

I YEAR- I SEMESTER

	G		Ins (hrs	structio s per w	ons reek)		Evaluation					
S.NO.	Course	Name of the Course	ıry	ica	its	Inte	ernal Exam		External	Exam	Total Marks	
	rumber		Theo	Pract I	Cred	Duration in hrs	Max. Marks		Duration in hrs	Max. Marks		
1	BST02	Environmental Studies	4	-	4	2	30)	3	70	100	
2	BST03	Engineering Mathematics – I	4	-	4	2	30)	3	70	100	
3	BST04	Engineering Chemistry	4	-	4	2	30)	3	70	100	
4	CST01	Problem Solving and Computer Programming	4	-	4	2	30)	3	70	100	
5	MET02	Engineering Mechanics	4	-	4	2	30)	3	70	100	
PRAC	FICALS											
			Ins (hrs	structio s per w	ons reek)		Eva	aluation				
S.NO.	Course	Name of the Course	Ins (hrs	structio s per w न्त्र	ons reek)	Continuous	Eva Internal	aluation Exam	External	Exam	Total	
S.NO.	Course Number	Name of the Course	Theory / Julian Tutorial	bitructic Bractical Bractical	Credits	Continuous Evaluation Max Marks	Eva Internal Duration hrs	aluation Exam Max. Marks	External Duration in hrs	Exam Max. Marks	Total Marks	
S.NO.	Course Number MEP01	Name of the Course Engineering Graphics	Theory / Jutorial Juto	btructic w raq a bractical 4	ons eek) Credits 2	Continuous Evaluation Max Marks 20	Eva Internal Duration hrs 2	Aluation Exam Max. Marks 20	External Duration in hrs 3	Exam Max. Marks 60	Total Marks 100	
S.NO. 6 7	Course Number MEP01 MEP02	Name of the Course Engineering Graphics Workshop Practice	Theory / Tutorial Lutorial	bractical Bractical 4 2	Dins reek) Credits 2 1	Continuous Evaluation Max Marks 20 20	Eva Internal Duration hrs 2 2 2	Aluation Exam Max. Marks 20 20	External Duration in hrs 3 3	Exam Max. Marks 60 60	Total Marks 100 100	
S.NO. 6 7 8	Course Number MEP01 MEP02 BSP02	Name of the Course Engineering Graphics Workshop Practice Engineering Chemistry Lab	aul Theory / Tutorial	Structic s per w s per w lange lange 4 2 2	Dins reek) Credits 2 1 1	Continuous Evaluation Max Marks 20 20 20	Eva Internal Duration hrs 2 2 2 2 2	Aluation Exam Max. Marks 20 20 20	External Duration in hrs 3 3 3	Exam Max. Marks 60 60 60	Total Marks 100 100 100	
S.NO. 6 7 8 9	Course Number MEP01 MEP02 BSP02 CSP01	Name of the Course Engineering Graphics Workshop Practice Engineering Chemistry Lab Computer Programming Lab	aul Theory / Tutorial	A Construction of the second s	Credits 2 1 1 1	Continuous Evaluation Max Marks 20 20 20 20 20	Eva Internal Duration hrs 2 2 2 2 2 2 2	Aluation Exam Max. Marks 20 20 20 20 20	External Duration in hrs 3 3 3 3 3	Exam Max. Marks 60 60 60 60 60	Total Marks 100 100 100 100	





Instructions Evaluation (hrs per week) Course Total S.NO **Internal Exam External Exam** Practical Credits Theory Mark Numbe Name of the Course Max. r Duration Duratio S Mark Max. Marks in hrs n in hrs S BST01 2 30 70 English 4 4 3 100 1 _ Engineering Mathematics -BST06 2 4 4 2 30 3 70 100 _ Π BST05 **Engineering Physics** 30 3 2 3 70 100 4 4 _ 4 CST02 4 2 30 3 70 100 4 Data Structures _ Electronic Materials and 5 ECT01 4 2 30 3 100 4 70 _ Devices Advanced Engineering MET04 2 2 30 3 100 6 70 4 4 Graphics PRACTICALS Instructions **Evaluation** (hrs per week) Total Course Continuou **Internal Exam External Exam** S.NO Practical Tutorial Credits Theory / Name of the Course Mark Numbe S Max. . **Evaluation** r S Duratio Max. Duratio Mark Max n hrs Marks n in hrs S Marks BSP01 English Language Lab 20 7 2 2 20 3 60 100 1 _ 8 BSP03 **Engineering Physics Lab** 2 20 2 20 3 100 1 60 _ 9 CSP02 Data Structures Lab 2 20 2 20 3 60 100 1 _ TOTAL 22 10 27 900 -_ _ -_

I YEAR- II SEMESTER



			Ins	structio	ons		Eva	aluation			
S.NO	Course	Nome of the Course	(nrs	s per w		Inte	ernal Exam		External	Exam	Total Mark
•	r	Name of the Course	Theory	Practic	Credit	Duration in hrs	Max. N	larks	Duratio n in hrs	Max. Mark s	s S
1	BST08	Probability & Statistics	4	-	4	2	30)	3	70	100
2	MET01	Thermodynamics	4	-	4	2	30)	3	70	100
3	MET03	Material Science & Metallurgy	4	-	4	2	30)	3	70	100
4	MET05	Strength of Materials	4	-	4	2	30)	3	70	100
5	EET17	Basic Electrical Engineering	4	-	4	2	30)	3	70	100
6	MET06	Machine Drawing	2	4	4	2	30)	3	70	100
PRAC	ΓICALS										
			Ins (hrs	structio s per w	ons 'eek)		Eva	aluation			
S.NO	Course		/ 1	I		Continuou	Internal	Exam	External	Exam	Total
•	Numbe r	Name of the Course	Theory Tutoria	Practica	Credits	s Evaluation Max Marks	Duratio n hrs	Max. Marks	Duratio n in hrs	Max. Mark s	Mark s
7	EEP08	Electrical Engineering Lab & Electronics Engineering	-	2	1	20	2	20	3	60	100

II YEAR- I SEMESTER



		Lab									
8	MEP03	Mechanics of Solids lab & Material Science Lab	-	2	1	20	2	20	3	60	100
		TOTAL	22	8	26	-	-	-	-	-	800



II YEAR- II SEMESTER

	G		Ins (hrs	tructio per w	ons eek)		Eva	aluation			T (1
S.NO.	Course Number	Name of the Course	iry	ical	its	Inte	rnal Exam		External	Exam	Total Marks
	Tumber		Theo	Pract	Cred	Duration in hrs	Max. N	larks	Duration in hrs	Max. Marks	warks
1	BST09	Managereial Economics & Financial Analysis	4	-	4	2	30)	3	70	100
2	MET07	Thermal Engineering	4	-	4	2	30)	3	70	100
3	MET08	Manufacturing Processes	4	-	4	2	30		3	70	100
4	MET09	Kinematics of Machinery	4	-	4	2	30)	3	70	100
5	MET10	Fluid Mechanics & Hydraulic Machinery	4	-	4	2	30)	3	70	100
6	MET11	Design of Machine Members-I	4	-	4	2	30)	3	70	100
PRAC	FICALS										
			Ins (hrs	tructio per w	ons reek)		Eva	aluation			
S.NO.	Course	Name of the Course	y/ ial	cal	its	Continuous	Internal	Exam	External	Exam	Total
	Number		Theor Tutor	Practi	Credi	Evaluation Max Marks	Duration hrs	Max. Marks	Duration in hrs	Max. Marks	Marks
7	MEP04	Manfacturing processes Lab	-	2	1	20	2	20	3	60	100
8	MEP05	Fluid Mechanics & Hydraulic Machinery Lab	-	2	1	20	2	20	3	60	100



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III YEAR- I SEMESTER

	~		Ins (hrs	structio s per w	ons reek)		Eva				
S.NO.	Course	Name of the Course	ry	ical	its	Inte	ernal Exam		External	Exam	Total Marks
	Tumber		Theo	Practi	Cred	Duration in hrs	Max. N	larks	Duration in hrs	Max. Marks	
1	MET12	IC Engines & Gas Turbines	4	-	4	2	30)	3	70	100
2	MET13	Metal Cutting & Machine Tools	4	-	4	2	30)	3	70	100
3	MET14	Dynamics Of Machinery	4	-	4	2	30)	3	70	100
4	MET15	Design of Machine Members-II	4	-	4	2	30)	3	70	100
5	MET16	Instrumentation & Control Systems	4	-	4	2	30)	3	70	100
6	MET17	Industrial Engineering & Management	4	-	4	2	30)	3	70	100
PRAC	TICALS										
			Ins (hrs	structio s per w	ons reek)		Eva	aluation			
S.NO.	Course	Name of the Course	y/ ial	cal	ts	Continuous	Internal	Exam	External	l Exam	Total
	Number		Theor. Tutori	Practic	Credi	Evaluation Max Marks	Duration hrs	Max. Marks	Duration in hrs	Max. Marks	Marks
7	MEP06	Machine Tools lab	-	2	1	20	2	20	3	60	100
8	MEP07	I C Engines Lab	-	2	1	20	2	20	3	60	100
	T	OTAL	24	4	26	-	-	-	-	-	800



III YEAR -II SEMESTER

			In (hr	Instructions (hrs per week)			Ev	aluation			
S.NO.	Course	Name of the Course	ý	ial ,	ŢS_	Int	ernal Exam		Externa	l Exam	Total
	Number		Theor	Practic	Credi	Duration in hrs	Max. N	Marks	Duration in hrs	Max. Marks	Marks
1	MET18	Operations Research	4	-	4	2	30)	3	70	100
2	CST42	Computer Graphics	4	-	4	2	30)	3	70	100
3	MET19	Finite Element Method	4	-	4	2	30)	3	70	100
4	MET20	Engineering Metrology	4	-	4	2	30)	3	70	100
5	MET26 MET27 MET28 CSP 13	Elective-I 1. Non Conventional Sources of Energy 2.Tool Design 3. Mechatronics 4.Advanced programming languages lab	4	-	3	2	3()	3	70	100
6	MET29 MET30 MET31 MUP01 MUP02 MUP03	Elective-II 1.Nano Technology 2. Composite Materials 3.Power Plant Engineering 4.Music 5.Bharatha Natyam 6.Kuchipudi	4	-	3	2	3()	3	70	100
	G		In (hr	structions per w	ons eek)		Ev	aluation			
S.NO.	Course Number	Name of the Course	ry ial	cal	its	Continuous	Internal	Exam	External	l Exam	1 Otal Morlea
	number		Theor	Practi	Credi	Evaluation Max Marks	Duration hrs	Max. Marks	Duration in hrs	Max. Marks	
7	CSP12	Computer Graphics lab	_	2	1	20	2	20	3	60	100



8	MEP08	Instrumentation & Dynamics lab	-	2	1	20	2	20	3	60	100
9	MEP09	Metrology Lab	-	2	1	20	2	20	3	60	100
		TOTAL	23	6	24	-	-	-	-	-	900



C M	Course Name of the Course		Ins (hrs	structio s per we	ns eek)	Evaluation				Total
S.N	Course	Name of the Course	ry	cal	its	Inte	rnal Exam	External	l Exam	Total
U.	Number		heo	acti	redi	Duration in	Max Marks	Duratio	Max.	Marks
			Τ	Pr	C	hrs	With With KS	n in hrs	Marks	
1	MET21	CAD / CAM	4	-	4	2	30	3	70	100
2	MET22	Heat Transfer	4	-	4	2	30	3	70	100
3	MET23	Automobile Engineering	4	-	4	2	30	3	70	100
4	MET24	Modern Machining Processes	4	-	4	2	30	3	70	100
5	MET32 MET33 MET34	Elective - III 1. 1.Refrigeration & Air Conditioning 2. Industrial Robotics 3.Simulation & Modelling	4	-	3	2	30	3	70	100
6	MET35 MET36 MET37	ELECTIVE -IV 1. Computational fluid dynamics 2. Automation in Manufacturing 3. Innovation & Entreprenuership 4.MOOCS	4	-	3	2	30	3	70	100
PRAC	TICALS							·	·	
S.N	Course	Name of the Course	Ins	structio	ns	Evaluation				

IV YEAR- I SEMESTER



0.	Number		(hrs	s per w	eek)						Marks
			'/ al	al	Ś	Continuous	Internal	Exam	Externa	l Exam	
			Theory Tutoria	Practic	Credit	Evaluation Max Marks	Duration hrs	Max. Marks	Duratio n in hrs	Max. Marks	
7	MEP10	CAD /CAM lab	-	2	1	20	2	20	3	60	100
8	MEP11	Heat Transfer lab	-	2	1	20	2	20	3	60	100
		TOTAL	24	4	24	-	-	-	-	-	800

IV YEAR- II SEMESTER

S.NO	Course	Name of the Course	Instructions	Evaluation	Total
	Number	Name of the Course	(hrs per week)	Evaluation	Marks



			ory	ical	lits	Inte	ernal Exam		External	Exam	
			Theo	Practi	Cred	Duration in hrs	Max. N	Marks	Duration in hrs	Max. Marks	
1	MET25	Production Systems	4	-	4	2	30)	3	70	100
2	MET38 MET39 MET40	Elective - V 1.Welding Technology 2. Total Quality Management 3. Non Destructive Testing	4	-	3	2	3()	3	70	100
3	MET41 MET42 MET43	Elective - VI 1.Project Management 2.Supply Chain Management 3.Experimental Stress Analysis	4	-	3	2	3()	3	70	100
PRAC	FICALS										
	G		Ins (hrs	structio s per we	ns eek)		Ev	aluation			
S.NO	Course Number	Name of the Course	ry / rial	ical	lits	Continuous	Internal	Exam	External	Exam	Total Marks
	1 tunioor		Theo	Pract	Cred	EvaluationDurationMax.Max MarkshrsMarks		Max. Marks	Duration in hrs	Max. Marks	
7	MEP12	Project Work		12	6	20		20		60	100
		TOTAL	12	12	16			-	-	400	

BST02 ENVIRONMENTAL STUDIES

(COMMON TO CSE AND ME)

Internal Marks: 30



University Examination Marks: 60

Unit I

Environmental Studies and Natural Resources-Definition of environment, Scope and importance of Environment, Environmental studies, Need for public awareness.

Renewable and **Non Renewable Resources and associated problems and case studies-**Uses, consequences of exploitation and remedial measures- (i) Water resources, (ii) Forest resources, (iii) Land resources, (iv) Mineral resources, (v) Food resources, (v*i*) Energy resources.

Unit II

Environmental pollution and Global Effects- Definition, Causes, Effects, and control measures of pollution- Air pollution, Water

pollution, Soil pollution, Marine pollution, Noise pollution.

Solid waste Management- Causes, effects and disposal methods; Role of an individual in prevention of pollution; case studies.

Climate changes- Global warming, Acid rain, Ozone depletion

Unit III

Disaster management- Earthquakes, cyclone, avalanches, land slides, Tsunami.

Environment and Human health- Epidemic diseases and pathology of Hepatitis-b, HIV/AIDS, Malaria, Typhoi, Chikungunya, Avian Flue, anthrax, *etc*.

Water Conservation- Rain water harvesting- watershed management.

Waste land reclamation.

Unit IV

Ecosystem- Definition -Structure and functions of an ecosystem; types of ecosystems. Biodiversity and its conservation- Importance

of biodiversity -Hot-spots of biodiversity, India as a mega-diversity nation; Threats and Conservation of biodiversity. Case Studies.



Unit V

Social Issues- Population Explosion, Sustainable Development

Environmental Impact Assessment, Environmental Risk assessment (ERA), Clean Production and Life cycle assessment. **Environment Legislation:** Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act,

Issues involved in Enforcement of Environmental legislation.

REFERENCE BOOKS:

- 1. Kaushik & Kaushik Environmental Studies" McGraw Hill, New York, 1996.
- 2. Canter, L.W., "Handbook of Environmental Impact Assessment Vol.I and II", The World Bank, Washington, 1991.
- Pelczer, Jr., M. J., Chan, e. C. S., Krieg, R. Noel., and Pelczar Maerna Foss, "Microbiology", 5th Edn., Tata McGraw Hill Publishing Company Lmited, New Delhi – 1996.
- 4. METCALF & EDDY, INC. "Wastewater Engineering Treatment Disposal, and Reise', Third Edition, Taya McGraw Hill Publishing Company Limited, New Delhi-1995.
- 5. CSSEY.I.J. 'Unit Treatment processes in and Waste water Engineering', John Wiley & Sons England 1993.

BST03 - ENGINEERING MATHEMATICS - I



University Examinations Marks: 70

UNIT - I

Calculus: Roll's and Mean value theorems, Taylor's theorem, Maclaurins theorem - Maxima & minima for functions of two variables – Curve tracing.

UNIT - II

Multiple integrals: Double and triple integrals, Change of order of integration, Change of variables – Simple applications – areas & volumes.

$\mathbf{UNIT}-\mathbf{III}$

Differential Equations-I: Exact, Linear and Bernoulli's equations, orthogonal trajectories; Homogeneous and Non-Homogeneous linear differential equations of second and higher order with constant coefficients.

$\mathbf{UNIT}-\mathbf{IV}$

Differential Equations-II: Linear equations with variable coefficients - Euler equations, Method of variation of parameters,

Simultaneous equations.

$\mathbf{UNIT} - \mathbf{V}$

Vector Calculus: Gradient, Divergence, Curl and related properties; Line, surface and volume integrals; Stokes, Greens and Gauss-Divergence theorems.

Text books:

- 1. Higher Engineering Mathematics, 42nd Edition, Grewal, B.S., Khanna Publications, New Delhi.
- 2. Engineering Mathematics, Vol-I, II, Dr. M.K. Venkata Raman, National Publishing Co., Madras.
- 3. Advanced Engineering Mathematics, 9th Edition, Erwin Kresyzing, Wiley Eastern Ltd., New Delhi.
- 4. Engineering Mathematics, 6th Edition, B.V. Ramana, Tata McGraw Hill, New Delhi.

CST01 PROBLEM SOLVING AND COMPUTER PROGRAMMING



Credits: 4

Internal Marks: 30 University Examinations Marks: 70

UNIT I

Introduction to Problem Solving: Introduction to Computer Systems, Computer Environments, Computer Languages, Problem Solving Aspects, Top-Down Design, Development of Algorithms, Representation of Algorithm, Flow Chart, Pseudo Code, Coding, Testing and Debugging.

UNIT II

History of C programming Language, form of a C program - Comments, pre-processor statements, function header statements, variable declaration statements and executable statements.

C character set, C tokens- constants, identifiers, operators, punctuations and keywords. Basic data types, modifiers, identifiers, variables, C Scopes, Type qualifiers, Storage Class Specifiers, variable initializations and constants, I/O statements, operators, expressions, operator precedence and associativity.

Category of Statements - Selection, Iteration, Jump, Label, Expression and Block.

UNIT III

Functions - Declaration, Prototype definition, calling by value and address, Standard Library Functions, Recursive Functions.

Arrays and strings - Declaration, Initialization, Reading and Writing, Accessing, and Passing as a parameter to functions, Multidimensional arrays, String functions.

UNIT IV

Pointers - pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointers to functions, Dynamic memory allocation functions.

Structures - declaration, initialization, accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, Unions, Bit-fields, typedef, and enumerations.



UNIT V

Files - I/O and processing operations on Text and binary files, Pre-processor directives and Command Line Arguments.

