in Rankine cycles Rankine cycle with super fordification in Rankine cycles for efficiency improvements: Brayton cycle, open and closed cycle analysis, Gas turation and their combinations, Stage efficiency, Polytrop Rocket propulsion: principles of jet propulsion, Turbot inciple of rocket propulsion.</li> <li>Nozzles and Steam Turbines</li> <li>Nozzles: Flow through Convergent and convergent-diverses stationary normal shock waves, Effect of friction</li> <li>Classification of steam turbine, Impulse and Reaction factor, Bleeding, Velocity diagram of simple, cord diagram of reaction turbines and related calculation</li> </ul>	ar fuels. uper critical boild accessories, Drau iency, Equivalent nce parameters. theat, reheat and ents urbine cycles with bic efficiency. ojet and turboprop vergent nozzles, v ciency, Off design n on nozzle, Supe turbines, Stage a npound multistag ons, efficiency o	8 Hours ers: spiral ight and its evaporation 8 Hours regeneration intercooling engines and 8 Hours ariation of a operation r saturated nd Overall reaction,
UNI Boild Verti calcu Boild Cond UNI Vapo exerg Gas rehea Aero their UNI Stean veloc of no flow. Stean effici turbi	e temperature <b>IT-II</b> ers : Classific ical tube ut ilations, air p er trial and head denser: Class <b>IT-III</b> our Power c gy analysis .M power cycles at and regener o plane and I processes, Pr <b>IT-IV</b> m and Gas M city, area and ozzle, Shock w m Turbines: iency, reheat nes, Velocity	<ul> <li>Alternative fuels, blended fuels. Introduction to nuclea</li> <li>Boilers and condensers</li> <li>cations and working of boilers, High pressure and surversal pressure boilers, boilers mountings and re-heater, feed water heater, super heater. Boiler efficient balance.</li> <li>ification of condenser, air leakage, condenser performant Gas and Vapour Power cycles</li> <li>ycles: Vapor power cycles Rankine cycle with super fordification in Rankine cycles for efficiency improvements: Brayton cycle, open and closed cycle analysis, Gas to ration and their combinations, Stage efficiency, Polytrop Rocket propulsion: principles of jet propulsion, Turbot inciple of rocket propulsion.</li> <li>Nozzles and Steam Turbines</li> <li>Nozzles: Flow through Convergent and convergent-dives specific volume, choked flow, throat area, Nozzle efficiency area, Nozzle efficiency normal shock waves, Effect of friction</li> </ul>	ar fuels. uper critical boild accessories, Drau iency, Equivalent nce parameters. theat, reheat and ents urbine cycles with bic efficiency. ojet and turboprop vergent nozzles, v ciency, Off design n on nozzle, Supe turbines, Stage a npound multistag ons, efficiency o	8 Hours ers: spiral ight and its evaporation 8 Hours regeneration intercooling engines and 8 Hours ariation of a operation r saturated nd Overall reaction,

system, Introduction to Turbine control system, digital steam turbine control. Electrically actuated Nozzles, Nozzle analogy to predict steam turbine performance, An introduction to electronic control of gas turbine engines. Automatic spray nozzles.

<b>Course outcome:</b> At the end of the course the students will be able to Level				
CO1	understand the use of fuels and apply combustion equations.	K2		
CO2	understand the working of boilers and condensers.	K2		
CO3	analyze the power generation using gas and steam based cycles.	K3		
CO4	analyze the flow of fluids through nozzles and turbines.	К3		
CO5	understand the working of reciprocating compressors and gas turbines.	K2		

### **Reference Books:**

1. Basic and Applied Thermodynamics by P.K. Nag, McGraw hill India.

2.Applied Thermodynamics for Engineering Technologists by Eastop and McConkey, Pearson Education.

3.Fundamentals of Thermodynamics by Sonntag, R. E, Borgnakke, C. and Van Waylen, G. J., 2003, 6th Edition,

4. John Wiley and Sons.

5. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India

6.Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.

7. Thermal Engineering by P. L. Ballaney, Khanna Publishers, 1994

		<b>B. TECH. SECOND YEAR</b>				
Cour	se Code	AME0403	L	Т	Р	Credit
Cour	se Title	Strength of Materials	3	0	0	3
Cour	se objectiv	e: The student will				
1	•	pple and compound stress strain				
2	understand	the concept of bending of beams, deflection of beams.				
3		bes of spring and analysis of spring				
4	understand	the concept, of thick and thin cylinders				
Pre-r	equisites:	Student know the Mechanics and basics of mat	hema	atic	6	
		<b>Course Content / Syllabus</b>				
UNIT	<b>]-I</b>	Simple Stress and Strain				10 Hours
incline strain,	s sections, s	and strains: Introduction, normal stress and strain, shear s train energy, impact loads and stresses, state of plane s near stress, Mohr's circle for plane stress, generalized Hoo	stress,	pri	ncipa	l stress and
UNIT	Γ-II					8 Hours
and ax <b>Deflec</b> Macau	ial loads, cor <b>tion of Bean</b> lay's method	<ul> <li>Pure Bending, normal stresses in beams, shear stresses nposite beams.</li> <li>ns: Differential equation of the elastic curve, cantilever and, area moment method, fixed and continuous beams.</li> <li>ombinedbending&amp;torsionofsolid&amp;hollowshafts,torsionofth</li> </ul>	ıd sim	ply	suppo	
UNIT	-III					8 Hours
under acting <b>Colum</b> third endedo mecha	axial twist ( simultaneou <b>insandStrut</b> and middle columns,effeo nicalequipmo	<b>prings:</b> Deflection of springs by energy method, helical s respectively for circular and square cross sections) axial sly both for open and closed coiled springs, laminated spri Bucklingandstability,slendernessratio,combinedbendinga quarter rules, struts with different end conditions, ctofendconditionsoncolumnbuckling,RankingGordonforme entandmachines.	load ings. anddir Eule	and ects er's	twist tress, theo	ing moment middle ory for pin fcolumnsin
UNIT	<b>C-IV</b>					8 Hours
vessels Thick orexten fits.	s, thin walled cylinders: 1 malpressures	<b>spheres:</b> Introduction, difference between thin walled as spheres and cylinders, hoop and axial stresses and strain, Radial, axial and circumferential stresses in thick cylind compoundcylinders, stresses inrotating shaft and cylinders, st	volun ers su	netri Ibjec	c stra ted t	in. o internal erference
UNIT						8 Hours
rectang subjec Unsyn	gular, trapez ted to tensior nmetrical B	Bending of beams with large initial curvature, position bidal and circular cross sections, stress in crane hooks, a or compression. ending: Properties of beam cross-section, slope of a metrical bending, determination of shear center and flex	, stres neutra	s in 1 ax	circ ais, s	ular rings tress and

about bot	h axisandaboutone axis) for I-sectionandchannelsection.	
	<b>outcome:</b> At the end of the course the students will be able to Levels.	
CO 1	Understand the concept of stress and strain under different conditions of loading	K2
CO 2	Determine the principal stresses and strains in structural members	K4
CO 3	Determine the principal stresses and strains in structural members.	K2
CO 4	Apply the concepts of stresses and strain in solving problems related to springs,	K3
	column and pressure vessels	
CO 5	Analyze the stresses developed in straight and curved beams of different cross	K3
	sections	
Referen	nce Books:	
1. Mecha	nics of Materials by Hibbeler, Pearson.	
2.Mechan	nics of material by Gere, Cengage Learning	
3.Mechan	nics of Materials by Beer, Johnston, DE wolf and Mazurek, Mc Graw Hill India	
4. Streng	th of Materials by Pytel and Singer, Harper Collins	
5.Strengt	h of Materials by Ryder, Macmillan.	
6.Strengt	hofMaterialsbyTimoshenkoandYoung,EastWestPress.	
7.Introdu	ctiontoSolidMechanicsbyShames,Pearson	