Text Books:

- 1. Schildt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
- 2. Balagurusamy E, Programming in ANSI C, 4th Edition, Tata McGraw-Hill, 2008
- 3. R.G.Dromey, How to Solve it by Computer, PHI.

Reference Books:

- 1. Let us C, Yeswanth Kanitkar, Ninth Edition, BPB Publications.
- 2. Programming In C, Second Edition- Pradip Dey, Manas Ghosh, Oxford University Press.

MET02 ENGINEERING MECHANICS



University Examinations Marks: 60

UNIT - I

Introduction of Engineering Mechanics – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams – Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II

Friction : Types of friction- laws of Friction - Limiting friction- Cone of limiting friction- static and Dynamic Frictions - Motion of bodies - Wedge and Screw jack

UNIT – III

Centroid and Center of Gravity: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures.

Mass Moment of Inertia: Moment of Inertia of Simple solids – Moment of Inertia of composite masses. (Simple problems only)

UNIT – IV

Kinematics: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

Kinetics: Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies

$\mathbf{UNIT} - \mathbf{V}$

Analysis of Perfect Frames: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.



Text Books:

- (1) Engineering Mechanics by Jayakumar, Kumar, PHI, 2014
- (2) Singer's Engineering Mechanics Statics and Dynamics, Vijay Kumar Reddy, Suresh Kumar. BS Publications 2015
- (3) Engineering Mechanics B. Bhattacharyya, Oxford University Publications, 2015

MEP 01 ENGINEERING GRAPHICS

Credits: 2

Internal Marks: 40 University Examinations Marks: 60



Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance-Conventions in Drawing-Lettering – BIS Conventions.

Scales: Plain scales and Diagonal scales

Conics: Construction of ellipse, parabola and hyperbola using eccentricity method

Ellipse: Concentric circles method, Oblong method, arcs of circles method

Parabola: - Rectangular method, parallelogram method, Rectangular hyperbola

UNIT II

Special curves: - Cycloids, Epicycloids and Hypocycloids

Involutes:- Involutes of a circle and polygons

Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Straight Lines: Projections of lines inclined to single plane Projections of lines inclined to both planes - True lengths and true inclinations.

Projections of Planes: Projections of regular plane surfaces (polygons, circular lamina) - plane surfaces inclined to one plane- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Right Regular Solids (prisms, pyramids, cone, and cylinder) axis inclined to one plane

Sections of Solids: Sections of simple Solids in simple vertical position Cutting plane inclined to one plane and perpendicular to the other plane.

Developments of Surfaces: Development of Surfaces of Right Regular solids like prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone).

Conversion of isometric Views to Orthographic Views of simple objects

Text Books:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers



2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai. **References:**

- 1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers, 2014
- 2. Engineering Drawing, N.S Patha sarathy, vela murali, Oxford University Press, 2015
- 3. Engineering Graphics D.A.Hindoliya, BSP publications, 2014
- 4. Engineering Graphics, K.C.John, PHI,2014

MEP02 : WORKSHOP PRACTICE (COMMON TO ALL BRANCHES)



Carpentry

Wood sizing exercise in planning, marking, sawing, chiseling and grooving to prepare Half – lap joint

- 1. Dove tail joint
- 2. Tenon joint

Fitting

Markings, cutting and filing to prepare

- 1. Straight fitting
- 2. V fitting
- 3. Square fitting

Tin smithy

Markings, bending and cutting to prepare

- 1. Round tin
- 2. Square tin

Foundry

Ramming and placing of riser and runner to prepare the moulds for the following

- 1. Two-stepped pulley
- 2. Three stepped pulley
- 3. Dumbell

Electrical Wiring Shop:

Safety rules and practices in wiring, basic circuits, Common House wiring connections such as parallel and series connections, bell circuit.

Reference Text Books:

- 1. Workshop Manual by K. Venkat Reddy
- 2. Elementary Workshop Technology by Hazara Chowdary & Bhattaaaacharya
- 3. Workshop Technology Vol I & II by Raghuvamsi.



BSP02 ENGINEERING CHEMISTRY LAB

Internal Marks: 40 University Examinations Marks: 60

Credits: 1



LIST OF EXPERIMENTS (Minimum Seven are Mandatory)

- 1. To determine the strength of KMnO4 solution by titrating it against a standard solution of Oxalic acid.
- 2. Determination of hardness of water by EDTA method.
- 3. Estimation of acidity of Water
- 4. Estimation of Dissolved oxygen in water sample
- 5. Determination of Iron by using potassium dichromate
- 6. Estimation of copper by EDTA method
- 7. Estimation of chloride in water sample.
- 8. Conductomeric titration of strong acid with strong base
- 9. Potentiometric titration of Iron by dichrometry method
- 10. Colorimetric estimation of manganese
- 11. Estimation of Glucose

CSP01 PROBLEM SOLVING AND COMPUTER PROGRAMMING LAB

Credits: 1

Internal Marks: 40 University Examinations Marks: 60



List of Experiments:

- 1. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
- 2. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, To read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
- 3. Write a program to find the roots of a Quadratic equation.
- 4. Write a program to compute the factorial of a given number.
- 5. Write a program to check whether the number is prime or not.
- 6. Write a program to find the series of prime numbers in the given range.
- 7. Write a program to generate Fibonacci numbers in the given range.
- 8. Write a program to find the maximum of a set of numbers.
- 9. Write a program to reverse the digits of a number.
- 10. Write a program to find the sum of the digits of a number.
- 11. Write a program to find the sum of positive and negative numbers in a given set of numbers.
- 12. Write a program to check for number palindrome.
- 13. Write a program to evaluate the sum of the following series up to 'n' terms

 $e^{x}=1+x+x^{2}/2!+x^{3}/3!+x^{4}/4!+\cdots$

- 14. Write a program to generate Pascal Triangle.
- 15. Write a program to read two matrices and print their sum and product in the matrix form.
- 16. Write a program to read matrix and perform the following operations.

i. Find the sum of Diagonal Elements of a matrix.

ii. Print Transpose of a matrix.

iii. Print sum of even and odd numbers in a given matrix.

17. Write a program to accept a line of characters and print the number of Vowels, Consonants, blank spaces, digits and special characters.



- 18. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
- 19. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
- 20. Write a program to split a 'file' in to two files, say file1 and file2. Read lines into the 'file' from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
- 21. Write a program to merge two files.
- 22. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.
- 23. Write a program to read a set of strings and sort them in alphabetical order.
- 24. Write a program to exchange two numbers using pointers.
- 25. Write a program to read student records into a file. Record consists of roll no, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
- 26. A file consists of information about employee salary with fields employee id, name, Basic, HRA, DA, IT, other deductions, Gross and Net salary. Initially only employee id, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
- 27. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
- 28. Write a program to find the square root of a number without using built-in library function.
- 29. Write a program to convert from string to number.
- 30. Write a program to implement pseudo random generator.
- 31. Write a program to generate multiplication tables from 11 to 20.
- 32. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
- 33. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
- 34. Write a program to find the execution time of a program.
- 35. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels.



BST01 ENGLISH

Internal Marks: 30 University Examination Marks: 70

Credits: 4



UNIT – I

Inspiration: Reaching for the Stars. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing. **Information Technology:** A Very Short History of Computer Ethics. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

UNIT – II

Writing English: Letter Writing, Résumé writing, Electronic Mode of Writing, Information Transfer, Note Taking & Reading Comprehensive.

UNIT-III

Travel and Transport: The Climb to Annapurna. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing. **Media:** Freedom of Press, Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

$\mathbf{UNIT} - \mathbf{IV}$

Human Interest: A Service of Love. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing. **Environment**: Water. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

UNIT - V

Grammar: Tenses: Past and Present, Fundamentals of Grammar, Correction of Sentences.

TEXT BOOKS:

Learning English: A communicative Approach – Orient Longman A Manual for English Language Laboratories – D.Sudha Rani - Pearson

REFERENCES:

- 1. Hancock, Mark, English Pronunciation in Use CUP
- 2. Murphy, Raymond, Essential English Grammar CUP
- 3. English vocabulary in use CUP
- 4. M. Gnanamurali. English Grammar at a Glance S.Chand& Company Ltd.
- 5. LeenaSen, Communication Skills Prentice Hall of India



BST06 ENGINEERING MATHEMATICS – II

Internal Marks: 30 University Examinations Marks: 70

Credits: 4



Laplace Transforms: Laplace transforms of standard functions, Transform of Periodic functions, Step function, Inverse transforms of derivatives and integrals, Convolution theorem, applications to solutions of ordinary differential equations.

UNIT - II

Matrices: Rank, solution of system of linear equations, Eigen values, Eigen vectors, Cayley Hamilton theorem, Quadratic forms – Diagonalization.

UNIT – III

Partial Differential Equations: Formation of PDEs by elimination of arbitrary constants and arbitrary functions, Method of separation of variables, one dimensional wave equation, heat equation, Laplace equation.

UNIT – IV

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation by Gauss elimination method, Gauss matrix and Gauss – Seidal iteration method. **Interpolation:** Newton's forward and backward interpolation formulae – Lagrange's formulae.

$\mathbf{UNIT} - \mathbf{V}$

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method, Runge-Kutta Methods, Predictor-Corrector Method-Milne's Method.

Text books:

- 1. Higher Engineering Mathematics, 42nd Edition, Grewal, B.S., Khanna Publications, New Delhi.
- 2. Engineering Mathematics, Vol-I, II, Dr. M.K. Venkata Raman, National Publishing Co., Madras.
- 3. Advanced Engineering Mathematics, 9th Edition, Erwin Kresyzing, Wiley Eastern Ltd., New Delhi.
- 4. Engineering Mathematics, 6th Edition, B.V. Ramana, Tata McGraw Hill, New Delhi.

BST05 ENGINEERING PHYSICS



UNIT I:

Principles of Quantum Mechanics: Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer's Experiment, Heisenberg's Uncertainty Principle

Schrödinger's Time depended and Independent Wave Equation - Physical Significance of the Wave Function - Particle in a one dimensional infinite potential well

UNIT-II:

Band Theory of Solids: Classical free electron theory of metals-Success and Failures-Quantum free electron theory-Fermi Factor-Electron in periodic potential-Bloch Theorem- Kronig-Penny Model

Distinction between metals, Insulators and semiconductors-Intrinsic and Extrinsic semiconductors-Hall effect

UNIT – III:

Semiconductors : Introduction, intrinsic and extrinsic semiconductors, direct and indirect band gap semiconductors, carrier concentration, electrical conductivity in semiconductors, drift and diffusion, Hall effect, p-n junction diode, diode equation, LED, LCD and photo diode

Superconductivity: General properties, Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory, applications of superconductors.

UNIT IV:

Lasers & Fiber Optics: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and Relation between them, Population Inversion, Lasing Action, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers



Principle of Optical Fiber, Construction of fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers: Step Index and Graded Index Fibers, Attenuation in Optical Fibers, Application of Optical Fiber in communication systems.

Unit V:

Nano Materials: Introduction-properties: optical properties-quantum confinement-electrical properties-synthesis of nano materials: Ball milling, arc deposition, chemical vapour deposition, pulsed laser deposition methods characteristics of C (zero dimensional), Carbon nanotubes (1 dimensional), Graphene (2 dimensional). Applications of nanomaterials.

Text Books:

- 1. Engineering Physics V. Rajendran, K. Thyagarajan Tata MacGraw Hill Publishers, III Edition, 2012.
- 2. Engineering physics M.N. Avadhanulu and P.G. KshirSagar, S.Chand and Co, Revised Edition, 2013.
- 3. Engineering Physics M. Arumugam, Anuradha Publications II Edition, 1997
- 4. Engineering Physics Hitendra K Mallik and AK Singh, McGraw Hill Education Pvt. Ltd, New Delhi , I Edition, 2010

Reference Books:

- 1. Modern Physics- R.Murugeshan, Er.Kiruthiga Sivaprasath, S.Chand and Co, Revised Edition, 2013.
- 2. A Text book of Quantum Mechanics- Sathya prakash
- 3. Introduction to solid state physics, Kittel, Wiley Eastern Ltd., 2003
- 4. Principles of Electronics-V.K.Mehta, S.Chand and Co, Revised Edition 2008.
- 5. Fiber Optics & Laser The Two Revolutions-Ajoy Ghatac&K.Thiyagarajan,Macmillan Publishers India Ltd,2006.
- 6. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.

CST02 DATA STRUCTURES



Credits: 4

Internal Marks: 30 University Examinations Marks: 70

UNIT-I

An overview of C++ Programming, OOPS Concepts, Data Abstraction with C++, Concept of the Inheritance, Concept of Polymorphism, Friend Functions, Inline Functions, Exception Handling.

UNIT – II

Introduction to Data Structures, Types of Data Structures, Abstract Data Types, Complexity of an algorithm, Arrays; Linked Lists : Introduction, Single Linked List, Double, Circular Lists, Stacks, Queues and their Operations and Applications.

UNIT – III

Trees: Basic Terminologies- Definition and Concepts- Representations of Binary Tree- Operation on a Binary Tree- Types of Binary Trees-Binary Search Trees, Heap Trees, Height Balanced Trees, AVL Trees, B-Trees.

Graphs: Introduction- Graph terminologies- Representation of graphs- Operations on Graphs- Application of Graph Structures: Shortest path problem- topological sorting.

UNIT – IV

Hashing: Basic Concepts of Hashing Methods, Hash Tables, Choosing a hash Function, Collision Resolutions, File Organisation-Sequential File Organization, ISAM, Direct Files.

UNIT - V

Sorting: Internal Sorting Techniques: Selection sort, Bubble sort ,Merge sort Quick sort, heap sort and Radix sort; Introduction to external sorting; Searching Techniques; Linear and Binary search.

Text Books:

- 1. Herbert Schildt; C++ ;Complete Reference C++.Fourth edition 2003
- 2. S.Sahni, "Data Structures, Algorithms and Applications in C++" Second Edifion, Orient Longman Pvt.ltd
- 3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C + +", Pearson Education, Second Edition.
- 4. 1. "Classic Data Structures", Second Edition by DebasisSamanta, PHI.



Reference Books:

- 1. J.P. Trembly and P.G. Sorensen, "An Introduction to Data Structures with Applications". Tata McGraw Hill, Third edition.
- 2. E.Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Book Source.
- 3. SartajSahni, "Data Structures, Algorithms and Applications in C++" Tata McGraw- Hill International Editions

ECT01 ELECTRONIC MATERIALS AND DEVICES

Credits: 4

Internal Marks: 30

University Examinations Marks: 70



UNIT – I

ELECTRON DYNAMICS AND CRO: Motion of charged particles in electric and magnetic fields. Simple problems involving Electric and Magnetic fields only. Principles of CRT. Deflection sensitivity Electrostatic and magnetic deflection systems. Applications of CRO.

UNIT - II

SEMICONDUCTORS AND PN JUNCTION DIODE: Conductors, Semiconductors and Insulators. Conductivity and mobility. Intrinsic and extrinsic semiconductors. Fermi level and carrier concentration of p and n type semiconductors. Drift and diffusion currents. Hall effect.

PN Junction diode. Volt-ampere characteristic and its temperature dependence – Diode resistance and capacitance, zener diode, varactor diode, Half-wave and full-wave rectifiers.

UNIT – III

BIPOLAR JUNCTION TRANSISTOR: Transistor action, NPN and PNP transistors CB, CE, CC configurations and their characteristics and parameters. Transistor as an amplifier. CB, CE and CC amplifiers and their comparison.

UNIT - IV

FIELD EFFECT TRANSISTOR: Characteristics and parameters of JFET, depletion and enhancement type MOSFETS. FET amplifier CS, CD, and CG amplifiers and their comparison.

Comparison of BJT and FET amplifiers, Characteristics and parameters of UJT and SCR.

UNIT V

OPTO ELECTRONIC DEVICES: Principles of operation and characteristics of Photo conductors, Photo diodes and transistors, Photovoltaic cells, Display devices LED and LCD. Seven segment display, Spontaneous emission, stimulated emission, population inversion, optical resonant cavity, Semiconductor Lasers.

TEXT BOOKS:

- 1. Millman and Halkias, "Electronic Devices and Circuits". Tata Mc Graw Hill & Co.
- 2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education.


3. Floyd, "Electronic Devices". Pearson Education.

MET 04 ADVANCED ENGINEERING GRAPHICS

Internal Marks: 30 University Examinations Marks: 70

Credits: 4



First Angle projection has to be adopted

UNIT-I:-

Projections of solids: Projections Of Solids Axis Inclined to Both the Planes

Auxiliary projections: - Auxiliary vertical plane, auxiliary inclined plane, auxiliary projections of points – lines – planes and solids using auxiliary plane method.

UNIT-II

Sections of solids & Developments- sectional planes and sectional views of right regular solids with sectional plane inclined to one plane, true shape of the section by auxiliary plane method.

Development of surfaces: Development of Surfaces for cut sections

UNIT-III

Interpenetration of solids- Projections of interpenetration solids with axes perpendicular and intersecting, axes inclined and intersecting for Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism

UNIT-IV

Isometric projections & views Isometric projections and views of machine parts

UNIT V

Perspective Projections: Perspective views of Plane figures and simple solids, Visual Ray method, Vanishing point method Conversion of isometric to orthographic & orthographic to isometric views for complex geometries and parts

Text Books:

- 1. Engineering Drawing, N.D. Bhat, Charotar Publishers
- 2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

References:

- 1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers, 2014
- 2. Engineering Drawing, N.S Patha sarathy, vela murali, Oxford University Press, 2015
- 3. Engineering Graphics D.A.Hindoliya, BSP publications, 2014
- 4. Engineering Graphics, K.C.John, PHI, 2014

BSP01 COMMUNICATIVE ENGLISH LABS

Internal Marks: 40 University Examination Marks: 60

Credits: 1



UNIT-I SPEAKING

- i) Speech Sounds: Vowels and Consonants
- ii) Accent & Rhythm: Word and Sentence Accent
- iii) Intonation: rising tone, falling tone.

UNIT – II WRITING

- i) Spelling and Punctuation
- ii) Dialogue Writing and Paragraph writing

UNIT- III ORAL PRESENTATIONS

- i) Panel Discussions (Group Discussion)
- ii) Just a minute (JAM), Debate, Role Play

UNIT - IV VOCABULARY

Missing words, Phrasal verbs and Idiomatic expressions, Proverbs

Number of Hours: 8

Number of Hours: 6

Number of Hours: 12

BSP03 ENGINEERING PHYSICS LAB

Credits: 1

Internal Marks: 40 University Examinations Marks: 60



LIST OF EXPERIMENTS (Minimum Six are mandatory)

- 1. Determination of Numerical aperture of an optical fiber
- 2. Youngs modulus non uniform bending optic lever
- 3. Calibration of voltmeter / ammeter using potentiometer
- 4. Spectrometer-Determination of angle of prism.
- 5. Laser-Determination of wavelength using grating.
- 6. Bending losses of fibres & Evaluation of numerical aperture of a given fibre
- 7. Regidity Modulus-Torsional pendulum
- 8. Post office box Determination of Band gap of a semiconductor

CSP02 DATA STRUCTURES LAB

Credits: 1

Internal Marks: 40 University Examinations Marks: 60



- 1. Write a program to sort the elements of an array using sorting by exchange.
- 2. Write a program to sort the elements of an array using Selection Sort.
- 3. Write a program to implement heap sort.
- 4. Write a program to perform Linear Search on the elements of a given array.
- 5. Write a program to perform Binary Search on the elements of a given array.
- 6. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
- 7. Write a program to implement stack, queue, circular queue using arrays and linked lists.
- 8. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list.
- 9. Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.
- 10. Write a program to remove duplicates from ordered and unordered arrays.
- 11. Write a program to sort numbers using insertion sort.
- 12. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
- 13. Write a program to search a word in a given file and display all its positions.
- 14. Write a program for tic-tac-toe game.
- 15. Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.
- 16. Write a program to implement depth first search and breadth first search on graphs.
- 17. Write a program to perform different operations on Red Black trees.
- 18. Write a program to implement external sorting.
- 19. Write a program to perform different operations of B Tree.