		<b>B. TECH. SECOND YEAR</b>		
Cour	·se Code	AME0401	L T P	Credit
Cour	se Title	Manufacturing Technology-II	300	3
Cour	se objecti	ve: The student will learn		
1	To apply the	he concept of mechanics of metal cutting,		
2	Working	of standard machine tools such as lathe, shaping and allied	machines, mil	ling, drilling
	and allied	machines,		
3	The conce	pt of abrasive machining process such as grinding and allie	d machines ar	nd broaching
	•			
4		concepts of Computer Numerical Control (CNC) of machi	ne tools and C	CNC
	Programm	5		
5		concepts of Non-Traditional Manufacturing Methods. Students have the knowledge of material set		
manu •	Ifacturing			
		<b>Course Content / Syllabus</b>		
UNI	Г-І І	Mechanics OF Metal Cutting	1	0 Hours
vario opera prelir deptł	us param ations, To minary an	es and tool angles, Merchants theory-original a eters on cutting forces , Different types of dyn ool life definition, mechanism of tool wear d ultimate feature, factors influencing tool life tool material, cutting fluids etc., Machinabil	amometers and mea such as sp	and their surement, eed, feed,
UNI	Г-ІІ І	Machine tool: introduction, classification of mac	chine tool.	8 Hours
metho autom Millin thickne Drillin machir applica <b>Reci</b> work	ds, thread atic lathes, G g Machine ess.Gear Man g Machining ne, and time ations, Milli procating ing princi	<b>tool:</b> Introduction to hole making process, classification of dril calculation. Twist drill Geometry.principles of location, Dring fixture and turning fixture. <b>G Machine Tools</b> : Introduction of reciprocation of shaper and planer machine tools.	and power own milling, m ling machines, rill bushes-the ating mach	estimation naximum chip radial drilling bir types and nine tools,
UNI		nachine tools. Abrasive Machining Processes and Computer	controllad	8 Hours
UNI		Abrasive Machining Processes and Computer	controlleu	0 110015
		nanufacturing process		
		ing Processes and Computer controlled manufacturing s: grinding wheel specifications and selection, types of gr	-	s cylindrical

grinding, surface grinding, centreless grinding and internal grinding- Mechanics of grinding. Common shaping processes for plastics.

**Computer controlled manufacturing process:** Numerical Control (NC) machine tools, CNC types, constructional details, special features, machining centre. part programming (turning, milling and drilling).

## UNIT-IV Non-traditional Machining Processes

8 Hours

**Non-traditional Machining**: introduction, principle advantages over conventional machining process, classification of non-traditional machining process.

**Mechanical energy based processes:** Abrasive Jet Machining (AJM) Water Jet Machining (WJM), Abrasive Water Jet Machining (AWJM), Ultrasonic Machining (USM). Working Principles ,equipment used, Process parameters, MRR,Applications.

**Electrical energy based processes:** Electric Discharge Machining (EDM)- working Principleequipment's, Process Parameters, Surface Finish and MRR- electrode / Tool Power and control Circuits-Tool Wear, Dielectric, Flushing, Wire cut EDM ,Applications.

# UNIT-V Thermal & electrochemical energy based processes

8 Hours

**Thermal energy based processes:** Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment Types, Beam control techniques Applications.

Chemicalandelectrochemicalenergybasedprocesses:ChemicalmachiningandElectro-Chemicalmachining(CHMandECM)-Etchants,Maskanttechniques of applying maskants.Process Parameters,Surface finish andMRR,Applications.Principlesof ECM,ECMSet up,SurfaceRoughness andMRRElectricalcircuit-ProcessParameters.ECGandECHApplications.Introduction toHybridMachiningProcess.Finish<t

**Course outcome:** At the end of the course the students will be able

CO1	To Analyze the mechanics of metal cutting	K3, K4
CO2	To understand and demonstrate the working of Machine tools.	K2
CO3	To analyze the Abrasive finishing processes.	K3
CO4	To analyze the non traditional machining process	K3
CO5	To understand the concept of computer controlled manufacturing processes	K2

## **Reference Books:**

- 1. P N Rao, Manufacturing Technology Vol II, 4th edition, McGraw Hill Education (India) Private Limited.
- 1. Mikell P. Groover, "Fundamentals of modern manufacturing: materials, processes and systems", John Wiley & Sons, Inc
- 2. Kalpakjian &Schmid, "Manufacturing Engineering & Technology", 6th Edition, Pearson.
- 3. Manufacturing science by A. Ghosh and AK Mallick Eat and west publishing house.
- 4. Vijay.K. Jain "Advanced Machining Processes" Allied Publishers Pvt. Ltd., New Delhi, 2007
- 5. Pandey P.C. and Shan H.S. "Modern Machining Processes" Tata McGraw-Hill, New Delhi, 2007

6. Production Engineering by PC Sharma S. Chand Publishers Pvt Ltd.

7. G. Boothroyd & W.A. Knight, "Fundamental of Machining and Machine Tools, third edition"CRC Press

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Course (	Code		AN	AE(	)452	2												L	Т	P		Credits		redits	
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1.	To ve	eri	fy t	he E	Berr	iou	lli'	s T	Theo	orem	n.														
2.	To de	ete	rmi	ne t	he o	coe	effic	cier	nt o	of dis	isch	narg	ge o	fve	entu	ıri 1	mete	er.							
3.	To de	ete	rmi	ne o	coef	fic	ien	t of	f dis	scha	arge	e of	f an	ori	ifice	e m	neter	r.							
4.	To de	ete	rmi	ne t	he o	coe	effic	cier	nt o	of dis	isch	narg	ge o	f N	otcl	h ('	V ar	nd F	Rec	tan	gul	ar t	ypes	5).	
5.	To de bends		rmi	ne t	he 1	mir	nor	los	sses	s due	e to	o su	ıdde	en e	nla	rge	mer	nt, s	ud	der	n co	ntra	actio	n and	
6.	To de	ete	rmi	ne t	he o	coe	effic	cier	nt o	of dis	isch	narg	ge, c	cont	trac	tio	n &	vel	loc	ity	of a	n o	rific	e.	
7.	To de	ete	rmi	ne t	he o	coe	effic	cier	nt o	of im	npa	ict f	for v	vane	es.										
8.	To fir	nd	cri	tica	l Re	eyn	old	ls n	uml	iber f	for	r a p	pipe	e flo	ow.										
9.	To fir	nd	ov	eral	l eff	fici	enc	су с	of po	oeltor	on w	whe	el.												
10.	Theor	oret	ica	1&	pra	ctic	cal	stu	dy c	of op	oper	ratio	on c	of si	ing	le a	actin	ng c	yli	nde	er				
11.	Theor	oret	ica	1&	pra	ctic	cal	stu	dy c	ofor	per	ratio	on c	of d	lout	ole	acti	ng	cyl	ind	ler				
12.	Opera	ati	on	of a	dou	uble	e ac	ctin	ng c	cylin	ndeı	er us	sing	g qu	ick	ex	hau	st v	alv	e					
Course Ou																				-					-
	To un																		s o	f f	low	and	1 flo	W	
CO 1	measu								·																
CO 2	To kn													-	-										
CO 3	To un fluid t				abc	out	the	e ap	oplic	catio	on o	ofr	mas	s ar	nd r	noi	men	itun	n co	ons	erv	atio	n la	ws for	