References:

1. Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.

2. Data structures and Algorithms using C++, Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education





DEPARTMENT OF MECHANICAL ENGINEEIRNG

BST08- PROBABILITY & STATISTICS

Lectures/Week: 4 Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

<u>UNIT – I</u> PROBABILITY & RANDOM

Theorems-Conditional probability-Baye's theorem.

Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectations, Mean and Variance.

VARIABLES: Probability- Axioms of Probability-some elementary

<u>UNIT – II</u>

PROBABILITY DISTRIBUTIONS: Binomial Distribution, Mean and Standard Deviations of Binomial Distribution, Poisson distribution, Mean and Standard Deviations of Poisson Distribution. Continuous Distributions: Normal Distribution, Mean, Variance and area properties.

<u>UNIT – III</u>

SAMPLING DISTRIBUTIONS, INFERENCES CONCERNING MEANS , INFERENCES CONCERNING VARIANCES

Populations and Samples, The Sampling Distribution of the Mean (σ Known), The Sampling Distribution of the Mean (σ Unknown), The Sampling Distribution of the Variance.

Point Estimation, Interval Estimation, Bayesian Estimation, Tests of Hypotheses, Null Hypotheses and Significance Tests, Hypotheses Concerning One Mean, Operating Characteristic Curves, Hypotheses Concerning Two Means, The Estimation of Variances, Hypotheses Concerning One Variance, Hypotheses Concerning Two Variances.

$\underline{UNIT}-IV$

INFERENCES CONCERNING PROPORTIONS AND CURVE FITTING: Estimation of

proportions, Bayesian Estimation, Hypotheses Concerning One Proportion, Hypotheses Concerning Several Proportions, The analysis of $r \times c$ Tables, Goodness of fit.

Curve fitting: The method of least squares-inferences based on the least squares estimators, Curvilinear Regression –Multiple Regressions, Correlation.

$\underline{UNIT} - \underline{V}$

ANOVA: Analysis of variance one way classification and two way classification Completely Randomized Designs. Reliability – Failure –Time Distributions-The exponential Model Reliability –The Weibull Model in Life Testing.



Text books:

- 1. Probability and Statistics for Engineers by Irwin Miller, John E.Freund.
- 2. Probability and Statistics by T.K.V.Iyengar & B.Krishna Gandhi Et
- 1. Fundamentals of Mathematical Statistics by S C Gupta and V.K.Kapoor
- 2. A text book of Probability and Statistics, Shahnaz Bathul, Ridge Publications.



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- Fundamentals of Applied Statistics,S.C.Gupta and V.K.Kapoor ,
 Engineering Mathematics B.V.Ramana Tata McGrawHill.



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET01-THERMODYNAMICS

Lectures/Week : 4Hrs Sessional Marks : 30

Credits:4

University Exam Marks : 70

UNIT – I

Basic Concepts Scope of Thermodynamics – Macroscopic and Microscopic properties Thermodynamic system – Control Volume – Thermodynamic Properties – Processes and cycles – Thermodynamic Equilibrium – Quasi static process – Zeroth Law Of Thermo dynamics – Measurement of temperature – Thermocouple – Work transfer – pdv work – Network done by a system – Specific heats and latent heat.

First Law of Thermodynamics: Energy – Different forms of stored energy – closed systems and steady flow systems – First law applied to flow process – Mass balance and energy balance in steady flow process – Perpetual motion machine of first kind.

UNIT – II

Boyle's Law – Charles Law – Characteristic equation of gas – Avagadro's Law – Joule's Law – First Law and non flow Processes Constant volume – Constant Pressure – Isothermal Hyperbolic – Adiabatic – free expansion and polytropic processes – Real gases Dalton's Law of pressures – Avogadro's Law – Gibb's – Dalton's Law of mixture of gases. Second Law of Thermodynamics: Limitations of first law – Heat engines and Heat reservoirs – Kelvin Planks statement of second law – Clausius inequality – refrigeration and heat pump reversibility and irreversibility – Carnot cycle – Reversible heat engine – Carnot Theorem – Corollaries – Efficiency of reversed heat engine.

UNIT – III

Entropy and availability: Claussiu's theorem – The property of entropy – temperature entropy plot – Principle of increase of entropy – Entropy changes in various thermodynamic processes. Availability: Availability energy referred to a cycle – The Helmholtz function and Gibb's functions – Availability in steady flow combined first law and second laws – Tds equations – energy equation – Joules Kelvin effect – Claussius – Clapeyron equation – Gibbs phase rule.

$\mathbf{UNIT} - \mathbf{IV}$

Gas Power cycles: Carnot cycle – Stirling cycle – Eriksson cycle – Air standard cycles – Otto cycle – Diesel cycle – limited pressure cycle Mixed cycle or duel cycle – Comparison of cycles – Brayton cycle.

UNIT – V

Fuels and Combustion: Conventional fuels – Calorific value of fuels (solid – liquid and gaseous) Experimental determination and calculation from chemical analysis – Combustion equations – Air required for complete combustion – Excess air – Determination of air fuel ratio and weight of flue gases.

Text Books:



- 1. Engineering Thermodynamics, P.K Nag, TMH Publishers, New Delhi, 5th Edition,2013.
- 2. Engineering Thermodynamics by P. Chattopadhya, Oxford,1st Revised ,2016



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Reference Books:

- 1. Thermodynamics for Engineers, Kenneth A. Kroos, Marle C.Potter, V.Pandurangadu.
- 2. Fundamentals of Thermodynamics Sonntag, Borgnakke and van wylen, John Wiley & sons
- 3. Thermodynamics An Engineering Approach YunusCengel& Boles, TMH, 2011.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET03- MATERIAL SCIENCE & METALLURGY

Lectures/Week: 4Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

UNIT – I

Structure of Metals and Constitution of alloys: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size. Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT –II

Equilibrium Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cus-Sn and Fe-Fe3C.

UNIT –III

Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels.

Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

$\mathbf{UNIT} - \mathbf{IV}$

Heat Treatment of Alloys: Effect of alloying elements on Fe-Fe3C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

UNIT – V

Ceramic and Composite Materials: Crystalline ceramics, glasses, cermaets, abrasive materials, nanomaterials – definition, properties and applications of the above.





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Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C - C composites.

TEXT BOOKS:

- 1. Introduction to Physical Metallurgy Sidney H. Avener McGrawHill
- 2. Essential of Materials science and engineering Donald R.Askeland Thomson.

REFERENCES :

- 1. Material Science and Metallurgy Dr. V.D.kodgire.
- 2. Materials Science and engineering Callister & Baalasubrahmanyam
- 3. Material Science for Engineering students Fischer Elsevier Publishers
- 4. Material science and Engineering V. Rahghavan
- 5. Introduction to Material Science and Engineering Yip-Wah Chung CRC Press





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET05 – STRENGTH OF MATERIALS

Lectures/Week: 4 periods

Internal Marks: 30

Credits: 4

End Examination Marks: 70

UNIT –I

Complex Stresses: Stresses on an inclined plane under different uniaxial, biaxial and triaxial stress conditions, Principal planes and principal stresses, Mohr's circle, Lateral Contraction.

UNIT – II

Bending Moments and Shear Forces: Beam – Types of loads, Types of supports, S.F. and B.M. diagrams for cantilever, simply supported and over hanging beams.

UNIT –III

Bending Stress in beams: Theory of simple bending – Assumptions – Derivation of bending equation. – Moment of Resistance of rectangular section, I Section and triangular section.

Shear stress: Equation for shear stress distribution across any cross section of beam –shear stress distribution across rectangular, circular, triangular, I-Sections.

UNIT –IV

Deflections of Beams: Relation between curvature, slope and defection, double Integration method, Macaulay's method, Moment area method.

Torsional Stresses in shafts and springs: Analysis of torsional stresses, Power transmitted, combined bending and torsion, Closed and open coiled helical springs. Laminated springs.

UNIT –V

Cylinders and Spherical Shells: Stresses and strains in thin cylinders, Thick Cylinders and Thin Spherical shells.

TEXT BOOK:

- 1. Strength of Materials by R.Subramaniam, oxford publishers.
- 2. Strength of Materials by S. Ramamrutham, Dhanpat Rai Publishers
- 3. Strength of Materials by R.K. Bansal, Laxmi Publishers, 5th Edition, 2012.
- 4. Mechanics of Materials, Andrews Pytel, Jaan Kiusallaas & M.M.M.Sarcar (Second Edition), Cengage Learning Publishers.

Reference Books:

- 1. Strength of Materials by R.K. Rajput, S.Chand& Company, 5th Edition, 2012.
- 2. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers, 10th Edition,2013.
- 3. Strength of Materials by M.Chakraborti, S.K.Kataria& Sons, 2nd Edition,2011.
- 4. Strength of Materials by S S Rattan, The McGraw-Hill Companies, 2nd Editon, 2011.



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DEPARTMENT OF MECHANICAL ENGINEEIRNG

EET17- BASIC ELECTRICAL ENGINEERING

(Common for CSE& ME Branches)

Lectures/week:4 Hrs

Sessional Marks:30

Credits:4

University exam marks:70

UNIT-I

DC Circuits: Active and passive elements – Ideal and practical sources – V –I Characteristics of R.L and C elements – Kirchhoffs laws, Mesh and nodal analysis – Concept of super mesh and super node.

Magnetic circuits: Basic definitions, Analogy between electric and magnetic circuits, magnetization characteristics of ferromagnetic materials, self inductance, mutual inductance, energy in linear magnetic systems, coils connected in series attracting force of electro magnets. Concept of coupling and dot convention.

UNIT-II

AC Circuits: Principle of AC voltages, wave forms and basic definitions, relationship between frequency, speed and number of poles, root mean square and average values of alternating current and voltage, form factor and peak factor, phasor representation of Alternating Quantities, the j operator and phasor algebra, analysis of AC circuits with single basic network element, single phase series circuits, single phase parallel circuits, single phase series parallel circuits, power in AC circuits.

UNIT-III

Network Theorems: Super position theorem, Thevinin's& Norton's theorem, Maximum power transfer theorems, Tellegan's Theorem, Millman's Theorem and problems.

UNIT-IV TRANSFORMERS:

Principle of operation, constructional details, ideal transformer, and practical transformer, losses, transformer testing, efficiency, and regulation calculations (all the above topics are elementary treatment and simple problems).

Direct Current Machines: principle of operation of DC machines, armature windings, EMF equation in DC machines, torque production in a DC machine, operation of a DC machine as a generator, operation of a DC machine as a motor.



UNIT-V



DEPARTMENT OF MECHANICAL ENGINEEIRNG

A.C MACHINES

Single phase induction motor: principle of operation, types of single phase induction motor and working.

Three phase induction motor: principle of operation, production of rotating magnetic field, slip and rotor frequency, torque (simple problems).

TEXT BOOKS

1. Basic Electrical Engineering-By M.S Naidu and S.Kamakshaiah-TMH

2. Basic Electrical Engineering-By T.K.Nagsarkar and M.S.Sukhija, Oxford University press **REFERENCES**

1. Theory And Problems of Basic Electrical Engineering-By D.P.Kothari & I.J.Nagrath PHI.

2. Principles of Electrical Engineering –By V.K.Mehta, S.Chand publications.

3. Essentricals of Electrical and computer Engineering –By David V.Kems, JRJ.David Irwin pearson.



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET06 – MACHINE DRAWING

Lectures/Week: 4 Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

Part A: 2 out of 3 questions from Unit I. Each question carries 12 marks. 2 X12 =24 marks Part B: Assembly Drawing - Unit II (Compulsory question) - 46 marks

Machine Drawing Conventions :

Need for drawing conventions - introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.

c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.

d) Title boxes, their size, location and details - common abbreviations & their liberal usage e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts:

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, cottered joints and knuckle joint.

c) Rivetted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

c) Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.



NOTE : First angle projection to be adopted. The student should be able to provide working drawings of actual parts.



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TEXT BOOKS:

- 1. Machine Drawing Dhawan, S.Chand Publications
- 2. Machine Drawing -K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers

REFERENCES:

- 1. Machine Drawing N.Siddeswar, K.Kannaiah & V.V.S.Sastry TMH
- 2. Machine Drawing P.S.Gill,
- 3. Machine Drawing N.D. Junnarkar, Pearson





DEPARTMENT OF MECHANICAL ENGINEEIRNG

EEP08- ELECTRICAL ENGINEERING LAB AND ELECTRONICS ENGINEERING LAB

Lectures/Week: 2 Hrs Credits:1 Sessional Marks: 40 University Exam Marks: 60

List of Experiments

- 1. Verification of Superposition Theorem
- 2. Verification of Thevenin's Theorem
- 3. Verification of Norton's theorem
- 4. Verification of Maximum power transfer theorem for DC
- 5. Verification of Reciprocity Theorem
- 6. Verification of Maximum power transfer theorem for AC
- 7. Cathode Ray oscilloscope.
- 8. Function Generator.
- 9. PN Junction diode
- 10. Zener diode
- 11. Seven segment display
- **12.** LED(Light Emitting Diode)
- 13. Half Wave Rectifier
- 14. Full Wave Rectifier





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MEP-03 MECHANICS OF SOLIDS LAB & MATERIAL SCIENCE LAB

Practical / Week: 2 Hrs Credits:1 Sessional Marks: 40 University Exam Marks: 60

List of Experiments

(A) MECHNICS OF SOLIDS LAB

- 1. Direct tension test beam
- 2. Compression Test
- 3. Bending test on
 - a) Simply supported beam b) Cantilever beam
- 4. Torsion test
- 5. Brinells hardness test
- 6. Rockwell hardness test
- 7. Test on springs

(B) MATERIAL SCIENCE LAB:

- 1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
- 2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high C steels.
- 3. Study of the Micro Structures of Cast Irons.
- 4. Study of the Micro Structures of Non-Ferrous alloys.
- 5. Study of the Micro structures of Heat treated steels.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

BST09- MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Lectures/Week: 4 Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

UNIT - I

INTRODUCTION TO MANAGERIAL ECONOMICS: Management Economics: Definition, Nature

and Scope. **DEMAND ANALYSIS:** Law of Demand, Demand Determinants **ELASTICITY OF**

DAMAND: Definition, Types and Demand Forecasting methods.

UNIT – II

THEORY OF PRODUCTION: Firm and Industry- Production Function – Cobb Douglas Production Function- Laws of returns- internal and external economies of scale. **COST ANALYSIS:** Cost Concepts: Fixed Vs Variable costs, explicit Vs implicit costs, Out-ofpocket costs Vs imputed costs, Opportunity cost, Sunk costs and abandonment costs.

BREAK-EVEN ANALYSI: Concept of Break-even point (BEP)- Break-even Chart, Determination of BEP in volume and value. Assumptions underlying and practical significance of BEP (Simple problems).

UNIT-III

Introduction to Markets and Business Organisations: Market structure, types of competition, features of Perfect competition, Monopoly, Monopolistic competition- Price output determination.

TYPES OF BUSINESS ORGANISATIONS: Features, Merits and Demerits of Sole Trading Proprietorship, Partnership, Joint Stock Companies including Public and Private sector companies.

UNIT – IV

INTRODUCTION TO FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS:

Double Entry Book Keeping- Journal, Ledger, Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments. **RATIO ANALYSIS:** Computation of Liquidity Ratios (current ratio and quick ratio), Activity Ratios (Inventory Turnover ratio, Debtors Turnover ratio) Capital Structure Ratios (Debt-equity Ratio and



Interest Coverage Ratio) and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio,, P/E Ratio and EPS) Analysis and interpretation.

 $\mathbf{UNIT} - \mathbf{V}$



DEPARTMENT OF MECHANICAL ENGINEEIRNG

FUNDAMENTALS OF FINANCE AND CAPITAL BUDGETING: Capital and its

significance- Types of Capital, Estimation of Fixed and Working Capital, requirements and methods of raising capital. **CAPITAL BUDGETING METHODS:** Pay back method, Accounting Rate of Return (ARR) and Net Present Value (NPV) and IRR methods (simple problems).

TEXT BOOKS:

- 1. Joel Dean, _Managerial Economics', PHI 2001
- 2. James C. Van Home, _Financial Management Policy'
- 3. I.M Pandey, Management Accounting. Third Revised Edition



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET07-THERMAL ENGINEERING

Lectures/Week: 4 Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

UNIT – I

Steam properties and stream generators: Properties of steam – use of steam tables – PV, TS, HS diagrams – steam processes – constant volume – constant pressure – Isothermal – Adiabatic and Hyperbolic processes – Throttling expansion.

Steam Generators: Classification of fire tube and water tube boilers – introduction to high pressure boilers – boiler mountings and accessories – boiler performance – boiler draught.

UNIT-II

Reciprocating Compressors -Mechanical details of compressor- shaft work and isothermal efficiency of a single stage and multi stage compressor indicator diagram – effect of clearance – volumetric efficiency – losses during compression – optimum pressure condition in two stage compression inter coolers and after coolers.

$\mathbf{UNIT} - \mathbf{III}$

Rotary Compressors Classification – positive displacement and rotary dynamic (non-positive displacement) compressors – fans – blowers and compressors – static and total head

 centrifugal compressors velocity diagrams – type of impeller vanes – slip factor – diffuser isentropic efficiency – axial flow compressors – velocity diagrams – degree of reaction – isentropic efficiency.

$\mathbf{UNIT} - \mathbf{IV}$

Refrigeration, cycles, thermodynamic analysis of vapor compression, absorption, air cycles, steam jet and thermoelectric refrigeration system. Comparison of COP – Properties and selection of refrigerants – alternative refrigerants.

UNIT – V

Air Conditioning- basic concepts - Psychometrics – air and humidity calculations– psychometric chart – simple systems for winter and summer air conditioning- industrial ventilation – air cleaning

TEXT BOOKS:



1. Vasandani V P and Kumar D S: Heat Engineering, Third Edition, Metropolitan, 1979.



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- 2.Nag P K: Engineering Thermodynamics, Third Edition, Tata McGrew Hill, 2006.
- 3. Russel B Scott: Cryogenic Engineering, Volume 39, Cryogenic Engineering conference. Publication, 2005.
- 5. Ballaney PL: Heat Engines, Sixteenth Edition, Khanna Publication, 1987.

REFERENCE BOOKS:

- 1 Eastop and Mcconkey: Applied Thermodynamics, Fifth Edition, Pearson Publication, 2009.
- 2. IC Engines Mathur& Sharma DhanpathRai& Sons, ,2010
- 3. Engineering fundamentals of IC Engines Pulkrabek, Pearson, PHI, 2nd Edition,2009
- 4. Thermal Engineering, Rudramoorthy TMH, 10th Edition, 2010
- 6. Thermal Engineering R.S. Khurmi&J.K.Gupta S.Chand, 15th Edition, 2012


DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET08 - MANUFACTURING PROCESSES

Lectures/Week: 4 Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

UNIT - I

Introduction: Classification of Manufacturing processes – various kinds of production. Casting processes – sand-mould casting – patterns – Molding materials – cores – Gates and Risers – Different types of casting processes. Casting defects and remedies

UNIT – II

Introduction to fabrication processes-Classification- General consideration – Gas Welding and cutting – Arc welding – Resistance welding – Other fusion welding processes – Thermit welding – Electro Slag welding – Electron beam welding – Laser beam welding.

UNIT – III

Metal working processes- Nature of plastic deformation - Hot working and cold working. Rolling- Principle – Rolling stand arrangement – Roll passes – Breakdown passes – Roll pass sequences.

Sheet metal operations- Press tool operations – Shearing action – Shearing operations – Drawing – Draw die design – Spinning – Bending – Stretch forming – Embossing and coining.

UNIT – IV

Forging - Forging operations – Smith forging – Drop forging – Press forging – Machine forging – Forging design – Drop forging die design – Upset forging die design

Extrusion and other processes- Extrusion principle - Hot extrusion processes - Cold extrusion

- Extruding tubes - Wire drawing - Rod and tube drawing - Swaging - Tube making.

$\mathbf{UNIT} - \mathbf{V}$

Powder Metallurgy: Basic steps in powder metallurgy – production of metal powders, advantages, limitations and applications of powder metallurgy-



Processing of Plastics: Types of plastics, properties, processing methods, Blow molding, Injection molding



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Text Books:

- 1. Manufacturing Technology, Vol I P.N. Rao, Tata Mc Graw Hill, 4th Edition, 2013
- 2. Manufacturing Technology, Kalpakjain, Pearson education, 4th Edition,2002

Reference Books:

- 1. Production Technology, K.L Narayana, I.K. International Pub, 3rd Edition, 2013
- 2. Manufacturing Process Vol. I, H.S.Shah Pearson, 2013,
- 3. Principles of Metal Castings, Rosenthal, Tata Mc Graw Hill ,2nd Edition,2001
- 4. Welding Process, Parmar.
- 5. Manufacturing Technology, R.K. Rajput, Laxmi Pub, 1st Edition,2007
- 6. Workshop Technology B.S.RaghuVamshi Vol I.



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET-09 KINEMATICS OF MACHINERY

Lectures/Week: 4 Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

UNIT I

KINEMATICS FUNDAMENTALS: Elements or Links, Joints and kinematic chains– Classification–Rigid Link, flexible and fluid link. Types of kinematic pairs–sliding, turning, rolling, screw and spherical pairs– lower and higher pairs–closed and open pairs–constrained motion–completely, partially or successfully constrained and incompletely constrained. Mobility of mechanisms – Kutzbach criterion, Gruebler's criterion.

MECHANISMS AND MACHINES-classification of mechanisms and machines- Grashofs conditions –inversion of mechanisms- single and double slider crank chain. Straight Line Motion Mechanisms-Exact and approximate, copiers and generated types – Peaucellier, Hart and Scott Russel-Grasshopper,Watt,Tchebicheff and Robert Mechanisms. Pantograph. – Quick return mechanisms.

UNIT II

STEERING MECHANISMS: Conditions for correct steering–DavisSteering gear, Ackermann's steering gear. Hooke'sJoint (Universal coupling)-Single and double Hooke's joint—applications– Simple problems.

Synthesis of Mechanisms: Precision points: Chebyshev Spacing of Precision Points, Bloch's Synthesis Method – Freudenstein's Method for four bar linkage.

UNIT III KINEMATICS:

Velocity and Acceleration Diagrams- Velocity and acceleration–Motion of link in machine– Determination of Velocity and acceleration – Graphical method – Application of relative velocity method–Slider crank mechanism, four bar mechanism. Acceleration diagrams for simple mechanisms, Coriolis acceleration, and determination of Coriolis component of acceleration. Kleins construction. Analysis of slider crank mechanism for displacement, velocity and acceleration of slider using analytical method Instantaneous Centre Method: Instantaneous centre of rotation, centrode and axode– relative motion between two bodies– Three centres in-line theorem–Locating instantaneous centres for simple mechanisms and determination of angular velocity of points and links.



UNIT IV



DEPARTMENT OF MECHANICAL ENGINEEIRNG

GEARS: Higher pairs, friction wheels and toothed gears – types–law of gearing, condition for constant velocity ratio for transmission of motion, Forms of tooth- cycloidal and involute profiles. Velocity of sliding – phenomena of interference – Methods to avoid interference. Condition for minimum number of teeth to avoid interference. Introduction to Helical, Bevel and worm gearing

GEARTRAINS: Introduction– Types of gears – Simple, compound, reverted and Epicyclic gear trains. Train value – Methods of finding train value or velocity ratio– Tabular column method for Epicyclic gear trains. Torque in epicyclic gear trains. Differential gear of an automobile

II YEAR B.TECH II SEMESTER

UNIT V



CAMS: Definitions of cam and follower–uses–Types of followers and cams– Terminology. Types of follower motion – Uniform velocity–Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during out ward and return strokes. Drawing of cam profiles.

ANALYSIS OF MOTION OF FOLLOWERS: Tangent cam with roller follower– circular arc (Convex) cam with flat faced and roller follower.

Text Books:

- 1. Theory of Machines, S.S. Rattan, Tata McGraw Hill Publishers, 3rd Edition, 2013.
- 2. Kinematics and dynamics of machinery, R.L Norton ,Tata McGraw Hill Publishers,1st Edition, 2009.

Reference Books:

- 1. Theory of Machines and Mechanisms, 3rd Edition, J.E. Shiegley et. al, Oxford International Student Edition.
- 2. The theory of Machines, Ballaney, Kanna Publishers
- 3. Theory of Machines, Thomas Bevan, Pearson (P) 3rd Edition, 2012.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET-10 FLUID MECHANICS AND HYRAULIC MACHINERY

Lectures/Week: 4 Hrs

Sessional Marks: 30

Credits:4

University Exam Marks: 70

UNIT – I

Fluid properties: Mass density, weight density, specific volume, relative density, viscosity, compressibility, surface tension and capillarity and standard atmosphere pressure, Vapour pressure. Pressure Measurements: Piezometer, manometer differential manometers, micro manometers, velocity measurements- Pitot tube. Discharge measurement: Orifice and mouthpiece- venturimeter, Orifice meter and Nozzle-meter

UNIT –II

Fluid static's: Fluid pressure Pascal's law, absolute and gauge pressure, hydrostatic force on

surfaces- total pressure and center of pressure on plane surfaces.Fluid kinematics: Type of fluid flow, type of flow lines, rate of flow, velocity potential and stream function continuity equation. Fluid dynamics: Eluer's equation- Bernoulli's equation and its application momentum equation and moment of momentum equation.

UNIT –III

Laminar flow: Relationship between shear stress and pressure gradients- laminar flow through circular pipes- Hagen poisulle law- loss of head due to friction.Turbulent flow: Loss of head due to friction in pipe- Darcy- Wersbach equation Minor head losses- pipes in series and parallel siphon.

Boundary layer concept: Boundary layer growth over a flat plate- Boundary layer thickness, displacement thickness, momentum thickness and energy thickness- turbulent boundary layer-separation of boundary layer.Flow around submerged objects: Drag and lift- types of drag on flat and cylinder lift on circular and air foils.

UNIT IV

Impact of water jets Hydrodynamic forces of jets on stationary and moving flat, inclined and curved vanes – Jet striking centrally and at tip- Velocity triangle at inlet and outlet – work done and efficiency.Turbines – Classification of Hydraulic turbines – Pelton Wheel, Francis turbine, Kaplan working principle - Work done and efficiency of Pelton wheel, Francis, Kaplan turbine - Draft tube - Specific speed unit quantities – Specific speed - Performance characteristics – Model testing.



UNIT –V



DEPARTMENT OF MECHANICAL ENGINEEIRNG

Centrifugal pumps – Classification of pumps – Working of a centrifugal pump work done by the impeller on liquid – Heads and efficiencies – Multi – stage centrifugal pumps – Specific speed – Performance characteristics – Model testing.Reciprocating Pumps Classification of Reciprocating Pumps – Working of a reciprocating pump – Coefficient of discharge and slip – Single acting and double acting reciprocating pumps.Hydraulic Systems, Pneumatic Control Systems and Actuators.Hydraulic devices - Hydraulic accumulator, Hydraulic intensifier, Hydraulic press, Hydraulic ram, Hydraulic crane and Hydraulic lift – Hydraulic coupling Hydraulic torque converter – Introduction to pneumatic control systems and actuators.

TEXT BOOKS:

 Rajput R.K.: Fluid Mechanics and Fluid Machinery, S. Chand & Company Limited, 2008.
 Bhansal R.K.: Fluid Mechanics and Fluid Machinery, 9th Edition,Laxmi Publication,2005.
 P. N. Modi, S. M. Seth: Hydraulics and Fluid Mechanics,8th Edition, Standard Book House, 1987.



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET11-DESIGN OF MACHINEMEMBERS-I

Lectures/Week: 4 periods

Internal Marks: 30

Credits: 4

End Examination Marks: 70

UNIT-I

Engineering Design

Introduction to Design; The process of Design; design by evolution; The Morphology of design; Identification and analysis of need; True need; Specifications ; Standards of Performance; use of checklists ; Morphological Analysis ; Brainstorming; measure of physical realizibility; Economic and financial feasibility ; Designing for shipping, handling and installation; Design for maintenance ; Detailed design

UNIT-II

Mechanical Engineering design

Traditional Design methods; Design Synthesis; design considerations and standards; engineering classification and selection; BIS designation of steels; Mechanical properties Design against static load, Modes of failure; factor of safety; Stress-strain relationships; shear stress and shear strain relationships; Axial, Bending, Torsional stresses; principles stresses; Theories of failure.

UNIT-III

Design against Fluctuating loads

Stress Concentration factors; Reduction of stress concentration effects ; Fluctuating stresses; fatigue Failure; Endurance limit; Notch sensitivity; Endurance limit; Soderberg and Goodman Diagrams; Modified Goodman's diagrams; Fatigue design under combined stresses.

UNIT-IV

Design of fasters

Threaded joints-Thread joints; ISO metric screw threads, Bolted joint in tension; Torque requirement for bolt tightening; bolted joint under fluctuating load; eccentricity loaded bolted joints in shear; bolted joints with combined stresses; Bolt of uniform strength.





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Welded joints-types of welded joints; stresses in butt and fillet welds; strength of welded joints; eccentricity welded joint; weld joint subject to bending moment and fluctuating forces; welding symbols; weld inspection.

UNIT-V

Mechanical springs

Helical springs-stress equation and deflection equation; spring materials; spring end formation; design against-static and fluctuating loads; Design of helical and Torsional springs; Compound springs ; equalized stress in spring leaves ; multi leaf springs; nipping and shot peening.

Text Books:

- 1. Design of Machine Elements, V.B.Bhandari , TMH Publishers, NewDelhi, 2 edition, 2013
- 2. MachineDesign,Schaum"sseries,TMHPublishers, NewDelhi, 1 edition, 2011
- 3. MachineDesign, R.K.Jain, KhannaPublishers, NewDelhi.





Reference Books:

- 1. MachineDesign,SadhuSingh,KhannaPublishers, NewDelhi
- 2. MachineDesign,R.S. Kurmi and J.K. Gupta ,S.ChandPublishers, NewDelhi
- 3. MechanicalEngineeringDesign,JosephE.Shigely,TMH Publishers,NewDelhi, 9TH edition, 2011 R
- 4. DesignofMachineElements, M.F.Spotts, PHIPublishers, NewDelhi.
- Designonviachine Elements, wir Spous, 17th donsiers, New Denn.
 Machine Design, Pandyaand Shah, Charotar Publishers, Anand, 17TH edition, 2009
 Machine Design, R.L. Norton, Tata McGrawHillPublishers, 2nd edition, 2002
- 7. Machine Design by Groover CBS Publications, 5th th edition, 2012.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MEP-04 MANUFACTURING PROCESSES LAB

Practical /Week: 2 Hrs

Credits:1

Sessional Marks: 40

University Exam Marks: 60

List of Experiments

I. METAL CASTING LAB:

- a. Pattern Design and making for one casting drawing.
- b. Sand properties testing Exercise -for strengths, and permeability -1

II. WELDING LAB:

- a. Arc Welding: Lap & Butt Joint 2 Exercises
- b. Spot Welding 1 Exercise

III. MECHANICAL PRESS WORKING:

a. Blanking & Piercing operation and study of simple, compound and progressive press tool.

b. Hydraulic Press: Deep drawing and extrusion operation.

c. Bending and other operations

IV. PROCESSING OF PLASTICS

- a. Injection Moulding
- b. Blow Moulding





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MEP-05 FLUID MECHANICS AND HYDRUALIC MACHINERY LAB

Practical /Week: 2 Hrs

Sessional Marks: 40

Credits:1

University Exam Marks: 60

List of Experiments

- 1. Introduction
- 2. Rectangular notch
- 3. Triangular notch
- 4. Trapezoidal notch
- 5. Rota meter test-rig
- 6. Performance Test On Multistage Centrifugal Pump
- 7. Orifice meter
- 8. Pelton wheel turbine working
- 9. Impact of Jets On vanes
- 10. Kaplan Turbine
- 11. Calibration Of Venturimeter
- 12. Determination Of Friction Factor For A Given Pipe line





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET12 - I C ENGINES AND GAS TURBINES

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT- I

I.C. Engines: Classification - Working Principles - Valve and Port Timing Diagrams – Carburetor - Fuel Injection System - Ignition System - Cooling and Lubrication - Principles of Supercharging and Turbo charging.

UNIT- II

Combustion in S I Engines: Stages of Combustion in S I Engines - Velocity of Flame Propagation-Detonation- Effects of Engine Variables on Detonation - Fuel Requirements and Fuel Rating- Octane Rating - Types of Combustion Chambers

UNIT-III

Combustion in C I Engines: Stages of Combustion in C I Engines - Delay Period- Effects of Engine Variables on Delay Period – Knock - Fuel Requirements and Fuel Rating- Cetane Rating- Anti Knock Additives- Types of Combustion Chambers

UNIT- IV

Performance and Emission of I C Engines: Performance Parameters – Engine power, engine Efficiencies, Methods of improving engine performance, Variables affecting the performance characteristics. - Heat Balance Sheet – Problems -Engine Emissions and controlling Methods.

UNIT -V

Gas Turbines: Simple Gas Turbine Plant – Open and Closed Cycle Arrangements – Ideal and Actual Cycles and their Analysis

Jet Propulsion: Air Breathing Engines - Turbo Jet- Turbo Prop and Ram Jet – Rocket Engines-Liquid and Solid Propellant

TEXT BOOKS

- 1. Internal combustion engine -Ganeshan TMG
- 2. Internal combustion Engines M.L. Mathur& Sharma -Dhanpatrai& Sons

REFERENCES

- 1. Heat power engineering Dr. V.P. Vasandhani& Dr. D.S. Kumar,Metropolitan. Book Co. (p) Ltd. .
- 2. Internal combustion Engines- Collin R. Ferguson & Allan T. Kirkpatric.
- 3. An introduction to combustion- Stephen R. Turns- McGraw Hill. 6. Internal combustion engines & air pollution- Edward Obert-Intex Educational Pub



- 4. Thermal Engineering by R.K.Rajput, Laxmi Publications (P) Ltd.
- 5. Internal combustion Engines Fundaments- John B. Heywood- McGraw Hill. III YEAR B.TECH I SEMESTER



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET13 - METAL CUTTING AND MACHINE TOOLS

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Metal Cutting: Classification of Cutting Tools-Nomenclature of Single Point Tool and Angles-Difference Between Orthogonal and Oblique Cutting-Tool Geometry In Designation In ORS System. Inter-Relationship Between ASA and ORS System. Chip formation- Types of Chips -Chip Breakers-Merchant' S force Diagram- Cutting forces –Cutting Speeds- Feed- Depth of Cut- Heat Generationeffect of tool geometry on Material Removal Rate, surface geometry, surface roughness and cutting forces-Tool Life-Taylors Tool Life Equation-Cutting Tool Material and Cutting Fluids- Machinability

UNIT-II

Turning: Lathe and Its Parts-Different Type of Lathes-Type of Operations Done On Lathe-Cutting Tools for Lathe Operations-Work Holding Devices-Feed Drive-Turret and Capstan Lathe-Tool Holding Device-Thread Cutting On Lathe.

UNIT-III

Drilling: Types-Constructional Details-Operations Performed On Them. Twist Drill-Elements-Boring Machines – Types and Constructional Details

Shaping - Constructional Details-Quick Return Mechanisms – Estimation of Machining Time In Lathe-Shaper and Planer

UNIT-IV

Milling – Classification –Constructional Details of Various Types – Operation Performed On Milling Machines. Universal Milling Machine- Milling Methods – Up Cut and Down Cut Milling -Estimation of Machining Time In Milling. Indexing Head and Types of Indexing Methods – Simple- Compound-Differential and Angle Indexing.

Gear cutting- Milling: Spur and Helical Gears. Gear Generating Methods – Gear Shaping and Gear Hobbing. Finishing of Gear - Gear Shaving- Gear Grinding and Gear Lapping

UNIT-V

Grinding - Classification of Grinding Machines- Cylindrical and Surface Grinding Machines- Tool and Cutter Grinding Machines- Machining time-Different Types of Abrasives- Bonds- Specification and Selection of A Grinding Wheel. Lapping-Honing &Surface Finishing. Principles of Design of Jigs and Fixtures and Uses- Classification of Jigs & Fixtures

TEXT BOOKS:

- 1. Manufacturing Techology- machine tools & metal Cutting-P.N Rao-TMH
- 2. Workshop Technology Vol II-B.S.RaghuVamshi, DhanpatRai& Co





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REFERENCES:

- 1. Workshop Technology vol II -Hazrachoudary and Bose S.K,Media Promoters
- 2. Manufacturing Technology -Kalpakzian- Pearson
- 3. Production Technology -HMT
- 4. Workshop Technology WAJ Chapman, Taylor & Francis
- 5. Theory of metal cutting and machine tools -B.L.Juneja,Sekhon& Seth, New Age International Publishers
- 6. Production Technology R.K. Jain and S.C. Gupta, Khanna Publishers
- 7. Production Engineering -P.C.Sharma, S. Chand





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET14 - DYNAMICS OF MACHINERY

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Transmission of Motion: Types of Belts And Belt Drives- Materials Used for Belts- Velocity Ratio In Belt Drive- Length of Open And Crossed Belt Drives - Slip In Belt. Ratio of Tensions for Flat Belts And V Belts- Initial Tension- Power Transmitted - Belt- Centrifugal Tension. Condition for The Transmission of Maximum Power- Advantages And Disadvantages of Various Belt Drives-Rope Drives & Chain Drives

UNIT-II

Centrifugal Governors: Sleeve Loaded Governors- Spring Loaded Governors-Hartnell-Hartung Governors And Governors With Auxiliary Springs- Sensitiveness-Isochromism- Stability And Hunting In Governors- Governor Effort And Power- Controlling force Diagrams.