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Course (	Code		AN	1E(	0454	4													L	Т	]	Р		Credits		
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1.	To stu	ıdy	lov	v pr	essu	ure	boil	lers	s an	nd t	thei	ir a	acce	ssor	ies	and	m	oun	ting	s.						
2.	To stu	ıdy	hig	gh p	ress	ure	boi	iler	rs a	and	the	eir a	acce	esso	ries	and	d m	nour	nting	gs.						
3.	To stu	ıdy	the	e wo	orkir	ng c	of in	npt	ulse	e ar	nd r	read	ictio	n ste	earr	ı tu	rbiı	nes.								
4.	To fin	nd o	lryr	ness	frac	ctio	n of	f ste	tean	m b	by se	sepa	arat	ing	and	thr	ottl	ling	cal	orir	me	eter.				
5.	To fin	nd c	alo	rific	c va	lue	of a	a sa	amp	ple	of	fue	el us	sing	Bo	mb	cal	orir	nete	er						
6.	Detern a mult																					char	nica	l eff	ficie	ncy of
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10.	To stu	ıdy	an	d fiı	nd v	olu	met	tric	eff	fici	ienc	cy c	of a	rec	ipro	ocat	ing	air	con	npr	es	sor.				
11.	Study	of	Pc	siti	ve I	Disp	olace	em	lent	t Ai	ir C	Con	npre	esso	r											
Course Ou	itcome	es:	Th	e st	tude	ent	s w	ou	ld	be	e ab	ole	to													
CO 1	Unde	erst	anc	l th	e co	onst	truc	ctio	on a	and	d w	vork	kin	g of	`Ste	eam	n G	lene	erat	ors						
CO 2	Unde	erst	anc	l th	e w	ork	ing	g of	f ste	tean	m tı	urt	bine	es												
CO 3	Analy	Analyse the performance of I.C.Engines																								
<b>CO 4</b>	Unde	erst	anc	l th	e w	ork	ing	g of	fai	ir co	om	npre	ess	ors												

		<b>B.TECH SECOND YEAR</b>										
Course	Code	AME0451	L	Т	Р	Credits						
Course '	Title	Manufacturing Technology-II Lab	0	0	2	1						
S. No		LIST OF EXPERIME	NTS									
1.	To stu	udy Centre Lathe machine and perform operati	ons suc	h as	s Facir	ng, Plain						
	Turni	Turning, Step Turning, and Thread Cutting on center lathe machine.										
2.		To make a single Point cutting tool on grinding machine with use of mild steel										
	mater											
3.		-angle determination (using formula) with tub	e cutting	g (fo	or orth	ogonal) on						
		machine										
4.		udy surface grinding machine and perform ope	eration c	on s	urface	grinding						
	machi											
5.		ake Spur gear on milling machine tool.										
6.		To study shaper M/C tool and perform operation on shaper M/c tool										
7.		ady Twist drill geometry and drill a hole on dr	lling M	/c.								
8.	To stu	ady about CNC and perform operation.										
9.		Programming (in word address format) experin										
		ding operations such as grooving and threadin										
10.		Programming (in word address format or ATP)	· •	mer	nt for o	lrilling						
		tion (point to point) and running on CNC ma										
11.		Programming (in word address format or ATP)	experin	nen	t for n	nilling						
	-	tion and running on CNC machine.										
		s: The students would be able to										
CO 1		ce making parts on lathe machine tool.										
CO 2		nts are able to identify, manipulate and contro	l machir	ning	g parar	neters for						
		as manufacturing processes used in industry										
<b>CO 3</b>		nts are able to demonstrate and practice CNC										
<b>CO 4</b>	Practi	ce making parts on Milling and drilling machi	ne tools	•								

	irse Cod	e ANC0402	LTP	Credits
Cor	irse Title		2 0 0	0
	irse obje			
1	To help	the students in realizing the inter-relationship between man and e students in acquiring basic knowledge about environment.	nd environment. and	
2		elop the sense of awareness among the students about environment.	nent and its various pro	blems.
3		te positive attitude about environment among the student.	1	
4	To deve evaluati	elop proper skill required for the fulfilment of the aims of tons	environmental educati	on and educationa
5	To deve	elop the capability of using skills to fulfil the required aims, to	realize and solve envi	ronmental problem
	through	social, political, cultural and educational processes		
Pre	-requisit	es: Basic knowledge of nature.		
		Course Contents / Syllabus		
UN]	IT-I	Basic Principle of Ecology		8 Hours
diffei Phosj	rent ecosys phorus and	d chains and food webs. Ecological pyramids, Energy flow stems. Biogeochemical Cycles: Importance, gaseous and Sulphur Cycles. of sustainable development, SDGs, Ecosystem services, UN D	sedimentary cycles.	Carbon, Nitrogen
UN]	IT-II	Natural Resources and Associated Problems		8 Hours
Land Non-l	resources: L Renewable I	zer-pesticide problems, water logging, salinity. and as a resource, land degradation, man induced landslides. Equita Energy Resources: Fossil fuels and their reserves, Nuclear energy power, Solar energy, geothermal, tidal and wind energy, Biomass en	y, types, uses and effects	s, Renewable Energ
Resou	IT-III		Energy Resources	
		Biodiversity Succession and Non-Renewable B		8 Hours
UN Biod extin Strate	iversity and ction, IUCN egies for b egies Mega	<b>Biodiversity Succession and Non-Renewable H</b> d their importance, Threats to biodiversity, major causes, N threat categories, Red data book. biodiversity conservation, principles of biodiversity conse diversity zones and Hot spots, concepts, distribution and impo- ncepts of succession, Types of Succession. Trends in succession	extinction's, vulneral ervation in-situ and e prtance.	pility of species t x-situ conservatio
UN Biod extin Strate Strate	iversity and ction, IUCN egies for b egies Mega ession: Con	d their importance, Threats to biodiversity, major causes, N threat categories, Red data book. biodiversity conservation, principles of biodiversity conse diversity zones and Hot spots, concepts, distribution and impo- ncepts of succession, Types of Succession. Trends in succession	extinction's, vulneral ervation in-situ and e prtance.	pility of species t x-situ conservatio
UN Biod extin Strate Succe UN Air p Hydro Eutro	iversity and ction, IUCN egies for b egies Mega ession: Con IT-IV pollution: so ocarbon, con phication, So	d their importance, Threats to biodiversity, major causes, N threat categories, Red data book. biodiversity conservation, principles of biodiversity conse diversity zones and Hot spots, concepts, distribution and impo	extinction's, vulneral ervation in-situ and er ortance. on. Climax and stability rigin and effects of SO2 water pollution, Effects jor sources of and effects	bility of species t x-situ conservatio <b>8 Hours</b> X, NOX, Cox, CFC of water pollution
UN Biod extin Strate Succ UN Air p Hydro Eutro health	iversity and ction, IUCN egies for b egies Mega ession: Con IT-IV	d their importance, Threats to biodiversity, major causes, N threat categories, Red data book. biodiversity conservation, principles of biodiversity conse diversity zones and Hot spots, concepts, distribution and impo- ncepts of succession, Types of Succession. Trends in succession <b>Pollution and Solid Waste Management</b> urces of air pollution, Primary and secondary air pollutants. On ntrol of air pollution. Water pollution: sources and types of oil pollution: Causes of soil pollution, Effects of soil pollution, Major e and thermal pollution sources and their effects on surrounding environment, Climate change, glob	extinction's, vulneral ervation in-situ and er ortance. on. Climax and stability rigin and effects of SO2 water pollution, Effects jor sources of and effects /ironment. oal warming, acid rain, oz	bility of species t x-situ conservatio <b>8 Hours</b> X, NOX, Cox, CFC of water pollution of noise pollution o
UN Biod extin Strate Succ UN Air p Hydro Eutro health Solid UN	iversity and ction, IUCN egies for b egies Mega ession: Con IT-IV	d their importance, Threats to biodiversity, major causes, N threat categories, Red data book. biodiversity conservation, principles of biodiversity conse diversity zones and Hot spots, concepts, distribution and impo- ncepts of succession, Types of Succession. Trends in succession <b>Pollution and Solid Waste Management</b> urces of air pollution, Primary and secondary air pollutants. On ntrol of air pollution. Water pollution: sources and types of oil pollution: Causes of soil pollution, Effects of soil pollution, Major e and thermal pollution sources and their effects on surrounding environments.	extinction's, vulneral ervation in-situ and er ortance. on. Climax and stability rigin and effects of SO2 water pollution, Effects jor sources of and effects vironment. oal warming, acid rain, oz	bility of species t x-situ conservatio <b>8 Hours</b> X, NOX, Cox, CFC of water pollution of noise pollution o cone layer depletion. <b>8 Hours</b>

Cours	e outcome: After completion of this course students will be able to	
CO 1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem., food chains and food webs. Ecological pyramids	K2
CO 2	Understand the different types of natural recourses like food, forest, minerals and energy and their conservation	K2
CO 3	Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation.	K2
CO 4	Understand the different types of pollution, pollutants, their sources, effects and their control methods	K3
CO 5	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K3

### **Text books:**

1. Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.