UNIT-III

Friction: Inclined Planes- Friction of Screws And Nuts- Pivot And Collar- Uniform Pressure-Uniform Wear-Friction Circle- Journal Bearing

Clutches: Friction Clutches- Single Disc Or Plate Clutch- Multiple Disc Clutch- Cone Clutch-Centrifugal Clutch

Breaks And Dynamometers: Simple Block Brake-Band Brake- Internal Expanding Brake. Dynamometers Absorption And Transmission Types- General Description And Methods of Operations.

UNIT-IV

Turning Moment Diagrams And Flywheel: Construction of Crank Effort And Torque Diagrams-Fluctuation of Energy And Speed In Flywheels- Flywheel of An IC Engine- Fly Wheel of A Punching Press And Problems

UNIT-V

Gyroscopic Couple And Processional Motion- Gyroscopic Couple- Effect of Precession On Stability of Moving Vehicle's Such As Motor Cars- Motor Cycles- Aero Planes And Ships-Gyroscopic Stabilization.

TEXT BOOKS

- 1. Theory of Machines -Balleny
- 2. Theory of Machines-Khurmi R.S. &J.K.Guptha, S. Chand Publishing

REFERENCES:

- 1. Theory of Machines Rattan S.S,McGraw-Hill Education (India) Private
- 2. Theory of Machines Joseph Edward Shingely, TMH



- 3. Mechanisms and Machine Theory -Rao J.S. and Dukkipati R.V.newagepublishers;
- 4. Theory of Machines -Thomas Bevan, CBS Publishers



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET15 - DESIGN OF MACHINE MEMBERS – II

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Keys and Couplings: Keys: Types of Keys; Design of Keys. Effect of Key Way. Design of Splines. Types of Shaft Couplings: Design of Sleeve Or Muff Couplings- Clamp Or Compression Coupling-Flange Couplings. Design of Bushed Pin Type Flexible Coupling.

UNIT-II

Sliding Contact Bearings: Classification of Bearings- Hydrodynamic Lubricated Bearings; Materials for Sliding Contact Bearings; Lubricants – Properties And Their Selection Terminology Used In Hydrodynamic Journal Bearings. Design Procedure for Journal Bearings – Design of Bearing Caps And Bolts. Heat In Bearings.

Thrust Bearings: Design of Footstep Bearing And Collar Bearings.

UNIT-III

Rolling Contact Bearings: Types of Rolling Contact Bearings And Sliding Contact Bearings. Merits And Demerits of Rolling Contact Bearings Over Sliding Contact Bearings. Static And Dynamic Load Capacities. Equivalent Bearing Load- Design for Cyclic Loads. Reliability of A Bearing. Selection of Bearings - Stribeck's Equation.

UNIT-IV

Gears: Gears: Types of Gears And Their Applications- Gear Materials Allowable Stresses. Law of Gearing. Spur Gears: Terminology- force Analysis- Design of Spur Gears – Lewis Equation. Check for Dynamic Load And Wear Load. Gear Wheel Proportion-Helical Gears: Terminology- Design of Helical Gears. Check for Wear Load. force Analysis. Bevel Gears: Terminology- Design of Bevel Gears.

UNIT-V

Engine Parts: Connecting Rod: Thrust In Connecting Rod – Stress Due To Whipping Action On Connecting Rod Ends – Cranks And Crank Shafts- Strength And Proportions of Overhang And Centre Cranks – Crank Pins- Crank Shafts.

Pistons- forces Acting On Pistons - Constructional Features.

TEXT BOOKS

- 1. Pandya and Shah: Machine Design- 15th Edition-Charotar Publishing House.
- 2. Khurmi R.S. & Gupta: Machine Design- 14th Edition- S. Chand





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REFERENCES

- 1. Sundararaja Murthy T.V. & Shanmugan N.: Machine Design-Anuradha Publications Sarma and Agarwal: Machine Design- 4th Edition-Katson Publications
 Jain R.K.: Machine Design- 5th Edition-Khanna Publications
 P.S.G.College of Technology: Design Data Book- PSG College of Technology .

- 4. Bandari V.B.: Design of Machine Members- 3rd Edition- Tata McGraw Hill
- 5. Mahadevan & Balaveera Reddy: Mechanical Engineering. Design Data Hand Book-**CBS** Publishers and Distributors
- 6. Pandya and Shah: Machine Design- 15th Edition- Charotar Publishing House.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET16 - INSTRUMENTATION AND CONTROL SYSTEMS

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Definition - Basic Principles of Measurement - Measurement Systems - Performance Characteristics: Dynamic and Static Performance Characteristics sources of error- Classification and Elimination of Error in Instruments.

Measurement of Displacement: Piezo Electric- Inductive- Capacitance- Resistance- Ionization and Photo Electric Transducers.

Measurement of Speed: Mechanical Tachometers - Electrical Tachometers

UNIT – II

Measurement of force and Torque: Strain Gauges - Piezo Electric - Hydraulic and Pneumatic Systems - Torque Measurements.

Measurement of Pressure: Classification - Different Principles used-Manometers- Bourdon Pressure Gauge- Bellows - Diaphragm Gauges – Thermal Conductivity Gauges - Ionization Pressure Gauges-Mcleod Pressure Gauge.

Measurement of Temperature: Classification - Ranges - Various Principles of Measurement - Thermistor - Thermocouple

UNIT-III

Measurement of Motion: Vibrometer and Accelerometers, elementary vibrometers and vibration detectors, Elementary Accelerometers, the seismic instruments. Vibrational Exciter Systems **Acoustical Measurements:** Introduction - Characterization of Sound - Basic Acoustical Parameters , Sound measuring apparatus and techniques - Measurement and Interpretation of Industrial and Environmental Noise.

UNIT -IV

Measurement of Level: Introduction-Capacitive- Ultrasonic- Magnetic- Cryogenic Fuel Level Indicators - Bubbler Level Indicators.

Flow Measurement: Obstruction Measurements - Rotameter- Magnetic- Ultrasonic- Turbine Flow Meter- Hot -Wire Anemometer.

UNIT – V

Elements of Control Systems: Introduction- Importance - Classification – Open and Closed Systems- Components - Mathematical model of Physical Systems - Feedback characteristics of



Control systems - Servomechanisms - Introduction to Digital and Optical Measurements - Examples with Block Diagrams.



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TEXT BOOKS

- 1. Measurement Measurements: Applications & Design D.S Kumar, Anuradha Agencies.
- 2. Mechanical Measurements Thomas G Beckwith, John H Linehard & Roy D Marangoni, Pearson

REFERENCES

- 1. Mechanical Measurements and Control Prof. E O Doebelin, McGraw Hill.
- 2. Instrumentation- measurement & analysis -B.C. Nakra &K.K. Choudhary, TMH.
- 3. Control Systems A Nagoor Kani, R B A Publications.
- 4. Principles of Industrial Instrumentation and Control Systems Chennakesava R Alavala,Cengage Learning.
- 5. Instrumentation and Control systems -S.Bhaskar, Anuradha Agencies.
- 6. Experimental Methods for Engineers Holman, McGraw Hill.
- 7. Mechanical and Industrial Measurements I R.K. Jain, Khanna Publishers.
- 8. Mechanical Measurements Sirohi and Radhakrishna, New Age.
- 9. Instrumentation & Mech. Measurements A.K. Tayal, Galgotia Publications




DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET17 - INDUSTRIAL ENGINEERING & MANAGEMENT

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Concepts of Industrial Management: Principles of management- Growth of management thought-Functions of management- Principles of organization- Types of organization and committees. Introduction to personnel management- Functions- Motivation- Theories of motivation-Hawthrone studies- Discipline in industry- Promotion- Transfer- lay off and discharge- Labour turnover.

UNIT-II

Production Planning and Control: Types of productions- Production cycle- Product design and development- Process planning- forecasting- Loading- Scheduling- Dispatching- Routing- Progress-Control- Simple problems.

UNIT-III

Plant Location & Layout: Economics of plant location- Rural Vs Suburban sites- Types of layouts-Types of building- Travel chart technique- Assembly line balancing simple problems. Materials Handling- Principles- Concept of unit load- Containerization-Pelletization- Selection of material handling equipment- Applications of belt conveyors- Cranes- forklift trucks in industry.Plant Maintenance: Objectives and types.

UNIT-IV

Work Study: Concept of productivity- Method Study - Basic steps in method study- Process charts-Diagrams- Models and Templates- Principles of motion economy- Micro motion study-Therbligs-SIMO chart. Work Measurement - Stop watch procedure of time study- Performance ratingallowances- Work sampling- Simple problems.

UNIT-V

Materials Management: Introduction- Purchasing- Objectives of purchasing department-Buying techniques- Purchase procedure- Stores and material control- Receipt and issue of materials-Store records. Quality Control - Control charts of variables and attributes (Use of formulae only). Single and Double sampling plans.

TEXT BOOKS

- 1. Production and Operations Management- Buffa
- 2. Industrial Engineering Management- Dr. O. P. Khanna.
- 1. Principles of Management Koontz & Donnel.
- 2. Production and Operations Management Everette Adam & Ronald Ebert.
- 3. Operations Management John McClain & Joseph Thames.
- 4. Industrial Engineering and Production Management Telsang- S. Chand & Co.





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MEP06 - MACHINE TOOLS LAB

Credits:	1	Internal Examination Marks: 40
Lectures /Week	2	External Examination Marks: 60

- 1. Demonstration of construction & operations of general purpose machines: Lathe-Drilling machine- Milling machine- Shaper- Planning machine- Slotting machine-Cylindrical Grinder- Surface grinder and Tool & cutter grinder.
- 2. Job on Step turning and taper turning on lathe machine
- 3. Job on Thread cutting and knurling on -lathe machine.
- 4. Job on Drilling and Tapping
- 5. Job on Shaping and Planning
- 6. Job on Milling
- 7. Job on Grinding of Tool angles.





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SCHOOL OF ENGINEERING AND TECHNOLOGY

MEP07 - I C ENGINES LAB

Credits:	1	Internal Examination Marks: 40

Lectures /Week

External Examination Marks: 60

- 1. Valve Timing Diagrams
- 2. Port Timing Diagrams
- 3. Performance Test on 4-Stroke Single Cylinder Water Cooled Diesel Engine
- 4. Heat Balance Sheet on 4-Stroke Single Cylinder Water Cooled Diesel Engine
- 5. Morse Test On 4-Stroke Multi Cylinder Petrol Engine
- 6. Retardation Test On 4-Stroke Single Cylinder Water Cooled Diesel Engine
- 7. Cooling Curves On 4-Stroke Single Cylinder Diesel Engine
- 8. Performance Test on Air Cooled Petrol Engine

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- 9. Heat Balance Sheet on Air Cooled Petrol Engine
- 10. Performance Test on Air Compressor









DEPARTMENT OF MECHANICAL ENGINEEIRNG SCHOOL OF ENGINEERING AND TECHNOLOGY

MET18 - OPERATIONS RESEARCH

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Introduction: Introduction to General nature of Operations Research models and their types-Introduction to LP Problems- Examples-Graphical method of Solution-Simplex Algorithm-Duality

UNIT- II

Transportation Problem - Transportation and Assignment Problem- Transhipment models- Travelling Salesman Problems.

UNIT-III

Replacement: Replacement Models –Replacement of Items that deteriorate with time and group replacement of items that fail suddenly.

Game theory Models- Two persons Zero Sum Games.

UNIT-IV

Inventory: Inventory Models- Costs used in Inventory Models-Basic Inventory Models-deterministic and Static Demand. Models with price breaks- Models with Restrictions- Single Period Models with probabilistic demand and without setup cost

Inventory Control: ABC analysis-Fixed order quantity-Fixed order interval systems and S-s policy-XYZ, VED, FSN,SDE Analysis

UNIT-V

Waiting Lines: Waiting line models-Basic Structure of queuing models – single server an multi server models – Stress is only on applications

Simulation: Basic concepts-Simple Models in inventory and queuing systems

TEXT BOOKS

- 1. Operations Research -J.K.Sharma 4e. -MacMilan.
- 2. Operations Research R Pannerselvam, PHI

REFERENCES

- 1. Introduction to Operations Research Taha-PHI.
- 2. Operations Research- NVS Raju- SMS Education.
- 3. Introduction to Operations Research I.Hillier&Libermannf-TMH.
- 4. Quantitative techniques in Managaement-Vohra N D PHI
- 5. Operations Research A.M. Natarajan P-Balasubramaniam A Tamilarasi-Pearson Education.
- 6. Operations Research-M.V. Durga Prasad- K-Vijaya Kumar Reddy- J- Suresh KumarlCengage Learning





DEPARTMENT OF MECHANICAL ENGINEEIRNG

CST42 - COMPUTER GRAPHICS

Credits:	3	Internal Examination Marks: 30
Lectures /Week	3	External Examination Marks: 70

UNIT – I

Introduction to computer Graphics: Basic Raster Graphics algorithms for drawing 2-D primitives.

UNIT- II

Geometrical transformations: 2-D transformations- homogeneous coordinate and Matrix representation of 2-D transformations- window to view port transformations.

Matrix representation of 3-D transformations- composition of 3-D transformation- Transformation as a changing coordinate system.

UNIT – III

Viewing in 3-D: Projections- specifying an orbitrary 3-D view- Mathematics of planar- Geometric projections-Dialogue Design.

UNIT – IV

Representing curves and surfaces: polygon meshes- parametric cubic curves- parametric bi cubic surfaces-quadric surfaces.

Solid Modeling: Representing solids- Regularized Boolean set operations- Primitive instancing-RepresentationS-Constructive solid Geometry.

$\mathbf{UNIT} - \mathbf{V}$

Visible surface determination: Functions of two variables- techniques for efficient visible surface algorithms. Algorithms for visible line determination: Z-buffer algorithm- list-priority algorithm.

Animation: Conventional and computer assist animation- Animation languages- methods of controlling Animation-Basic rules of animation.

TEXT BOOKS:

1. Computer Graphics- Principles &practice.Second edition in c by Foley- Van Dam-Feiner- Hughes- Pearson education- 1996.

REFERENCES

- 1. D.F. Roger and J.A. Adams (1990)- Mathematical elements for computer graphics Tata McGraw Hill.
- 2. Donald Hearn M.Panline Baker- Computer Graphics- Second edition-. Prentice-Hall of India Private ltd





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET19- FINITE ELEMENT METHOD

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT - I

Introduction: Introduction to Finite Element Method for solving field problems.Stress and Equilibrium.Boundary conditions. Strain - Displacement relations. Stress - strain relations for 2-D and 3-D Elastic problems.

One Dimensional Problem: Finite element modeling coordinates and shape functions. Assembly of Global stiffness matrix and load vector. Finite element equations- Treatment of boundary conditions- Quadratic shape functions.

UNIT - II

Analysis of Trusses: Stiffness Matrix for Plane Truss Elements- Stress Calculations and problems.

Analysis of Beams: Element stiffness matrix for two noded- two degrees of freedom per node beam element and simple problems.

UNIT - III

Two Dimensional Problems: Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions- Estimation of Load Vector- Stresses.

Finite element modeling of Axi-symmetric solids subjected to Axi-symmetric loading with triangular elements. Two dimensional four nodedIsoparametric elements and problems.

UNIT - IV

Steady State Heat Transfer Analysis: one dimensional analysis of Slab- fin and two dimensional analysis of thin plate. Analysis of a uniform shaft subjected to torsion.

UNIT - V

Dynamic Analysis: formulation of finite element model- element – Mass matrices- evaluation of Eigen values and Eigen vectors for a stepped bar-truss.Finite element - formulation to 3 D problems in stress analysis- convergence requirements- Mesh generation- techniques such as semi automatic and fully Automatic use of softwares such as ANSYS- NISA- NASTRAN- etc.

TEXT BOOKS

- 1. Introduction to Finite Elements in Engineering-Chandrupatla- Ashok and Belegundu- Prentice Hall.
- 2. Finite Element Analysis-J N Reddy-TMH

REFERENCE BOOKS

- 1. Finite Element Method -Zincowitz- McGraw Hill.
- 2. Introduction to Finite element analysis-S.Md.Jalaludeen-Anuradha Publications
- 3. A First Course in the Finite Element Method-Daryl Logan-CengageLearningFinite Element Method-Krishna Murthy TMH.



- 4. Finite Element Analysis -Bathe PHI.
- 5. The Finite Element Methods in Engineering SS Rao-Pergamon.



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6. Finite Element Methods: Basic Concepts and applications-Chennakesava-Alavala-PHI.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET20 – ENGINEERING METROLOGY

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT - I:

Basic Concepts In Measurement: Basic Terminology, Definition, Types, Need Of Inspection, Terminologies, Methods Of Measurement, Selection Of Instruments, Measurement Errors, Units, Measurement Standards, Calibration, Statistical Concepts In Metrology

UNIT - II:

Linear Measurement: Length Standard: Line and End Standard- Slip Gauges - Calibration Of Slip Gauges-Dial Indicator-Micrometers.

Angular Measurement : Different Methods - Bevel Protractor - Angle Slip Gauges - Spirit Levels - Sine Bar - Sine Plate Used To Determine The Tappers.

Limit Gauges: Taylor's Principle - Design Of GO and NO-GO Gauge- Plug- Ring- Snap- Taper-Profile and Position Gauges.

UNIT - III:

Systems Of Limits and Fits: Introduction- Normal Size- Tolerance Limits- Deviations- Allowance- Fits and Their Types - Unilateral and Bilateral Tolerance System- Hole and Shaft Basis Systems - Interchangeability and Selective Assembly. Indian Standard Institution System - International Standard System for Plane and Screwed Work

UNIT - IV:

Comparators- Introduction -Mechanical-Pneumatic-Optical-Electric and Electronic Comparators **Screw Thread Measurement:** Element Of Measurement - Errors In Screw Threads - Measurement Of Effective Diameter- Angle Of Thread and Thread Pitch- Profile Thread Gauges.

Gear Measurement: Gear Measuring Instruments- Gear Tooth Profile Measurement- Measurement Of Diameter- Pitch Pressure Angle and Tooth Thickness.

UNIT - V:

Surface Roughness Measurement: Difference Between Surface Roughness and Surface Waviness -





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Numerical Assessment Of Surface Finish: CLA- R.M.S Values- R2 Values- R10 Value - Methods Of Measurement Of Surface Finish: Profilograph - Talysurf - ISI Symbol for Indication Of Surface Finish.

Coordinate Measuring Machines: Types Of CMM- Role Of CMM- and Applications Of CMM.

TEXT BOOKS

- 1. Engineering Metrology R. K. Jain Khanna Publishers
- 2. Engineering Metrology I C Gupta DhanpathRai





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REFERENCES

- 1. Dimensional Metrology Connie Dotson Thamson 4th Edition.
- 2. Principles of Engineering Metrology RegaRajendra Jaico Publications.
- 3. BIS Standards on Limits & Fits- Surface Finish- Machine Tool Alignment etc.
- 4. Fundamentals of Dimensional Metrology Connie Dotson Thamson- 4th Edition.
- 5. Engineering Metrology Kenneth John Hume -Mc Donald.
- 6. Engineering Metrology D. M Anthony -Pergamon Press.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET26 – NON CONVENTIONAL SOURCES OF ENERGY

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT - I

Solar Energy: Fundamentals; Solar Radiation; Estimation Of Solar Radiation On Horizontal And Inclined Surfaces; Measurement Of Solar Radiation Data

UNIT -II

Solar Thermal Systems: Introduction; Basics Of Thermodynamics And Heat Transfer; Flat Plate Collector; Evacuated Tubular Collector; Solar Air Collector; Solar Concentrator; Solar Distillation; Solar Cooker; Solar Refrigeration And Air Conditioning;

UNIT-III

Solar Photovoltaic Systems: Introduction; Solar Cell Fundamentals; Characteristics And Classification; Solar Cell: Module- Panel And Array Construction; Photovoltaic Thermal Systems. Energy Storage Systems: Thermal Energy Storage Methods- Energy Saving-

UNIT-IV

Wind Energy: Introduction; Origin And Nature Of Winds; Wind Turbine Siting; Basics Of Fluid Mechanics; Wind Turbine Aerodynamics; Wind Turbine Types And Their Construction; Wind Energy Conversion Systems.Fuel Cells: Overview; Classification Of Fuel Cells; Operating Principles; Fuel Cell Thermodynamics

UNIT-V

Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass Conversion Technologies; Urban Waste To Energy Conversion; Biomass Gasification.