2. Botkin, D.B and Kodler E.A., 2000, Environmental Studies: The earth as a living planet. John Wiley and Sons Inc.

3. Rao M.N. and H.V.N. Rao, 1989: Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi

4. Singh J.S., Singh S.P. and Gupta S.R., 2006, Ecology Environment and Resource Conservation, Anamaya Publishers, New Delhi. 5.Environmental Studies -Benny Joseph-Tata McgrawHill-2005

6. Environmental Studies- Dr. D.L. Manjunath, Pearson Education-2006.

7. Environmental studies- R, Rajagopalan -Oxford Publiotion2005.

### **Reference Books:**

1.Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.

- 2.Dash, M.C. (1994), Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.
- 3. Sharma P. D. (1996). Environmental Biology, Rastogi Publications, Meerut.

4. Verma P.S. and V.K. Agarwal. (1985). Principles of Ecology. S. Chand and Company (Pub.), New Delhi.

5. Principles of Environmental Sciences and Engineering -P. Venugopalan Rao, Prenitice Hall of India.

6. Environmental Science and Engineering Meenakshi, Prentice Hall India.

# NPTEL/ YouTube/ Faculty Video Link:

	1	
	https://www.youtube.com/watch?v=T21OO0sBBfc,	https://www.youtube.com/watch?
Unit 1	v=qt8AMjKKPDohttps://www.youtube.com/watch?v=yAK-m9	1Nxrshttps://www.youtube.com/watch?v=ha_O-
	1uOWkk, https://www.youtube.com/watch?v=brF0RWJyx9w	
Unit 2	https://www.youtube.com/watch?v=mOwyPENHhbc,	https://www.youtube.com/watch?v=yqev1G2iy20,
	https://www.youtube.com/watch?v=_74S3z3IO_I, https://www.	youtube.com/watch?v=jXVw6M6m2g0
	https://www.youtube.com/watch?v=GK_vRtHJZu4,	https://www.youtube.com/watch?v=b6Ua_zWDH6U,
Unit 3	https://www.youtube.com/watch?v=7tgNamjTRkk,	https://www.youtube.com/watch?v=ErATB1aMiSU,
Units	https://www.khanacademy.org/science/high-school-biology/hs-e	ecology/hs-human-impact-on-ecosystems/v/
	conservation-and-the-race-to-save-biodiversity	
	https://www.youtube.com/watch?v=7qkaz8Chell,	https://www.youtube.com/watch?v=NuQE5fKmfME,
Unit 4	https://www.youtube.com/watch?v=9CpAjOVLHII,	https://www.youtube.com/watch?v=yEci6iDkXYw,
	https://www.youtube.com/watch?v=yEci6iDkXYw	
	https://www.youtube.com/watch?v=ad9KhgGw5iA,	https://www.youtube.com/watch?v=nW5g83NSH9M,
Unit 5	https://www.youtube.com/watch?v=xqSZL4Ka8xo,	https://www.youtube.com/watch?v=WAI-hPRoBqs,
	https://www.youtube.com/watch?v=o-WpeyGlV9Y, https://www	w.youtube.com/watch?v=EDmtawhADnY

		<b>B. TECH. SECOND YEAR</b>				
Course C	ode	ANC0401	L	Т	P	Credit
Course Ti	itle	Cyber Security	2	0	0	0
and vulneral	owledge about S bility in various	Security of Information system and Risk factors scenarios, understand concept of cryptography attack and provide protection for software and h	and	encry		•
-	cept of network	ecognition in the domain of Computer Science. and operating system. ads of programming language.				
		<b>Course Contents / Syllabus</b>				
UNIT-I	Introductio	on				8 Hours
Systems, N Guidelines	eed for Inform	on Systems: Types of Information Systems, mation Security, Threats to Information Syste word and WI-FI Security and social media and programment	ems,	Info	rmatio	on Assurance,
UNIT-II	1	Layer Security				8 Hours
Attack, Secu Cards.	-	Viruses, Macro Viruses, Malicious Software,No E-Commerce: Electronic Payment System, e- (				
UNIT-III	Secure Syst					
A 1		tem Development				8 Hours
and Downlo	padable Device	tem Development Security, Architecture & Design, Security Issue es, Mobile Protection,Security Threats involvi ccess Control, CCTV and Intrusion Detectio	ng i	n soc	ial me	<b>8 Hours</b> Data Storage edia, Physical
and Downle Security of	Dadable Device TT Assets, A	Security, Architecture & Design, Security Issues, Mobile Protection, Security Threats involvi	ng i	n soc	ial me	<b>8 Hours</b> Data Storage edia, Physical
and Downlo Security of Measures. UNIT-IV Public key of Functions,P Symmetric I Secure hash Real World	The sector of th	Security, Architecture & Design, Security Issue es, Mobile Protection,Security Threats involving ccess Control, CCTV and Intrusion Detection <b>phy And Network Security</b> SA Public Key Crypto with implementation in I ibution. hy: DES (Data Encryption Standard), AES (Adv. A-1). c Terminologies, VPN, Email Security Certifica	ng in n Sy Pytho ance	n soc /stem on,Di d Enc	ial mo s, Bac gital S cryptio	<b>8 Hours</b> Data Storage edia, Physical ekup Security <b>8 Hours</b> ignature Hash n Standard),
and Downlo Security of Measures. UNIT-IV Public key of Functions,P Symmetric I Secure hash Real World	TT Assets, A TT Assets, A Cryptograp cryptography: R ublic Key Distr key cryptograph algorithm(SHA	Security, Architecture & Design, Security Issue es, Mobile Protection, Security Threats involvinces Control, CCTV and Intrusion Detection <b>ohy And Network Security</b> SA Public Key Crypto with implementation in I ibution. any: DES (Data Encryption Standard), AES (Adva A-1). c Terminologies, VPN, Email Security Certification arity.	ng in n Sy Pytho ance	n soc /stem on,Di d Enc	ial mo s, Bac gital S cryptio	<b>8 Hours</b> Data Storage edia, Physical ekup Security <b>8 Hours</b> ignature Hash n Standard),
and Downle Security of Measures. UNIT-IV Public key of Functions,P Symmetric I Secure hash Real World TLS, IP secu UNIT-V Policy desi Policies-Sar Policies.	Cryptograp Cryptography: R Cryptography: R ublic Key Distr key cryptograph algorithm(SHA Protocols: Basi urity, DNS Secu Security Po gn Task, WW nple Security I ls in security.	Security, Architecture & Design, Security Issue es, Mobile Protection, Security Threats involvinces Control, CCTV and Intrusion Detection <b>ohy And Network Security</b> SA Public Key Crypto with implementation in I ibution. any: DES (Data Encryption Standard), AES (Adva A-1). c Terminologies, VPN, Email Security Certification arity.	ng in n Sy Pytho ance utes, ' evalu	n soc /stem on,Di d Enc Trans uatior	gital S gital S port L Proc	8 HoursData Storageedia, Physicaledia, Physicalckup Security8 Hoursignature Hashn Standard),ayer Security,8 Hoursesss-Corporate