Other Forms Of Energy: Introduction: Nuclear- Ocean And Geothermal Energy Applications; Origin And Their Types; Working Principles

TEXT BOOKS

- 1. Sukhatme S.P. and J.K.Nayak- Solar Energy Principles of Thermal Collection and Storage-Tata McGraw Hill- New Delhi
- 2. Khan B.H.- Non-Conventional Energy Resources-Tata McGraw Hill- New Delhi

REFERENCES

1. M.V.R. KoteswaraRao, — Energy Resources: Conventional & Non-Conventional — BSP Publications,2006.

2. D.S. Chauhan, Non-conventional Energy Resources New Age International.

3. C.S. Solanki, -Renewal Energy Technologies: A Practical Guide for Beginners PHI Learning.



4.J.A. Duffie and W.A. Beckman- Solar Energy - Thermal Processes- John Wiley



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET27 - TOOL DESIGN

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT –I

Tool Design Introduction - Cutting Tools Classification – Nomenclature Of Single Point Cutting Tool Difference Between Orthogonal And Oblique Cutting – Mechanism Of Metal Cutting – Types Of Chips Chip Breakers – Forces Acting On Tool – Merchant Circle Diagram – Velocity Relations Specific Energy In Cutting.

UNIT-II

Machinability - Tool Wear – Tool Life – Tool Failure - Factors Affecting Tool Life – Taylor's Tool Life Equation – Tool Wear Mechanisms – Types Of Tool Wear – Heat Distribution In Metal Cutting – Measurement Of Temperature In Metal Cutting – Lathe Tool Dynamometer – Cutting Fluids – Selection And Applications.

UNIT-III

Cutting Tool Materials- Requirements Of Tool Materials-Abrasive Materials - Advances In Tool Materials- HSS-Coated HSS- Carbides -Coated Carbides- Ceramics- Cold Pressed- Hot Pressed - Ceramic Composites- CBN-Diamond- Properties- Advantages And Limitations; Specifications For Inserts And Tool Holders. Design Of Single Point Cutting Tool And Form For Lathe Work- Design Of Milling And Broach Tools - Shapes Of Grinding Wheels.

UNIT- IV

Press Working And Economics Of Machining: Press Working Operations- Press Selection And Tonnage- Centre Of Pressure- Cutting Forces And Clearances For Die Design – Compound And Progressive Die- Strip Layout. Costs Associated With Machining Operations- Optimum Cutting Speed For Minimum Cost And Maximum Production-Cutting Speed For Minimum Cost In Turning – Forging Dies Parts.

UNIT-V

Jigs & Fixtures- Uses- Locating Devices- 3-2-1 Principle Of Location – Pin Location- Radial Location- "V" Location- Diamond Locators. Types Of Clamping Devices- Principles Of Clamping. Design Principles To Jigs & Fixtures – Drill Jigs- Types- Drill Bushes- Types- Fixtures For Turning- Milling And Welding – Grinding And Forging.

TEXT BOOKS

- 1. Tool Design Donaldson, Tata McGraw-Hill
- 2. Tool Engineering & Design G.R.Nagpal, KhannPublishers

REFERENCES

- 1. Fundamental of Metal Cutting and Machine Tools-Juneja and Sekhan (New Age International Publishers)
- 2. Metal Cutting Principles- Milton C.Shaw-(Oxford University Press)





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MET28 - MECHATRONICS

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT – I

Introduction: Definition Of Mechatronics Products- Design Considerations And Trade Offs. Overview Of Mechtronic Products.Intelligent Machine Vs Automatic Machine Economic And Social Justification

Actuators And Drive Systems: Mechanical- Electrical- Hydraulicdrivesystems- Characteristics Of Mechanical- Electrical- Hydraulic Andpneumatic Actuators And Their Limitations.

UNIT – II

Motion Control: Control Parameters And System Objectives- Mechanicalconfigurations- Popular Control System Configurations. S-Curve- Motor-Load Inertia Matching- Design With Linear Slides. **Motion Control Algorithms:** Significance Of Feed Forward Control Loops-Shortfalls- Fundamentals Concepts Of Adaptive And Fuzzy – Control.Fuzzy Logic Compensatory Control Of Transformation And Deformation On- Linearity's.

UNIT – III

Sensor Interfacing:Analog And Digital Sensors For Motionmeasurement- Digital Transducers-Human-Machine And Machineinter Facing Devices And Strategy.

UNIT – IV

Machine Vision: Feature And Pattern Recognition Methods- Conceptsof Perception And Cognition In Decision-Making

Manufacturing Data Bases: Data Base Management System- CAD-CAM Data Bases- Graphic Data Base- Introduction To Object Oriented Concepts- Objects Oriented Model Language Interface-Procedures And Methods In Creation- Edition And Manipulation Of Data .

$\mathbf{UNIT} - \mathbf{V}$

Architecture Of Intelligent Machines: Introduction To Microprocessor And Programmable Logic Controls And Identification Of Systems. System Design Classification- Motion Control Aspects In Design.

TEXT BOOKS:

1. Designing intelligent machines, open university- London.MichelB.Histand and david G. Alciatore.



2. Introduction to Mechatronics and Measurement systems- Tata McGraw Hill.



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3. Control sensors and actuators-C.W.desilva- Prentice Hall.

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CSP13: ADVANCED PROGRAMMING LANGUAGES LAB

Internal Marks: 40

Credits: 3

Univ. Examinations Marks: 60

<u>UNIT- I</u>

Introduction to Problem Solving: Introduction to Computer Systems, Computer Environments, Computer Languages, Problem Solving Aspects, Top-Down Design, Bottom-Up Design, Development of Algorithms, Representation of Algorithm, Flow Chart, Pseudo Code, Coding, Testing and Debugging.

<u>UNIT-II</u>

Programming in C: Elements of C Tokens, Identifiers, Preprocessor Directives. Data types in C. Control Structures in C. Sequence, Selection and Iterations. Arrays, Strings, Pointers, Functions, Structures, Unions. Files I/O.

<u>UNIT-III</u>

OO Programming Concepts & C++: Classes, Object, Instantiation. Encapsulation, Abstraction, Inheritance, Polymorphism. C++ Programming: Elements of C++- Tokens, Identifiers. Variables and Constants, Data types, Operators, Control Statements. Functions Constructors and Destructors. Templates, Exception Handling.

<u>UNIT- IV</u>



Java Programming: An overview of Java, Data types, Arrays and Variables, Operators, Control Statements, Introduction of Classes, Inheritance, Packages and Interfaces, Exception Handling, Multithreaded Programming, I/O Basics, Applets.

<u>UNIT- V</u>

Data Structures and Algorithms: Data, Information, Definition of Data Structures. Arrays, Stacks, Queues, Linked Lists, Trees, Graphs. Searching and Sorting Techniques. Introduction



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to Algorithms. Analysis of Algorithms, Binary Search, Asymptotic Notations-Big O, Omega and Theta. Average Case Analysis of Simple Programs like Finding Maximum of N elements.

Text Books:

- 1. Balagurusamy E, Programming in ANSI C, 6th Edition, Tata McGraw-Hill, 2012
- 2. R.G.Dromey, How to Solve it by Computer, PHI.
- 3. Balagurusamy E , Object Oriented Programming with C++ 6th Edition, McGraw Hill Education, 2013
- 4. Herbert Schildt Java : The Complete Reference, 10th Edition, Mc Graw Hill India, 2017
- 5. —Fundamental of Algorithms^I, E. HOROWITZ and S. SAHNI, GALGOTIA.





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MET29 - NANO TECHNOLOGY

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Introduction: History and Scope- Can Small Things Make a Big Difference - Classification of Nanostructured Materials- Fascinating Nano structures- Applications of Nanomaterials- Nature: The Best of Nanotechnologist-Challenges and Future Prospects.

UNIT-II

Unique Properties of Nanomaterials: Microstructure and Defects in Nano crystalline Materials: Dislocations-Twins-stacking faults and voids- Grain Boundaries- triple and disclinations- Effect of Nano-dimensions on Materials Behaviour: Elastic properties- Melting Point- Diffusivity- Grain growth characteristics- Enhanced solid solubility- Magnetic Properties: Soft magnetic Nano crystalline alloy- Permanent magnetic Nano crystalline materials- Giant Magnetic Resonance- Electrical Properties- Optical Properties- Thermal Properties and Mechanical Properties.

UNIT-III

Synthesis Routes: Bottom up approaches: Physical Vapor Deposition- Inert Gas Condensation- Laser Ablation-Chemical Vapor Deposition- Molecular Beam Epitaxy- Sol-gel method -Self assembly- Top down approaches: Mechanical alloying- Nano-lithography- Consolidation of Nanopowders: Shock wave consolidation- Hot isostatic pressing and Cold isostatic pressing Spark plasma sintering.

UNIT-IV

Tools to Characterize nanomaterials: X-Ray Diffraction (XRD)- Small Angle X-ray scattering (SAXS)- Scanning Electron Microscopy (SEM)- Transmission Electron Microscopy (TEM)- Atomic force Microscopy (AFM)- Scanning Tunnelling Microscope (STM)- Field Ion Microscope (FEM)- Three-dimensional Atom Probe (3DAP)- Nanoindentation.

UNIT-V

Applications of Nanomaterials: Nano-electronics- Micro- and Nanoelectromechanical systems (MEMS-NEMS)-Nanosensors- Nanocatalysts- Food and Agricultural Industry- Cosmetic and Consumer Goods- Structure and Engineering- Automotive Industry- Water- Treatment and the environment- Nano-medical applications- Textiles-Paints- Energy- Defence and Space Applications- Concerns and challenges of Nanotechnology.

TEXT BOOKS

- 1. Text Book of Nano Science and Nano Technology B.S. Murthy- P. Shankar-Baldev Raj- B.B. Rath and James Munday- University Press IIM.
- 2. Introduction to Nanotechnology Charles P. Poole- Jr.- and Frank J. Owens-Wley India Edition-





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REFERENCES

- 1. Nano: The Essentials by T.Pradeep- McGraw- Hill Education.
- 2. Nanomaterials- Nanotechnologies and Design by Michael F. Ashby- Paulo J. Ferreira and Daniel L.Schodek.
- 3. Transport in Nano structures- David Ferry- Cambridge University press
- 4. Nanofabrication towards biomedical application: Techniques- tools- Application and impact Ed. Challa S.-S. R. Kumar- J. H. Carola.




DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET30- COMPOSITE MATERIALS

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT -I

Introduction To Composites Fundamentals Of Composites - Need For Composites – Enhancement Of Properties – Classification Of Composites – Matrix-Polymer Matrix Composites (PMC)- Metal Matrix Composites (MMC)-Ceramic Matrix Composites (CMC) – Reinforcement – Particle Reinforced Composites- Fibre Reinforced Composites. Applications Of Various Types Of Composites.

UNIT -II

Polymer Matrix Composites Polymer Matrix Resins – Thermosetting Resins- Thermoplastic Resins – Reinforcement Fibres – Rovings – Woven Fabrics – Non Woven Random Mats – Various Types Of Fibres. PMC Processes - Hand Lay Up Processes – Spray Up Processes – Compression Moulding – Reinforced Reaction Injection Moulding - Resin Transfer Moulding – Pultrusion – Filament Winding – Injection Moulding. Fibre Reinforced Plastics (FRP)- Glass Fibre Reinforced Plastics (GRP).

UNIT -III

Metal Matrix Composites Characteristics Of MMC- Various Types Of Metal Matrix Composites Alloy Vs. MMC-Advantages Of MMC- Limitations Of MMC- Reinforcements – Particles – Fibres. Effect Of Reinforcement -Volume Fraction – Rule Of Mixtures. Processing Of MMC – Powder Metallurgy Process -Diffusion Bonding – Stir Casting – Squeeze Casting.

UNIT -IV

Ceramic Matrix Composites Engineering Ceramic Materials – Properties – Advantages – Limitations – Monolithic Ceramics - Need For CMC – Ceramic Matrix - Various Types Of Ceramic Matrix Composites- Oxide Ceramics – Non Oxide Ceramics – Aluminium Oxide – Silicon Nitride – Reinforcements – Particles-Fibreswhiskers.Sintering - Hot Pressing – Cold Isostatic Pressing (Ciping) – Hot Isostaticpressing(Hiping).

UNIT -V

Advances In Composites Carbon -Carbon Composites – Advantages Of Carbon Matrix – Limitations Of Carbon Matrix Carbon Fibre – Chemical Vapour Deposition Of Carbon On Carbon Fibre Perform. Sol-Gel Technique. Composites For Aerospace Applications.

TEXT BOOKS

1. Mathews F.L. and Rawlings R.D.- —Composite Materials: Engineering and Sciencel- Chapman and Hall-London- England

2. Chawla K.K.- — Composite materials - Springer - Verlag

REFERENCES

1. T.W. Clyne and P.J. Withers- -- Introduction to Metal Matrix Composites -- Cambridge University Press

2. A.B. Strong--Fundamentals of Composite Manufacturing-SME



3. S.C. Sharma--Composite materials-Narosa Publications



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET31 - POWER PLANT ENGINEERING

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT- I

Coal Based Steam Power Plants-Thermal power plants: Introduction- plant lay out of a modern steam power plant. Cycles: Reheat- Regenerative- Binary vapour cycle. Different types of fuels used for steam generation-Selection of site for steam power station. Fuel handling system – coal handling systems- various stages in coal handling Fuel system – Pulverized fuel firing system-Ash handling system: Classify ash handling systems - Hydraulic and Pneumatic systems- Dust collector : Classify dust collectors – Mechanical- Cyclone separator.

UNIT -II

Steam Generators-Steam Boilers: Classification- Fire tube- Water tube boiler- High pressure boilers – Lamont-Benson selection of a boiler. Boiler Mounting& Accessories: Super heater- Economiser- Air Preheater- types – construction. Water Treatment: Impurities in water and their effects - Methods of water treatment- Demineralising process. Chimney draught: Classification of draught- Steam jet draught- Mechanical draught.

UNIT-III

Steam Condensers - Steam condensers: Introduction-types- Surface condenser- condenser auxiliaries- Methods of cleaning condenser tubes. Cooling Ponds & Cooling tower: Directed flow- Spray ponds- Natural draught cooling tower- Mechanical draught cooling tower- Maintenance of cooling towers. Steam Turbines : Classify- reaction turbine- governing of turbines – Methods of governing- Throttle control governing.

UNIT-IV

Plant Instrumentation & Control - Power plant instrumentation: Classification- commonly used instruments -Bourdon tube pressure gauge-Radiation pyrometer- classify-components - throttling calorimeter-steam calorimeter. Importance of measurement and instrumentation in power plant- measurement of water purity- gas analysis- O2 and CO2 measurements- measurement of smoke and dust- measurement of moisture in carbon dioxide circuit- nuclear measurements

UNIT-V

Nuclear Power Station - Nuclear power plants: Introduction- nuclear fission- nuclear fusion- chain reaction. Nuclear reactor: Basic principles – types of reactors -Pressurized Water Reactor (P.W.R)-Boiling Water Reactor(B.W.R)-shielding-radio Active waste disposal- radiation hazards – Control and safety rods. Safety Measures for Nuclear Power Plants.

TEXT BOOKS

1. Er. R.K.RAJPUT-Power plant engineering-Laxmi publications pvt limited- New Delhi

2. AroraS.C.&Domkundwar S: A course in power plant engineering-3 rd Edition DhanpatRai





DEPARTMENT OF MECHANICAL ENGINEEIRNG

REFERENCES

 $1.\ M.M.El-Wakil-PowerPlantTechnology-TataMcGraw-HillPublishingCompanyLtd$

 $2. Black \& Veatch-Springer-\ PowerPlant Engineering.$

3. Thomas C.E. IHt. Kao Chenand Robert C.Swanekamp-

Standard Handbook of Power Plant Engineering-McGraw-Hill

4. Renewableenergy- GodfreyBoyle-

 $Oxford University Pressinas sociation with \ The Open University$





DEPARTMENT OF MECHANICAL ENGINEEIRNG

CSP12-COMPUTER GRAPHICS LAB

Credits:	1	Internal Examination Marks: 40
Lectures /Week	2	External Examination Marks: 60

- 1. Write A Program for Pixel
- 2. Write A Program for Drawing A Line
- 3. Write A Program for Generation Of Circle
- 4. Write A Program for Filling A Circle
- 5. Write A Program for Boundary Fill Algorithm
- 6. Write A Program for 2D Scaling
- 7. Write A Program for 2D Rotation
- 8. Write A Program for 2D Translation
- 9. Write A Program for DOA Algorithm
- 10. Write A Program for Bresenham"s Line Drawing Algorithm
- 11. Write A Program for Midpoint Of A Circle
- 12. Write A Program for Midpoint Of An Ellipse





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MEP08-INSTRUMENTATION & DYNAMICS LAB

Credits:	1	Internal Examination Marks: 40
Lectures /Week	2	External Examination Marks: 60

Any 5 experiments from the below list

Instrumentation laboratory

List of Experiments

- 1. To study and calibration of McLeod gauge for low pressure.
- 2. To study and calibration of LVDT transducer for displacement measurement.
- 3. To study and calibration of thermocouple for temperature measurement.
- 4. To study and calibration of thermister for temperature measurement.
- 5. To study and calibration of pressure gauge transducer for pressure measurement.
- 6. To study and calibration of anemometer for flow measurement.
- 7. To study and calibration of force cell or load cell for force measurement.
- 8. Determination of Modulus of Elasticity of a Mild Steel Specimen Using Strain Gauges.

Dynamics Laboratory

Any 5 experiments from the below list

List of experiments

- 1. To verify the relation of a simple pendulum.
- 2. To study the radius of gyration of By-filler suspension.
- 3. To determine the radius of gyration "k" of a given compound pendulum.
- 4. To study the undamped torsional vibration of single rotor system.
- 5. To study the undamped torsional vibrations of double rotor system.
- 6. To study the longitudinal vibration of helical spring and to determine the frequency and time period of oscillation theoretically and actually by experiment.
- 7. Determination of characteristics curves of sleeve position against speed for all governors.
- 8. Cam analysis on eccentric cam with knife edge follower.
- 9. Cam analysis on Tangent cam with roller follower.
- 10. Cam analysis on circular cam with mushroom follower.





DEPARTMENT OF MECHANICAL ENGINEEIRNG SCHOOL OF ENGINEERING AND TECHNOLOGY

MEP09-METROLOGY LAB

Credits:	1	Internal Examination Marks: 40
Lectures /Week	2	External Examination Marks: 60

Any 8 experiments from the below list

List of experiments

- 1. Find the taper angle of given specimen by using bevel protractor and explain with a neat sketch.
- 2. Find the gear tooth profile of given specimen by using gear tooth vernier and explain with a neat sketch.
- 3. Find the screw thread parameter of given specimen using two wire method by floating carriage micrometer and explain with a neat sketch.
- 4. Find out the depth, internal and external diameter of specimen by using inside micrometer, outside micrometer and vernier calliper and explain inside micrometer with a neat sketch.
- 5. Calibrate vernier calliper by using slip gauges and explain with a neat sketch.
- 6. Find the taper angle of given specimen by using bevel protractor.
- 7. Calibrate micrometer by using slip gauges and explain with a neat sketch.
- 8. Find the taper angle of given specimen by using sine bar and explain with a neat sketch.
- 9. Find the bore diameter of given specimen by using bore gauge and explain with a neat sketch.
- 10. Find the height of given specimen by using vernier height gauge and explain with a neat sketch.
- 11. Alignment tests using dial gauges.
- 12. Measurement Of Alignment Using Autocollimator Roller Set
- 13. Drill Jig
- 14. Taper Ring Gauge using Spheres and Depth Micrometer
- 15. A) Surface Measurement
 - B) Tool Maker"s Microscope





DEPARTMENT OF MECHANICAL ENGINEEIRNG

SCHOOL OF ENGINEERING AND TECHNOLOGY

MET21 - CAD-CAM

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT- I

Overview of CAD-CAM- Product cycle- CAD- CAM and CIM. CAD Tools- CAM Tools-Utilization in an Industrial Environment- Evaluation criteria. CAD standards- CAD data structure-Data base management systems. Computer Graphics- Co-ordinate systems- Graphics package functions- 2D and 3D transformations- homogeneous transformations- clipping- hidden line - surface removal colour-shading.

UNIT II

Geometric Modeling- Representation techniques- Parametric and non parametric representationvarious construction methods- wire frame modeling- synthetic curves and their representations-surface modeling- synthetics surfaces and their representations. Solid modeling- solid representationfundamentals- introduction to boundary representations- constructive solid geometry- analytical solid modeling.

UNIT –III

Part Programming For NC Machines-NC- NC modes- NC elements- CNC machine tools- structure of CNC machine tools- features of Machining center- turning center- CNC Part Programming-fundamentals- manual part programming methods- Computer Aided Part Programming. Direct Numerical Control- Adaptive Control.

UNIT-IV

Group Technology & FMS- Part Family- Classification and Coding- advantages & limitations-Group technology machine cells- benefits. FMS- Introduction- components of FMS- material handling systems- Computer control systems- advantages. Computer Aided Quality Control-Terminology in Quality control- Inspection and testing- Contact inspection methods - optical and non opticalintegration of CAQC with CAD and CIM.

UNIT-V

Computer Integrated Manufacturing Systems- Types of manufacturing systems- machine tools and related equipment- material handling systems- material requirement planning- computer control systems- human labor in manufacturing systems- CIMS benefits.

TEXT BOOKS-

1. CAD-CAM -A Zimmers&P.Groover- PHI

2. CAD-CAM, Principles and applications -P.N. Rao

REFERENCES

- 1. CAD-CAM-CIM -Radhakrishnan and Subramaniah
- 2. Principles of Computer Aided Design and Manufacturing -FaridAmirouche- Pearson



3.CAD-CAM Theory and Practice - R. Sivasubramaniam- TMH





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET22 - HEAT TRANSFER

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

(Heat transfer data book allowed)

UNIT - I

Introduction: Modes And Mechanisms Of Heat Transfer – Basic Laws Of Heat Transfer – GeneralDiscussion About Applications Of Heat Transfer.

Conduction Heat Transfer: Fourier's equation – general heat conduction equation inCartesian and cylindrical coordinates.

UNIT – II

One Dimensional Steady State Conduction Heat Transfer: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer co-efficient – electrical analogy – critical radius of insulation-Variable thermal conductivity.

One Dimensional Transient Conduction Heat Transfer: Lumped Analysis – significance of Biot and fourier numbers - chart solutions of transient conduction. Extended surface (fins) heat Transfer – long fin, and short fin.

UNIT – III

Convective Heat Transfer: Classification of convective heat transfer –Buckingham Pi Theorem for forced and free convection. Significance of non-dimensional numbers – concepts of continuity, momentum and Energy Equations.

External & Internal Flows: Concepts about hydrodynamic and thermal boundary layer.

UNIT IV

Heat Exchangers: Classification of heat exchangers – overall heat transfer coefficient and fouling factor – concepts of LMTD– Problems.

Boiling& Condensation: Pool boiling – regimes- calculations on nucleate boiling, critical heat flux. Film wise and drop wise condensation –Nusselt's theory of condensation.

UNIT V

Radiation Heat Transfer:Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchoff, Lambert, Stefan Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation networks.





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TEXT BOOKS:

- 1. Heat Transfer HOLMAN/TMH
- 2. Heat Transfer P.K.Nag/ TMH





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REFERENCES:

- 1. Heat and Mass Transfer Arora and Domkundwar, Dhanpatai& sons
- 2. Fundamentals of Engg. Heat and Mass Transfer / R.C.SACHDEVA / New Age International
- 3. Heat and Mass Transfer –Cengel- McGraw Hill.
- 4. Heat and Mass Transfer D.S.Kumar / S.K.Kataria& Sons

5. Principles of Heat Transfer – Frank Kreith, RM Manglik& MS Bohn, Cengage learning Publishers





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET23 - AUTOMOBILE ENGINEERING

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Introduction-Components Of An Automobile- Types of engines- arrangement of cylinders- value arrangement of overhead- T-head-Lhead-F-head engines- combustion chambers for petrol and diesel engines.Liners- dry and Wet type- function and constructional details- Crank shaft – function and construction details.

UNIT-II

Air Cleaners-Function and construction details . Exhaust manifolds – function and construction details. Fuel supply system – function and constructional details.

Pistons-function and construction details.Carburetors-Function and constructional details for simple-S.U.Solex- Carter- Zenith carburetors.

UNIT-III

Cooling system-Need- thermo siphon and forced systems of water cooling- air cooling.Lubrication-Methods of engine lubrication. Lubrication and chassis transmission- SAE grading of lubricants and properties of lubricants.

Ignition System-Coil and magneto systems. Storage battery- function and constructional details and rating of batteries- dynamo- cut-out- voltage and current regulator starter- drives-Bendix and over running clutch drive systems.

Engine control: Recent developments including electronic monitoring and control of engines

UNIT-IV

Transmission Systems-Function of clutch- single plate and multiple plate- and centrifugal clutches and clutch materials- fluid coupling- torque converter.

Gear box- need- sliding type- constant and synchromesh type. Automatic transmission. Propeller shaft; need and constructional details.

UNIT-V

Front Axle-Independent suspension systems- torsion bar- stub axle and front hub.

Rear axle-Semi- three fourth and full floating systems- steering- linkages- Wheel alignment-caster camber- toe-in and toe-out. Power steering.

Brakes-Mechanical- Hydraulic- Vacuum- Air and Pneumatic Systems. Arrangements of brake shoes-vehicle electrical and electronic systems.



TEXT BOOKS



DEPARTMENT OF MECHANICAL ENGINEEIRNG

- 1. Automobile Engineering -Narang G.B.S.
- 2. Automobile Engineering Vol. I &II -Kirpal Singh.





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REFERENCES

- 1. Automotive Mechanics -Heitner J.
- 2. I.C.Engines-Mathur M.L. & Singh R.P.
- 3. Fundamentals of Motor Vehicle Technology Hillier & Pittuck
- 4. High Speed Combustion Engines -Heldt P.M.
- 5. Automotive Mechanics Services Course W.H.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET24 - MODERN MACHINING PROCESSES

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT – I

Introduction-Need For Modern Machining Methods-Classification Of Modern Machining Processes – Considerations In Process Selection- Applications. Ultrasonic Machining – Elements Of The Process- Mechanics Of Material Removal- MRR Process Parameters- Economic Considerations-Applications And Limitations.

UNIT – II

Electro – **Chemical Machining-**Fundamentals Of Electro Chemical Machining- Electrochemical Grinding- Electro Chemical Honing And Deburring Process- Metal Removal Rate In ECM- Tool Design- Surface Finish And Accuracy- Economic Aspects Of ECM – Simple Problems For Estimation Of Metal Removal Rate- Fundamentals Of Chemical- Machining- Advantages And Applications.

UNIT - III

Thermal Metal Removal Processes-General Principle And Applications Of Electric Discharge Machining- Electric Discharge Grinding And Wire EDM – Power Circuits For EDM- Mechanics Of Metal Removal In EDM- Process Parameters- Selection Of Tool Electrode And Dielectric Fluids-Surface Finish And Machining Accuracy- Characteristics Of Spark Eroded Surface

$\mathbf{UNIT} - \mathbf{IV}$

Electron Beam Machining- Laser Beam Machining- Basic Principle And Theory- Mechanics Of Material Removal- Process Parameters- Efficiency & Accuracy- Applications

UNIT-V

Plasma Machining-Application Of Plasma For Machining- Metal Removal Mechanism- Process Parameters- Accuracy And Surface Finish And Other Applications Of Plasma In Manufacturing Industries.

Abrasive Jet Machining- Water Jet Machining And Abrasive Water Jet Machining- Basic Principles-Equipments- Process Variables- Mechanics Of Material Removal- MRR- Application And Limitations-Agnetic Abrasive Finishing- Abrasive Flow Finishing- Electro-Stream Drilling- Shaped Tube Electrolytic Machining.

TEXT BOOKS

- 1. Fundamentals of Machining Processes-Conventional and non conventional processes-Hassan Abdel – Gawad El-Hafy-CRC Press
- 2. Modern Manufacturing process- V.K Jain, TMH



REFERENCES



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1. Modern Machining Process -Pandey P.C. and Shah H.S.- TMH.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET32- REFRIGERATION AND AIR CONDITIONING

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT I

Introduction to Refrigeration- Necessity and Applications- Carnot Refrigerator- First and Second Law Applied to Refrigerating Machines- Unit of Refrigeration- COP- EER- Different Refrigeration Methods Air Refrigeration- Bell-Coleman Cycle- Ideal and Actual Cycles- Open and Dense Air Systems - Numerical Problems – Refrigeration Needs of Air Crafts.

UNIT II

Vapour Compression Refrigeration (VCR) System – Basic Cycle - Working Principle and Essential Components of The Plant – COP – Representation of Cycle On T-S and P-h Charts – Expander Vs. Throttling- Effect of Sub Cooling and Super Heating – Cycle Analysis – Actual Cycle-Influence of Various Parameters on System Performance – Construction and Use of P-h Charts – Numerical Problems.

Refrigerants – Desirable Properties – Classification of Refrigerants Used – Nomenclature-Secondary Refrigerants- Lubricants – Ozone Depletion – Global Warming- Newer Refrigerants.

UNIT III

Vapour Absorption Refrigeration (VAR) System – Description and Working of NH3 – Water System and Li Br –Water (Two Shell & Four Shell) System -Calculation of Max COP- Principle of Operation of Three Fluid Absorption System.

Steam Jet Refrigeration System- Working Principle and Basic Components-Estimation of Motive Steam Required- Principle and Operation of- (I) Thermo-Electric Refrigerator (Ii) Vortex Tube Or Hilsch Tube.

UNIT IV

Introduction to Air Conditioning- Psychrometric Properties & Processes – Characterization of Sensible and Latent Heat Loads — Need For Ventilation- Consideration of Infiltrated Air – Heat Load Concepts. Air Conditioning Systems- Air Cooler (Evaporative Cooling) -Window- Split- Summer - Winter- Year Round- Central Air Conditioning Systems.

UNIT V

Air Conditioning Equipment - Humidifiers – Dehumidifiers – Air Filters- Fans and Blowers.Human Comfort- Requirements of Temperature- Humidity And Concept of Effective Temperature- Comfort Chart. Heat Pump – Heat Sources – Different Heat Pump Circuits.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

TEXT BOOKS-

- 1. Refrigeration and Air Conditioning -CPArora-TMH- 15th edition
- 2. A Course in Refrigeration and Air conditioning- S.CArora & Domkundwar-Dhanpatrai

REFERENCE BOOKS-

- 1. Refrigeration and Air Conditioning -Manohar Prasad New Age
- 2. Principles of Refrigeration Dossat- Pearson Education
- 3. Refrigeration and Air Conditioning-P.L.Ballaney
- 4. Basic Refrigeration and Air-Conditioning P.N.Ananthanarayanan- TMH




DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET33 - INDUSTRIAL ROBOTICS

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT I

Fundamentals of Robot -Robot - Definition - Robot Anatomy – Co- ordinate Systems- Work Envelope Types and Classification Specifications-Pitch- Yaw- Roll- Joint Notations- Speed of Motion- Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT II

Robot Drive Systems and End Effectors - Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors- Stepper Motors- A.C. Servo Motors-Salient Features-Applications and Comparison of all these Drives- End Effectors-Grippers-Mechanical Grippers-Pneumatic and Hydraulic- Grippers- Magnetic Grippers- Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III

Sensors and Machine Vision -Requirements of a sensor- Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor- LVDT- Resolvers- Optical Encoders-pneumatic Position Sensors- Range Sensors Triangulations Principles- Structured- Lighting Approach- Time of Flight- Range Finders- Laser Range Meters- Touch Sensors -binary Sensors. Analog Sensors- Wrist Sensors- Compliance Sensors- Slip Sensors- Camera- Frame Grabber- Sensing and Digitizing Image Data Signal Conversion-

Image Storage- Lighting Techniques- Image Processing and Analysis-Data Reduction-Segmentation-Feature Extraction- Object Recognition- Other Algorithms- Applications Inspection-Identification-Visual Serving and Navigation

UNIT IV

Robot Kinematics and Robot Programming Forward Kinematics- Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two- Three Degrees of Freedom (in 2 Dimension)- Four Degrees of freedom (in 3 Dimension) Jacobians- Velocity and Forces-Manipulator Dynamics- Trajectory Generator- Manipulator Mechanism Design-Derivations and problems. Lead through Programming- Robot programming Languages-VAL Programming-Motion Commands- Sensor Commands- End Effector commands and simple Programs.

UNIT V

Implementation and Robot Economics RGV- AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.





TEXT BOOKS-

1. Klafter R.D.-Chmielewski T.A and Negin M.- —Robotic Engineering - An Integrated Approach Prentice Hall

2. Groover M.P.- -- Industrial Robotics - Technology Programming and Applications -- McGraw Hill-

REFERENCES-

1. Craig J.J.- -- Introduction to Robotics Mechanics and Control -- Pearson Education

2. Deb S.R.- - Robotics Technology and Flexible Automation || Tata McGraw Hill Book Co

3. Koren Y.- — Robotics for Engineers"- McGraw Hill Book Co

4. Fu.K.S.-Gonzalz R.C. and Lee C.S.G.- —Robotics Control- Sensing- Vision and Intelligence-McGraw Hill Book Co

5. Janakiraman P.A.- — Robotics and Image Processing I- Tata McGraw Hill

6. Rajput R.K.- — Robotics and Industrial Automation -S.Chand and Company

7. Surender Kumar- —Industrial Robots and Computer Integrated Manufacturing- Oxford and IBH Publishing Co. Pvt. Ltd





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET34 - SIMULATION AND MODELLING

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT – I

Modelling and Simulation Fundamentals- System - Basic concepts- Hierarchy- Types- Elements of

3. system- System description-Modeling 3. Definition- Functions- Classification-Structure of simulation models-Modeling approaches- System simulation - Definitionsimulation process-advantages.

UNIT – II

Generation of Random Numbers- System behavior - simulation of random phenomena- Monte-Carlo sampling- Random number generation - Mid square method- Mid product method-Multiplicative congruential method- Additive congruential method- Testing for randomness - Chi – Square method-Kolmogrov- Smirnov method- Runs test- Gap test.

UNIT – III

Data Preparation and Model Building- Data preparation - Correlation and regression analysis-Curve fitting - Fitting of known distributions – Uniform- Normal- Exponential- Poisson-Weibull-Emperical Distribution Building-Modeling in computer - Language selection- Time flow mechanism-Flow diagram.

UNIT – IV

Simple Simulation Models- Simulation of a discrete system- Simulation of an event occurrence using random number table- Simulation of component failure using exponential and Weibull models-Simulation of single server and two servers queue- Simulation of an inventory system.

Planning of simulation experiments - tactical planning- Run length determination- Validation of simulation models- Analysis of simulation results.

UNIT – V

Simulation Languages- Simulation languages - Introduction- GPSS - concepts- advantages- case example- SIMSCRIPT - Basic concepts- advantages- case example.

TEXT BOOKS

- 1. NarasinghDeo- System Simulation with Digital Computers PHI
- 2. GeoferyGorden- System Simulation PHI

REFERENCES

1. Robert E. Shanon- Systems Simulation- The Art and science - Prentice Hall Inc.- New Jersy



2. Wyman - Forrest Paul- Simulation Modeling- A Guide in using Simscript New York – John Willey Sons-Inc



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3. Thomas J. Schriber- Simulation Using GPSS – John Willey & Sons - New York





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MET35- COMPUTATIONAL FLUID DYNAMICS

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Elementary Details In Numerical Techniques-Number system and errors - representation of integers- fractions- floating point arithmetic- loss of significance and error propagation- condition and instability- computational methods for error estimation- convergence of sequences.

UNIT – II

Applied Numerical Methods-Solution of a system of simultaneous linear algebraic equationsiterative schemes of matrix inversion- direct methods for matrix inversion- direct methods for banded matrices

Review Of Equations Governing Fluid Flow And Heat Transfer-Introduction- conservation of mass-

Newton's second law of motion- expanded forms of navier-stokes equations- conservation of energy principle- special forms of the navier-stokes equations.

UNIT - III

Steady flow- dimensionless form of momentum and energy equations- stokes equation-conservative body force fields- stream function - vorticity formulation.

Finite difference applications in heat conduction and convention – heat conduction- steady heat conduction in a rectangular geometry- transient heat conduction- finite difference application in convective heat transfer- closure.

UNIT - IV

Finite differences-discretization- consistency- stability- and fundamentals of fluid flow modelingintroduction- elementary finite difference quotients- implementation aspects of finite-difference equations- consistency- explicit and implicit methods.

Finite Volume Method-Approximation of surface integrals- volume integrals-interpolation and differentiation practices- upwind interpolation- linear interpolation and quadratic interpolation.

UNIT - V

Introduction to first order wave equation- stability of hyperbolic and elliptic equations-fundamentals of fluid flow modeling- conservative property- the upwind scheme.

TEXT BOOKS-

- 1. Numerical heat transfer and fluid flow -Suhas V. Patankar- Butter-worth Publishers
- 2. Computational fluid dynamics Basics with applications John. D. Anderson McGraw Hill.





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REFERENCES-

- 1. Computational Fluid Flow and Heat Transfer-Niyogi- Pearson Publications
- 2. Fundamentals of Computational Fluid Dynamics Tapan K. Sengupta- Universities Press.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET36 - AUTOMATION IN MANUFACTURING

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Introduction- Methods Of Part Transport- Transfer Mechanism .Types And Strategies Of Automation-Pneumatic And Hydraulic Components Circuits- Automation In Machine Tools. Mechanical Feeding And Tool Changing And Machine Tool Control.