CO 1	Analyze the cyber security needs of an organization.	K4
CO 2	Identify and examine software vulnerabilities and security solutions.	K1,K3
CO 3	Comprehend IT Assets security (hardware and Software) and	K2
	performance indicators	
CO 4	Measure the performance and encoding strategies of security	K3, K5
	systems.	
CO 5	Understand and apply cyber security methods and policies to	K2, K3
	enhance current scenario security.	
Text book	·S:	
5) Charles P	P. Pfleeger, Shari Lawerance Pfleeger, "Analyzing Computer Security", Pearson	n Education India
6) V.K.Pach	nghare, "Cryptography and information Security", PHI Learning Private Limite	d, Delhi India
7) Sarika Gu	upta & Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishir	1g House
8) Michael I	E.Whitman and Herbert J Mattord "Principle of Information Security" Cengage	;
Reference Be	ooks:	
5) Schou, Sl	hoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.	
6) CHAND	ER, HARISH," Cyber Laws and It Protection", PHI Learning Private Limited,	Delhi
7) V.K. Jain	, Cryptography and Network Security, Khanna Publishing House, Delhi	
8) William S	Stallings, Network Security Essentials: Applications and Standards, Prentice Ha	all, 4th edition, 2010
E-books& E	-Contents:	
5) https://pr	utor.ai/welcome/	
6) https://cr	ypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf	
7) https://cy	bermap.kaspersky.com/stats	
8) https://ww	ww.fireeye.com/cyber-map/threat-map.html	
Reference Li	inks:	
4) https://cr	ypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf	
5) https://cs	155.stanford.edu/lectures/03-isolation.pdf	
6) http://uru	$. ac. in/uruon line library/Cyber_Security/Cryptography\_and\_Network\_Security.pdf] and\_Network\_Security.pdf] and\_Network\_$	pdf
	itube/ Faculty Video Link:	
6) <u>https://w</u>	ww.youtube.com/watch?v=vv1ODDhXW8Q	
7) <u>https://ww</u>	ww.youtube.com/watch?v=fQ3ESFfvchg&list=PLUtfVcb-iqn834VGI9faVXG	IGSDXZMGp8
	ww.youtube.com/watch?v=iTVyKbDCJrA&list=PLgMDNELGJ1CbdGLyn70	<u> </u>
	ww.youtube.com/watch?v=1plMO7ChXMU&list=PLJ5C_6qdAvBFAuGoLC2	<u>2wFGruY_E2gYtev</u>
10) <u>https://wv</u>	ww.youtube.com/watch?v=_9QayISruzo	

		<b>B. TECH. SECOND YEAR</b>		
Cours	se Code	AOE0461	LTP	Credit
Cours	se Title	Energy Science and Engineering	3 1 0	4
Cours	se objective: St	tudents will able to learn		
1	examination of	to energy systems and renewable energy resources, w of the energy field and an emphasis on alternative e nology and application •		K2, K3
2	sources and s alternatives, r power, waves	ent needs and future energy demands, examine conve- ystems, including fossil fuels and nuclear energy, and enewable energy sources such as solar, biomass (conv and tidal, geothermal, ocean thermal, hydro and nucle	then focus on ersions), wind ear.	K2, K3
3	Energy conse perspective.	rvation methods will be emphasized from Mechanica	ll Engineering	K2, K3
Pre-re	equisites:			
		Course Content / Syllabus		
UNIT	`-I	Energy and its Usage		10 Hours
gas and UNIT • Fur for	s power cycles, d electrical aspe <b>-II</b> ndamental forc ces, energy sca	Nuclear Energy es in the universe, Quantum mechanics relevant ales and structure, Nuclear binding energy syste uclear fission and fission reactor physics, Nuclear	t for nuclear protections	7 Hours ohysics, nuclear ons and decays,
-	eration and fuel			0.11
UNIT		Solar Energy		9 Hours
phy Ser of s	vsics of semico niconductor jui	lar energy, fundamentals of solar radiation and it onductors, Carrier transport, generation and reconctions: metal-semiconductor junction & p-n junc aic devices, First Generation Solar Cells, Second Cells	mbination in s ction, Essentia	semiconductors, l characteristics
UNIT	-IV	Conventional & non-conventional energy sou	rce	8 Hours
res fari	ources, fluids, ms, Geotherma	sources and fossil fuels, Fluid dynamics and viscosity, types of fluid flow, lift, Wind turbing l power and ocean thermal energy conversion, Tic	e dynamics ar	nd design, wind power
UNIT		Systems and Synthesis		8 Hours
Cl Cc Ide pri	imate change, oncept of Gree entification of ioritizing these	rld Energy Scenario, Nuclear radiation, fuel cy Energy storage, Energy conservation. Engineer n Building and Green Architecture; Green build energy related enterprises that represent the as candidates; Embodied energy analysis and ergy Audit of Facilities and optimization of energy	ing for Energ ling concepts, breath of th use as a tool	y conservation: LEED ratings; e industry and for measuring

Course ou	Course outcome:							
At the end	Levels							
CO 1	Understand the various types of energy resources and their applications.	L2						
CO 2	Understand the concept of nuclear energy and its applications	L3						
CO 3	Understand the fundamentals of solar energy and their applications	L2						
CO 4	Describe the conventional and non-conventional energy resources.	L3						
CO 5	Apply the energy conservation methods.	L3						

Text books

1. Energy and the Challenge of Sustainability, World Energy Assessment, UNDP, New York, (2000).

**Reference Books** 

1. Perspective of Modern Physics, A. Beiser, McGraw-Hill International Editions (1968).

2. Introduction to Modern Physics, H.S. Mani and G.K.Mehta, East-West Press (1988)

3. Introduction to Electrodynamics, D. J. Griffiths, Fourth Edition, Prentice Hall (2013).

4. Introductory Nuclear Physics, R. K. Puri and V.K. Babbar, Narosa Publishing House (1996).

5. Physics of Solar Cells: From Basic Principles to Advanced Concepts by Peter Wurfel, John Wiley & Sons, 2016

6. Principles of Solar Engineering, D.Y. Goswami, F.Kreith and J.F. Kreider, Taylor and Francis, Philadelphia, 2000.

7. Perspective of Modern Physics, A. Beiser, McGraw-Hill International Editions (1968)

B. TECH SECOND YEAR					
Course Code	se Code AOE0462 L				
Course Title	ourse Title Sensor and Instrumentation 3				
<b>Course objective</b>	Student will able to learn				
C01	The use of sensors for measurement of displacement, and pressure.	force	K3		
CO2	commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.				
CO3	The Demonstrate the use of virtual instrumentation in automation industries.	1	K2		
CO4	Identify and use data acquisition methods.		K3		
C05	Comprehend intelligent instrumentation in industrial automation.		K2		
Pre-requisites:					
•	Course Content / Syllabus				

UNIT-I		10 Hours
Sensors & Trai	nsducer: Definition, Classification & selection of sensors,	Measurement of
displacement usir	ng Potentiometer, LVDT & Optical Encoder, Measurement of f	orce using strain
gauge, Measurem	ent of pressure using LVDT based diaphragm & piezoelectric se	ensor
UNIT-II		7 Hours
<b>Measurement of T</b>	emperature: Measurement of temperature using Thermistor, 7	Thermocouple &
	ermal imaging, Measurement of position using Hall effect se	
	& Capacitive, Use of proximity sensor as accelerometer and	-
	sonic & Laser, Level Sensors: Ultrasonic & Capacitive	
UNIT-III		9 Hours
• Virtual Instrum	entation: Graphical programming techniques, Data types, Adva	antage of Virtual
	techniques, Concept of WHILE & FOR loops, Arrays, Clu	0
	Sequence & Formula nodes, Need of software based instrume	nts for industrial
automation		0.11
UNIT-IV		8 Hours
Types of ADC: su	<b>n Methods:</b> Basic block diagram, Analog and Digital IO, C accessive approximation and sigma-delta, Types of DAC: Weigh e, Use of Data Sockets for Networked Communication.	
UNIT-V		8 Hours
smart sensors. St	$\alpha$ sen-communicating, Application (	of smart sensors.
Automatic robot Course outcome:	elf calibration, Self-testing & self-communicating, Application of control & automobile engine control	
Automatic robot Course outcome: At the end of the cou	control & automobile engine control urse the students will be able to	Levels
Automatic robot Course outcome:	control & automobile engine control arse the students will be able to Apply the use of sensors for measurement of displacement,	
Automatic robot Course outcome: At the end of the cou CO 1	control & automobile engine control urse the students will be able to Apply the use of sensors for measurement of displacement, force and pressure.	Levels K2
Automatic robot Course outcome: At the end of the cou	<ul> <li>control &amp; automobile engine control</li> <li>arse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement</li> </ul>	Levels
Automatic robot Course outcome: At the end of the cou CO 1	control & automobile engine control urse the students will be able to Apply the use of sensors for measurement of displacement, force and pressure.	Levels K2
Automatic robot Course outcome: At the end of the cou CO 1	<ul> <li>control &amp; automobile engine control</li> <li>arse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor,</li> </ul>	Levels K2
Automatic robot Course outcome: At the end of the cou CO 1 CO 2	<ul> <li>control &amp; automobile engine control</li> <li>arrse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.</li> <li>Demonstrate the use of virtual instrumentation in automation</li> </ul>	Levels K2 K4
Automatic robot Course outcome: At the end of the cou CO 1 CO 2 CO 3	<ul> <li>control &amp; automobile engine control</li> <li>arse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.</li> <li>Demonstrate the use of virtual instrumentation in automation industries.</li> </ul>	Levels K2 K4 K2
Automatic robot Course outcome: At the end of the cou CO 1 CO 2 CO 3 CO 4	<ul> <li>control &amp; automobile engine control</li> <li>arrse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.</li> <li>Demonstrate the use of virtual instrumentation in automation industries.</li> <li>Identify and use data acquisition methods.</li> <li>Comprehend intelligent instrumentation in industrial</li> </ul>	Levels K2 K4 K2 K3
Automatic robot Course outcome: At the end of the cou CO 1 CO 2 CO 3 CO 4 CO 5 Text books	<ul> <li>control &amp; automobile engine control</li> <li>arrse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.</li> <li>Demonstrate the use of virtual instrumentation in automation industries.</li> <li>Identify and use data acquisition methods.</li> <li>Comprehend intelligent instrumentation in industrial</li> </ul>	Levels K2 K4 K2 K3
Automatic robot Course outcome: At the end of the cou CO 1 CO 2 CO 2 CO 3 CO 4 CO 5 Text books 1. DVS Murthy, Tra	<ul> <li>control &amp; automobile engine control</li> <li>urse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.</li> <li>Demonstrate the use of virtual instrumentation in automation industries.</li> <li>Identify and use data acquisition methods.</li> <li>Comprehend intelligent instrumentation in industrial automation.</li> </ul>	Levels K2 K4 K2 K3
Automatic robot Course outcome: At the end of the cou CO 1 CO 2 CO 2 CO 3 CO 4 CO 5 Text books 1. DVS Murthy, Tra Reference Books	control & automobile engine control arse the students will be able to Apply the use of sensors for measurement of displacement, force and pressure. Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level. Demonstrate the use of virtual instrumentation in automation industries. Identify and use data acquisition methods. Comprehend intelligent instrumentation in industrial automation. ansducers and Instrumentation, PHI 2nd Edition 2013	Levels K2 K4 K2 K3
Automatic robot Course outcome: At the end of the cou CO 1 CO 2 CO 2 CO 3 CO 4 CO 5 Text books 1. DVS Murthy, Tra Reference Books 2. D Patranabis, Ser	<ul> <li>control &amp; automobile engine control</li> <li>arse the students will be able to</li> <li>Apply the use of sensors for measurement of displacement, force and pressure.</li> <li>Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.</li> <li>Demonstrate the use of virtual instrumentation in automation industries.</li> <li>Identify and use data acquisition methods.</li> <li>Comprehend intelligent instrumentation in industrial automation.</li> </ul>	Levels K2 K4 K2 K3 K3
Automatic robot Course outcome: At the end of the cou CO 1 CO 2 CO 2 CO 3 CO 4 CO 5 Text books 1. DVS Murthy, Tra Reference Books 2. D Patranabis, Ser	control & automobile engine control arse the students will be able to Apply the use of sensors for measurement of displacement, force and pressure. Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level. Demonstrate the use of virtual instrumentation in automation industries. Identify and use data acquisition methods. Comprehend intelligent instrumentation in industrial automation. ansducers and Instrumentation, PHI 2nd Edition 2013 msors and Transducers, PHI 2nd Edition 2013 Gupta / PC interfacing for Data Acquisition & Process Co	Levels K2 K4 K2 K3 K3

		<b>B. TECH SECOND YEAR</b>			
Course Code		AOE0463	L T	P	Credit
<b>Course Title</b>	Course TitleBasics Data Structure and Algorithms310		0	4	
<b>Course objec</b>	tive: S	Students will able to	ŀ		
CO1 Aanalyze the time and space complexity of an algorithm			K2,K4		
CO2	understand and implement fundamental algorithms (including sorting algorithms, graph algorithms, and dynamic programming)		K3		
CO3	Discuss various algorithm design techniques for developing algorithms		K2		
CO4	Discuss various algorithm design techniques for developing algorithms		K3		
CO5		cuss various algorithm design techniques for prithms	• developing		K2
Pre-requisite	s:				
		Course Content / Syllabus			
UNIT-I					10 Hour

Introduction to data structure and Algorithms: Performance analysis of Algorithm, time complexity, Big-oh notation, Elementary data organization data structure operations, Recurrences, Arrays, Operation on arrays, representation of arrays in memory, single dimensional and multidimensional arrays, spare matrices, Character storing in C, String operations.

LINIT II		
UNIT-II		7 Hours
Stack And Que	ie and Link List: Stack operation, PUSH and POP, Array	representation of
stacks, Operatio	n associated with stacks Application of stacks, Recursion,	Polish expression,
Representation	Queue, operation on Queue , Priority Queue , D-Queue , Sin	gly and circularly
linked list, List (	operations Lists implementations	
UNIT-III		9 Hours
Trees : Basic te	rminology, Binary Trees, Binary tree representation, Alge	braic/expressions,
<b>Complete Binar</b>	y Trees, Extended binary tree, representing binary tress in	n memory, linked
representation o	f Binary trees, Traversing binary trees & Searching in bina	ry trees, Inserting
in binary searcl	1 trees, Complexity of searching algorithm, Heaps, genera	l trees, Threaded
binary tree.		
UNIT-IV		8 Hours
• Graphs: Term	nology & representations, Graphs & Multigraphs, I	Directed Graphs,
-	esentation of graphs, adjacency Matrices, Transversal, con	<b>.</b> .
and spanning tr	ees, Minimum Cost spanning tree, Prims and Kruskal Algo	orithm, BFS, DFS,
Shortest path ar	d transitive closure, Activity networks, topological sort and	critical paths.
· · · · · · · · · · · · · · · · · · ·		
UNIT-V		8 Hours
UNIT-V Searching and	Sorting: Linear search, binary Search, Internal and Extern	8 Hours al sorting, Bubble
UNIT-V Searching and sorting, selection	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea	8 Hours al sorting, Bubble ap sort, sorting on
UNIT-V Searching and sorting, selection different keys, j	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting	8 Hours al sorting, Bubble p sort, sorting on g, Storage Devices
UNIT-V Searching and sorting, selectio different keys, j : Magnetic tape	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique	8 Hours al sorting, Bubble p sort, sorting on g, Storage Devices es, introduction to
UNIT-V Searching and sorting, selectio different keys, j : Magnetic tape	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting	8 Hours al sorting, Bubble p sort, sorting on g, Storage Devices es, introduction to
UNIT-V Searching and sorting, selectio different keys, j : Magnetic tape	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique	8 Hours al sorting, Bubble p sort, sorting on g, Storage Devices es, introduction to
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome:	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique	8 Hours al sorting, Bubble p sort, sorting on g, Storage Devices es, introduction to
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome:	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio	8 Hours al sorting, Bubble p sort, sorting on g, Storage Devices es, introduction to n to hoisting.
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome: At the end of the co	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio	8 Hours al sorting, Bubble ap sort, sorting on g, Storage Devices es, introduction to n to hoisting. Levels
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome: At the end of the co	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio ourse the students will be able to Understand and Aanalyze the time and space complexity of	8 Hours al sorting, Bubble ap sort, sorting on g, Storage Devices es, introduction to n to hoisting. Levels
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome: At the end of the co CO 1	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio ourse the students will be able to Understand and Aanalyze the time and space complexity of an algorithm	8 Hours al sorting, Bubble ap sort, sorting on g, Storage Devices es, introduction to n to hoisting. Levels K2
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome: At the end of the co CO 1	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio purse the students will be able to Understand and Aanalyze the time and space complexity of an algorithm understand and implement fundamental algorithms	8 Hours al sorting, Bubble ap sort, sorting on g, Storage Devices es, introduction to n to hoisting. Levels K2
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome: At the end of the co CO 1	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio ourse the students will be able to Understand and Aanalyze the time and space complexity of an algorithm understand and implement fundamental algorithms (including sorting algorithms, graph algorithms, and	8 Hours al sorting, Bubble ap sort, sorting on g, Storage Devices es, introduction to n to hoisting. Levels K2
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome: At the end of the co CO 1 CO 2	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Hea practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio ourse the students will be able to Understand and Aanalyze the time and space complexity of an algorithm understand and implement fundamental algorithms (including sorting algorithms, graph algorithms, and dynamic programming)	8 Hours al sorting, Bubble ap sort, sorting on g, Storage Devices es, introduction to n to hoisting. Levels K2 K4
UNIT-V Searching and sorting, selection different keys, p : Magnetic tape B tree and B+ t Course outcome: At the end of the co CO 1 CO 2	Sorting: Linear search, binary Search, Internal and Extern n sort, Insertion sort, quick sort, Two-way merge sort, Heap practical consideration for internal sorting, External Sorting es, Disk Storage, Sorting with disks and Indexing technique ree, File organization and storage management, Introductio ourse the students will be able to Understand and Aanalyze the time and space complexity of an algorithm understand and implement fundamental algorithms (including sorting algorithms, graph algorithms, and dynamic programming) Discribe various algorithm design techniques for developing	8 Hours al sorting, Bubble ap sort, sorting on g, Storage Devices es, introduction to n to hoisting. Levels K2 K4

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, Introduction to Algorithms,

Discuss various algorithm design techniques for developing

K3

algorithms

algorithms

CO 5

Text books

PHI.

2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication.

3. Weiss, "Data Structure & Algorithm Analysis in C", Addision Wesley.

4. Basse, "computer Algorithms: Introduction to Design & Analysis", Addision Wesley.

5. Lipschutz, "Data structure, "Schaum series.

6. Aho, hopcropt, Ullman, "Data Structure & Algorithm", Addision Wesley.

**7. Aho, Hopcraft, Ullman,** "The Design and Analysis of Computer Algorithms" Pearson Education, 2008

B. TECH SECOND YEAR					
Course Code AOE0464 L T P					
<b>Course Title</b>		Introduction to Soft Computing	3 1 0	4	
Course of	bjectiv	e:Student will able to			
CO1	Com	prehend the fuzzy logic and the concept of fu	zziness involved in	K2	
	vario	ous systems and fuzzy set theory.			
CO2	Und	erstand the concepts of fuzzy sets, knowledge 1	representation using	K3	
	fuzz	y rules, approximate reasoning, fuzzy inference	systems, and fuzzy		
	logic	c			
CO3	CO3 Describe with genetic algorithms and other random search procedures		K4		
	usef	ul while seeking global optimum in self-learning sit	uations.		
CO4	Und	erstand appropriate learning rules for each of the		K3	
	arch	itectures and learn several neural network	paradigms and its		
	appl	ications.			
CO5	Dev	elop some familiarity with current research pro-	blems and research	K5	
	methods in Soft Computing Techniques				
Pre-requi	isites:				
•					

	<b>Course Content / Syllabus</b>	
UNIT-I		10 Hours
Introductio	to Soft Computing	
ARTIFICIA	L NEURAL NETWORKS	
Basic concer	ts - Single layer perception - Multilayer Perception - Supervised and	l Unsupervised
learning – Ba	ick propagation networks - Kohen's self-organizing networks - Hop	field network.
UNIT-II		7 Hours
FUZZY SYS	STEMS	
Fuzzy sets,	Fuzzy Relations and Fuzzy reasoning, Fuzzy functions - Decomp	position - Fuzzy
automata and	l languages - Fuzzy control methods - Fuzzy decision making.	•
UNIT-III		9 Hours
NEURO - F	UZZY MODELING	
clustering al	works based Fuzzy interface systems - Classification and Regress gorithms - Rule based structure identification - Neuro-Fuzzy cont Evolutionary computation	
UNIT-IV		8 Hours
GENETIC A	ALGORITHMS	
Survival of	he Fittest - Fitness Computations - Cross over - Mutation - Repr	oduction - Rank
method - Rai	ık space method.	
UNIT-V		8 Hour
APPLICA	TION OF SOFT COMPUTING	
Optimisatio	n of traveling salesman problem using Genetic Algorithm, Genetic	algorithm based
-	i of travening satesman problem using Genetic Algorithm, Genetic	algorithin-based
Internet Sea	rch Techniques, Soft computing-based hybrid fuzzy controller,	-
		-
MATLAB H	arch Techniques, Soft computing-based hybrid fuzzy controller, Environment for Soft computing Techniques.	-
MATLAB E	arch Techniques, Soft computing-based hybrid fuzzy controller, Environment for Soft computing Techniques. e:	-
MATLAB E	arch Techniques, Soft computing-based hybrid fuzzy controller, Environment for Soft computing Techniques. e:	Introduction to
MATLAB E Course outcom At the end of th	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, environment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in</li> </ul>	Introduction to
MATLAB F Course outcom At the end of th	ecourse the students will be able to	Introduction to
MATLAB F Course outcom At the end of th CO 1	erch Techniques, Soft computing-based hybrid fuzzy controller, Environment for Soft computing Techniques. e: ecourse the students will be able to Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.	Introduction to Levels K2
MATLAB H Course outcom At the end of th CO 1	arch Techniques, Soft computing-based hybrid fuzzy controller,         invironment for Soft computing Techniques.         e:         ecourse the students will be able to         Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.         Apply the concepts of fuzzy sets, knowledge representation	Introduction to Levels K2
MATLAB H Course outcom At the end of th CO 1	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> </ul>	Introduction to Levels K2
MATLAB F Course outcom At the end of th CO 1 CO 2	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random</li> </ul>	Introduction to Levels K2 K4
MATLAB F Course outcom At the end of th CO 1 CO 2	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-</li> </ul>	Introduction to Levels K2 K4
MATLAB F Course outcom At the end of th CO 1 CO 2	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> </ul>	Introduction to Levels K2 K4
MATLAB F Course outcom At the end of th CO 1 CO 2	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> <li>Understand appropriate learning rules for each of the</li> </ul>	Introduction to Levels K2 K4 K2
MATLAB F Course outcom At the end of th CO 1 CO 2	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> <li>Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its</li> </ul>	Introduction to Levels K2 K4 K2
MATLAB F Course outcom At the end of th CO 1 CO 2 CO 3	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> <li>Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.</li> </ul>	Introduction to Levels K2 K4 K2
MATLAB F Course outcom At the end of th CO 1 CO 2	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> <li>Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its</li> </ul>	Introduction to Levels K2 K4 K2 K3
MATLAB F Course outcom At the end of th CO 1 CO 2 CO 3	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> <li>Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.</li> </ul>	Introduction to Levels K2 K4 K2 K3
MATLAB F Course outcom At the end of th CO 1 CO 2 CO 3 CO 4 CO 5 Text books	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> <li>Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.</li> <li>Develop familiarity with current research problems .</li> </ul>	Introduction to Levels K2 K4 K2 K3
MATLAB F Course outcom At the end of th CO 1 CO 2 CO 3 CO 4 CO 5 Text books 1. An Introduc	<ul> <li>arch Techniques, Soft computing-based hybrid fuzzy controller, invironment for Soft computing Techniques.</li> <li>e:</li> <li>ecourse the students will be able to</li> <li>Describe fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Apply the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>Apply the concept of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.</li> <li>Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.</li> </ul>	Introduction to Levels K2 K4 K2 K3 K3

3. Fuzzy Logic with Engineering Applications Timothy J. Ross (Wiley)

4. Neural Networks and Learning Machines Simon Haykin (PHI)

5. Sivanandam, Deepa, "Principles of Soft Computing", Wiley

6. Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall

7. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill

8. Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall

9. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley

10. Wang, "Fuzzy Logic", Springer

B TECH SECOND YEAR				
Course Code	AOE0465	LTP	Credit	
Course Title	Analog Electronics Circuits	3 1 0	4	
Course objectiv	ve: Students will learn			
CO1	The characteristics of diodes and transistors.		K2	
CO2	various rectifier and amplifier circuits		К3	
CO3	sinusoidal and non-sinusoidal oscillators.		K4	
CO4	The functioning of OP-AMP and design OP-AMP based circuits.		K3	
CO5	LPF, HPF, BPF, BSF.		K5	
Pre-requisites:				
•	Course Content / Syllabus			
UNIT-I	•		10 Hours	
Diode circu	its, amplifier models: Voltage amplifier, cur	rent amplifier,	, trans-conductance	
amplifier an	d trans-resistance amplifier. biasing schemes for	or BJT and F	ET amplifiers, bias	
stability, var	stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal			
analysis, low	v frequency transistor models, estimation of vol	tage gain, inpu	t resistance, output	
resistance e	tc., design procedure for particular-specificati	ons, low free	uency analysis of	

multistage amplifiers.

UNIT-II		7 Hours			
	ncy transistor: models, frequency response of single stage				
U 1	amplifiers, cascade amplifier, various classes of operation (Class A, B, AB, C etc.), their power				
-	linearity issues, feedback topologies: Voltage series, current serie	. –			
-	effect of feedback on gain, bandwidth etc., calculation with p	-			
	bility, gain margin and phase margin	,			
UNIT-III		9 Hours			
Oscillators: R	eview of the basic concept, Barkhuizen criterion, RC oscillators (	hase shift, Wien			
bridge etc.), LO	C oscillators (Hartley, Colpitts, Clapp etc.), non-sinusoidal oscillat	ors			
UNIT-IV		8 Hours			
Current mirror	: Basic topology and its variants, V-I characteristics, output	t resistance and			
minimum sustaina	able voltage (VON), maximum usable load, differential amplifier	: Basic structure			
and principle of c	operation, calculation of differential gain, common mode gain, CM	MRR and ICMR,			
Op-Amp design:	Design of differential amplifier for a given specification, design o	f gain stages and			
output stages, con	npensation				
UNIT-V		8 Hours			
Op-Amp applic	eations: Review of inverting and non-inverting amplifiers,	integrator and			
differentiator, sur	mming amplifier, precision rectifier, Schmitt trigger and its app	plications, active			
filters: Low pass,	high pass, band pass and band stop, design guidelines.				
Course outcome:	:				
		evels			
CO 1	Understand the characteristics of diodes and transistors.	K2			
CO 2	Design and analyze various rectifier and amplifier circuits	K4			
	Design sinusoidal and non-sinusoidal oscillators.	K2			
	Understand the functioning of OP-AMP and design OP-AMP based	K3			
	circuits.				
	Design LPF, HPF, BPF, BSF.	K3			
Text books					
1. J.V. Wait, L.P. Huelsman and GA Korn, "Introduction to Operational Amplifier theory and					
applications," Mc					
	A. Grabel, "Microelectronics," 2ndedition, McGraw Hill, 1988.				
	W. Hill, "The Art of Electronics," 2ndedition, Cambridge Univer	•			
	d K.C. Smith, "Microelectronic Circuits, "Saunder's College11	Publishing, 4th			
edition.					
5. Paul R. Gray and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits," John Wiley, 3rd edition					

6. Muhammad H. Rashid, "Electronic Devices and Circuits," Cengage publication, 2014.

B TECH SECOND YEAR					
Course Code	AOE0466 L T P Credit			Credit	
Course Title	Electronics Engineering310		4		
Course objectiv	e:Students will learn		I		
CO1	the concept of PN junction and special purpose	diodes		K2	
CO2	The application of conventional diode and	semicon	ductor	K3	
	diode.				
CO3	The I-V characteristics of BJT and FET			K4	
CO4	The of Op-Amp, amplifiers, integrator, and differentiator.		r.	K3	
CO5	The concept of digital storage oscilloscope and compare of		are of	K5	
DSO with analog oscilloscope					
Pre-requisites:					
•	Course Content / Sullabus				
***	Course Content / Syllabus			10 **	
UNIT-I	UNIT-I			10 Hours	
<b>P-N</b> junction	diode: Introduction of semiconductor materials	; Semico	onductor	r diode: Depletion	
layer, V-I ch	aracteristics, ideal and practical, diode resistan	ice, capa	citance,	diode equivalent	
circuits, trans	circuits, transition and diffusion capacitance, Zener diodes breakdown mechanism (Zener and				
avalanche)					

UNIT-II		7 Hours
Diode applica	ation: Series, parallel and series, parallel diode configuration, ha	lf and full wave
rectification, c	lippers, clampers, Zener diode as shunt regulator, voltage-multiplie	er circuits special
purpose two t	erminal devices : light-emitting diodes, Varactor (Varicap) diode	s, tunnel diodes,
liquidcrystal d	isplays.	
UNIT-III		9 Hours
Bipolar junct	ion transistors and field effect transistor: Bipolar junction trans	sistor: Transistor
construction, o	operation, amplification action, common base, common emitter, co	ommon collector
configuration	dc biasing BJTs: operating point, fixed-bias, emitter bias, volt	tage-divider bias
configuration.	Collector feedback, emitter-follower configuration. Bias stabilization	ion. CE, CB, CC
amplifiers and	A AC analysis of single stage CE amplifier (re Model), Field	effect transistor:
Construction a	and characteristic of JFETs. AC analysis of CS amplifier, MOSFE	T (depletion and
enhancement)	type, transfer characteristic.	
UNIT-IV		8 Hours
Operational an	nplifiers: Introduction and block diagram of Op-Amp, ide	eal & practical
characteristics of	f Op-Amp, differential amplifier circuits, practical Op-Amp ci	rcuits (inverting
amplifier, non-i	nverting amplifier, unity gain amplifier, summing ampli	fier, integrator,
	pAmp parameters: input offset voltage, output offset voltage, input	it biased current,
input offset curre	nt differential and common-mode operation.	
UNIT-V		8 Hours
oscilloscope, sim	rs: Introduction Oscilloscope: introduction, basic principle, CRT, b ple, measurement of voltage, current phase and frequency using C oscilloscope and comparison of DSO with analog oscilloscope.	-
Course outcome	:	
At the end of the	course the students will be able to	Levels
<b>CO</b> 1	Understand the concept of PN junction and special purpose diodes	K2
<b>CO 2</b>	Study the application of conventional diode and semiconductor diode.	K4
CO 3	Analyse the I-V characteristics of BJT and FET	K2
<b>CO 4</b>	Analyze the of Op-Amp, amplifiers, integrator, and differentiator.	К3
CO 5	Understand the concept of digital storage oscilloscope and	K3
	compare of DSO with analog oscilloscope	
Text books	1	
	lestand / Louis Nashelsky, "Electronic Devices and Circuit Theory,	" Latest Edition
Pearson Educatio		, Eurosi Earrion,
	ectronic Instrumentation", Latest Edition, TMH Publication.	
	A.K. singh "fundamental of electronics Engineering", New a	age international
nublisher	······································	0

publisher.