UNIT -II

Single Station Manufacturing Cells: Single Station Manned Cells, Automated Cells, Application Of Single Station Cells And Analysis Of Single Station Systems.

Manual Assembly Lines: Fundamentals ,Analysis Of Single Model Assembly Lines, Line Balancing Algorithms.

UNIT-III

Automated Flow Lines- Buffer Storage & Control Functions- Design And Fabrication Consideration. Analysis Of Automated Flow Lines- General Terminology And Analysis Of Transfer Lines With And Without Buffer Storage- Partial Automation- Implementation Of Automated Flow Lines.

Automated Production Lines: Fundamentals, Applications, Analysis Of Transfer Lines

UNIT - IV

Automated Manufacturing Systems-Components- Classification And Overview Of Manufacturing Systems-Manufacturing Cells- GT And Cellular Manufacturing- FMS- FMS And Its Planning And Implementation- Flow Lines & Transfer Mechanisms- Fundamentals And Analysis Of Transfer Lines- Product Design For Automatic Assembly.

Automated Assembly Systems : Fundamentals, Qualitative Analysis Of Assembly Systems

UNIT -V

Automated Material Handling - Types Of Equipment- Functions- Analysis And Design Of Material Handling Systems Conveyor Systems- Automated Guided Vehicle Systems. Automated Storage Systems- Automated Storage And Retrieval Systems; Work In Process Storage- Interfacing Handling And Storage With Manufacturing.

Automated Inspection- Fundamentals- Types Of Inspection Methods And Equipment- Coordinate Measuring Machines- Machine Vision. Other Optical Inspection Methods, Noncontact Non-Optical Inspection Techniques.

TEXT BOOK

1. Automation- Production Systems and Computer Integrated Manufacturing - M.P. Groover 3e.-PE-PHI

2. Handbook of design- manufacturing & Automation - R.C. Dorf- John Wiley and Sons.



REFERENCES



DEPARTMENT OF MECHANICAL ENGINEEIRNG

- 1. Computer Aided Manufacturing-Tien-Chien Chang- Richard A. Wysk and Hsu-Pin Wang- Pearson
- 2. Automation by W. Buekinsham.



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET37 - INNOVATION AND ENTREPRENEURSHIP

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT 1

Creativity and innovation-Linear and Non-linear thinking process- Convergent and Divergent thinking- Directed Creativity Process an heuristics-Creativity Techniques-Random Stimulus-Brain storming- Synetics-Nominal Group Techniques-Thinking Hats-Suggestion Systems-Quality Circles-Fishbone diagram-Force Filed Analysis-Flow charts.

UNIT II

Business Model Innovation-Elements- Patterns-Design Approaches-Distinctive Assets- Technology-Know-How—Property-The Evolution from Project to Corporate-Positioning and Marketing-Challenges in the New Century

Technological Substitution: Archiving Dominance-Financing the model-Venture Capital Vs. Private Equity- Organizational Structure- Using human resources as a competitive Edge-Sustainability-discount Operations-Amazom.com- Review current annual report and Public Sources

UNIT III

Innovation Management: Concept and Significance of Innovation- Innovation Environment-Innovation Opportunities- Managing Innovation Function- Strategizing Innovation- Organizing for innovation- Climate an Culture for Innovation-Managing Creativity-Innovation Project Management-Process Innovations- Product Innovations-Innovation diffusion-Legal Aspects of Innovation.

UNIT IV

Entrepreneurship: Concept-Significance- Competencies Of Entrepreneur- Successful Entrepreneurs Of India- Entrepreneurship Challenges In Global & National Business Environment- Types of Entrepreneurs-Supporting system for Entrepreneurs- Networking-Training Models for Entrepreneurs

UNIT V

Starting a New Enterprise- Business Opportunity Identification- Market Survey an demand Analysis- Feasibility analysis-Preparation of Project report for submission to funding- Organizations-Choice of forms of organizations (Sole Trader, Partnership, Cooperatives and stock companies)-Location and Layout decisions- decisions- Marketing and finance models- Venture financing-Promotion models- Technology assessment an assistance

TEXTBOOKS

- 1. Creativity, Innovation and Quality,- P.J.Plesk, PHI
- 2. Men and Women of the corporation-Kanter R



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REFERENCES

1. TheInnovator"s Solution- Creating and Sustaining Successful Growth-

Boston- MA-Harvard Business School Press- Christensen- C. M. and Raynor- M. E

2. Innovation and Entrepreneurship-Drucker- P. F. New York- Harper.

3. Harvard Business Review on Innovation (Collection of articles)- Harvard Business School Press

4. Harvard Business Review on Entrepreneurship (Collection of articles)- Harvard Business School







DEPARTMENT OF MECHANICAL ENGINEEIRNG

MEP10 - CAD -CAM LAB

Credits:	1	Internal Examination Marks: 40
Lectures /Week	2	External Examination Marks: 60

DRAFTING& PART MODELING-

- 1. Initiating the Graphics Package; Setting the paper size, space; setting the limits, units; use of snap and grid commands.
- 2. Drawing of primitives (Line, arc, circle, ellipse, triangle etc.)
- 3. Editing of Drawing
- 4. Symbols Library
- 5. 2D drawing
- 6. 3D Geometric Modelling, Wire Frame Modelling, Surface Modelling
- 7. 3D Drawing
- 8. Structural Analysis on a simple Truss
- 9. Structural Analysis on a simple beam
- 10. Thermal analysis on a fin

CAM LAB

- 1. Programming and Simulation for Step Turing
- 2. Programming and Simulation for MillingS





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MEP11 - HEAT TRANSFER LAB

Credits:	1	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

Any 8 Experiments from the below the list

- 1. Determination of overall heat transfer co-efficient of a composite slab
- 2. Determination of heat transfer rate through a lagged pipe.
- 3. Determination of heat transfer rate through a concentric sphere
- 4. Determination of thermal conductivity of a metal rod.
- 5. Determination of efficiency of a pin-fin
- 6. Determination of heat transfer coefficient in forced convection
- 7. Determination of heat transfer coefficient in natural convection.
- 8. Determination of effectiveness of parallel and counterflow heat exchangers.
- 9. Determination of emissivity of a given surface.
- 10. Determination of Stefan Boltzman constant.





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET25 – PRODUCTION SYSTEMS

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Introduction: The Production Paradigm-Production as a system- Types of Production systems – Job type – Batch Type – Flow type-Project type-Group Technology – Lean and agile manufacturing

UNIT-II

Facility Location & Layout: Multi plant location-Locational dynamics-Use of REL charts and Travel Charts- Computer based layout Techniques viz., CRAFT, CORELAP etc.

UNIT-III

Forecasting: Introduction- Statistical forecasting techniques- Moving Average-Exponential smoothing technique-Errors in forecasting and evaluation of fore casting techniques **Planning:** Planning- Manufacturing and service strategies- Aggregate Planning- Graphical Analysis **Assembly line Balancing:** Assembly line Balancing -Heuristics for line balancing

UNIT-IV

Mass Production: Mass Production –Scheduling-Assembly line Balancing-Master Production Scheduling- operation scheduling –Job Shop and flow shops

Sequencing: Sequencing - n jobs two machines - n jobs 3 machines—n jobs m machines- 2 jobs m machines- priority scheduling rules-Criteria and effectiveness- Materials Requirement Planning(MRP)-Product Structure-Bill Of Materials- Lot Sizing in MRP-Methods

UNIT-V

Controlling: Controlling- Project Planning and controlling with PERT / CPM- JIT-KANBAN Systems-MRP-II-Capacity Requirements Planning

TEXT BOOKS:

- 1. Production n Operations Management- Adam an Ebert, Prentice Hall
- 2. Modern Production management-Buffa Wiley

REFERENCES:

- 1. Operations Management- Joseph Monks-McgrawHhill
- 2. Automation, Production systems and CIM-Groover MP, Prentice Hall
- 3. Production Planning and Inventory control Seetharama L Narasimhan, Dennis W Mcleavy, Peter Billington- Prentice Hall
- 4. Analysis an Control of Production Systems- Elsayed A Elsayed, Thomas O Boucher-Prentice Hall





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET38 - WELDING TECHNOLOGY

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Classification of welding processes: Arc welding power sources- power source characteristic curvesflux covering- different types of electrodes and their applications- gas welding and cutting- flame characteristics Gas tungsten arc welding process- electrode polarity- shielding gas- use of pulsed arc welding process; gas metal arc welding- mode of metal transfers- pulsed MIG welding process. Submerged arc welding- advantages and limitations

UNIT-II

Plasma arc welding process- transferred and non- transferred arc welding and their applicationsplasma cutting- surfacing and applications Working Principle of resistance welding process-spotseam- projection- upset and flash butt welding- electro slag and electro gas welding. Radiant energy welding processes - equipment -electron beam welding (EBW) - laser beam welding (LBW) applications of EBW and LBW- Friction Steel Welding

UNIT-III

Explosive & Diffusion and Ultrasonic Welding: principles of operation- process characteristics and applications

Soldering: Techniques of soldering- solders- phase diagram- composition- applications

Brazing: Wetting and spreading characteristics- surface tension and contact angle-concepts- brazing fillers- adhesive bonding- Cladding- Surfacing and Cutting

UNIT-IV

Welding Metallurgy: Introduction- thermal cycles- prediction of peak temperature- pre heat and cooling rate- PWHT- Weldability of low alloy steels- welding of stainless steels use of Schaffler and Delong diagrams- welding of cast irons - Welding of Cu- Al- Ti and Ni alloys – processes-Weldability of carbon steel- aluminium. Hot & cold cracking phenomenon

UNIT V

Defects and Weldability: Defects in welded joints: Defects such as arc strike- porosity- undercutslag entrapment and hot cracking- causes and remedies in each case. Joining of dissimilar materials-Weldability tests- effect of metallurgical parameters

TEXT BOOKS:

1. Welding Methods and Metallurgy- Charles Griffin & Company-Jackson- M.D- London-

2. Welding and Welding Technology-Little (LR)- Tata McGraw Hill- New Delhi-

REFERENCES:

- 1. AWS- American Welding Society- Volume 1 to 5- Miami-
- 2. Welding Metallurgy-George E. Linnert- GML Publications- South Carolina- U.S.A.



3. —The Metallurgy of Weldingl.Saferian D. Chapman and Hall- UK



DEPARTMENT OF MECHANICAL ENGINEEIRNG

4. AWS Welding Hand book. 8th edition.Vol-1





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET39 - TOTAL QUALITY MANAGEMENT

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT I

Introduction To Quality Management -Definitions – TOM Framework- Benefits- Awareness and Obstacles. Quality – Vision- Mission and Policy Statements. Customer Focus – Customer Perception Of Quality- Translating Needs Into Requirements- Customer Retention. Dimensions Of Product and Service Quality. Cost Of Quality.

UNIT II

Principles and Philosophies Of Quality Management - Overview Of The Contributions Of Deming-Juran Crosby- Masaaki Imai-Feigenbaum- Ishikawa- Taguchi Techniques – Introduction-Loss Function- Parameter and Tolerance Design- Signal To Noise Ratio. Concepts Of Quality Circle-Japanese 5S Principles and 8D Methodology.

UNIT III

Statistical Process Control and Process Capability -Meaning and Significance Of Statistical Process Control (SPC) – Construction Of Control Charts For Variables and Attributed. Process Capability – Meaning- Significance and Measurement – Six Sigma Concepts Of Process Capability. Reliability Concepts – Definitions- Reliability In Series and Parallel- Product Life Characteristics Curve. Total Productive Maintenance (TMP) – Relevance To TQM- Terotechnology. Business Process Re-Engineering (BPR) – Principles- Applications- Reengineering Process- Benefits and Limitations.

UNIT IV

Tools and Techniques For Quality Management - Quality Functions Development (QFD) – Benefits- Voice Of Customer- Information Organization- House Of Quality (HOQ)- Building A HOQ-QFD Process. Failure Mode Effect Analysis (FMEA) – Requirements Of Reliability- Failure Rate-FMEA Stages- Design- Process and Documentation. Bench Marking and POKA YOKE.

UNIT V

Quality Systems Organizing and Implementation Introduction To IS/ISO 9004:2000 – Quality Management Systems – Guidelines For Performance Improvements. Quality Audits. TQM Culture-Leadership – Quality Council- Employee Involvement- Motivation-Empowerment- Recognition and Reward- Introduction To Software Quality.

TEXT BOOKS

- 1. Dale H.Besterfield et al- Total Quality Management- Third edition- Pearson Education
- 2. Dr.S.Rajaram and Dr.M.Sivakumar- Total Quality Management(Indian Text Edition)-Biztantra Publications(A Unit of John Wiley Publications- USA
- 3. Douglas C. Montgomory- Introduction to Statistical Quality Control- Wiley Student Edition-4th Edition- Wiley India Pvt Limited

4. PoornimaM.Charantimath- Total Quality Management- Pearson Education- First Indian Reprint

5. James R. Evans and William M. Lindsay- The Management and Control of Quality-Sixth Edition- Thomson-





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET40 - NON-DESTRUCTIVE TESTING

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Overview OfNDT: NDT Versus Mechanical testing- Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterisation. Relative merits and limitations- Various physical characteristics of materials and their applications in NDT.-Visual inspection – Unaided and aided

UNIT-II

Surface NDE Methods: Liquid Penetrant Testing - Principles- types and properties of liquid penetrants- developers-advantages and limitations of various methods- Testing Procedure-Interpretation of results. Magnetic Particle Testing- Theory of magnetism- inspection materials Magnetisation methods- Interpretation and evaluation of test indications- Principles and methods of demagnetization- Residual magnetism.

UNIT-III

Thermography and Eddy Current Testing: Thermography- Principles- Contact and non contact inspection methods- Techniques for applyingliquid crystals- Advantages and limitation - infrared radiation and infrared detectors- Instrumentations and methods- applications. Eddy Current Testing-Generation of eddy currents- Properties of eddy currents- Eddy current sensing elements- Probes-Instrumentation- Types of arrangement- Applications- advantages- Limitations- Interpretation/Evaluation.

UNIT-IV

Ultrasonic Testing (UT) and Acoustic Emission: Ultrasonic Testing-Principle- Transducerstransmission and pulse-echo method- straight beam and angle beam- instrumentation- data representation- A/Scan- B-scan- C-scan. Phased Array Ultrasound- Time of Flight Diffraction. Acoustic Emission Technique – Principle- AE parameters- Applications

UNIT-V

Radiography: Principle- interaction of X-Ray with matter- imaging- film and film less techniquestypes and use of filters and screens- geometric factors- Inverse square- law- characteristics of films graininess-density- speed- contrast- characteristic curves-Penetrameters- Exposure charts-Radiographicequivalence. Fluoroscopy- Xero-Radiography- Computed Radiography- Computed Tomography

TEXT BOOKS:

1. Baldev Raj-T.Jayakumar-M.Thavasimuthu —Practical Non-Destructive Testing-Narosa Publishing House

2. Ravi Prakash- —Non-Destructive Testing TechniquesI- 1st revised edition- New Age International Publishers

REFERENCES:

1. ASM Metals Handbook-INon-Destructive Evaluation and Quality ControlI- American Society of Metals- Metals Park- Ohio



2. Paul E Mix- —Introduction to Non-destructive testing: a training guidel- Wiley-2nd Edition New Jersey



DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET41- PROJECT MANAGEMENT

Credits:	4	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Introduction: Introduction to Project Management- History of Project Management- Project Life Cycle. Project Analysis: Facets of Project Analysis- Strategy and Resource Allocation- Market and Demand Analysis- Technical Analysis- Economic and Ecological Analysis.

UNIT-II

Financial Analysis: Financial Estimates and Projections- Investment Criteria- Financing of Projects.

UNIT-III

Network Methods in PM: Origin of Network Techniques- AON and AOA differentiation- CPM network- PERT network- Other network models.

UNIT-IV

Optimisation in PM: Time and Cost trade-off in CPM- Crashing procedure- Scheduling when resources are limited.

UNIT-V

Project Risk Management: Scope Management- Work Breakdown Structure- Earned Value Management- Project Risk Management.

TEXTBOOKS

1. Prasanna Chandra- Project: A Planning Analysis- Tata McGraw Hill Book Company- New Delh-

2. Cleland-Gray and Laudon- Project Management- Tata McGraw Hill Book Company- New Delhi

REFERENCES

1. Jack R. Meredith.- Samuel J. Jr. Mantel.- Project Management - A Managerial Approach-John Wiley





DEPARTMENT OF MECHANICAL ENGINEEIRNG

MET42- SUPPLY CHAIN MANAGEMENT

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT-I

Introduction To SCM-Definition- Global optimization- Objectives of SCM- The Objective of a Supply chain- The importance of supply chain Decisions- Decision Phases in a Supply Chain- Process view of supply chains- Importance of supply chain. Competitive and supply chain strategies-achieving strategic fit- Expanding Strategic Scope.

UNIT-II

Supply Chain Drivers - Frame work of Supply Chain Drivers- Inventory- Facilities- Information-Transportation- Sourcing and pricing- Obstacles to achieve strategic fit. Information technology for SCM-Goals- Standardization- Infrastructure- DSS for supply management.

UNIT-III

Warehouse Management -Introduction- Single ware house- examples- Economic lot size model-Effect of demand uncertainty- Risk pooling- centralized and decentralized system- Managing Inventory in the supply chain- Forecasting. International issues in SCM – Introduction- risks and advantages – design for logistics- supplies integration in to new Product development- mass customization- issues in customer valve.

UNIT-IV

Valve Of Information- Bullwhip effect- Information and supply chain technology- Supply chain integration – Push- Pull and Push – pull system- Demand driven strategies- Impact of internet on SCM- distribution strategies. Strategic alliances – Frame work for strategic alliance-Third party logistics- Retailer- supplies partnership- Distributor - integration- Procurement and out servicing strategies.

UNITV

Designing and Planning Transportation Networks -The role of transportation in a supply chain-Modes of transportation and their Performance characteristics- Transportation infrastructure and policies- Design options For transportation network- Trade - off s in transportation design- tailored transportation-The role of IT in transportation- Problems.

TEXT BOOKS

1. Sunil chopra&PeterMeindl- Supply chain management – Strategy- Planning and control for supply chain management- Tata McGraw Hill

2. JanatShah- Supply chain management- Pearson.

REFERENCE

1. Thomas EVollman and Clay Whybark D- Manufacturing planning and control ForSupply chain management-Tata McGraw Hill

2. Simichi Levi Davi-Kaminsky Philip and Simchi – Levi Edith- Designing and Managing the supply chain- Tata McGraw Hill- New Delhi.


SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATI MAHILA VISVAVIDYALAYAM (WOMEN'S UNIVERSITY), TIRUPATI- 517 502 DEPARTMENT OF MECHANICAL ENGINEEIRNG SCHEME OF INSTRUCTIONS

IV YEAR B.TECH II SEMESTER



SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATI MAHILA VISVAVIDYALAYAM (WOMEN'S UNIVERSITY), TIRUPATI- 517 502 DEPARTMENT OF MECHANICAL ENGINEEIRNG SCHEME OF INSTRUCTIONS

DEPARTMENT OF MECHANICAL ENGINEEIRNG SCHOOL OF ENGINEERING AND TECHNOLOGY

MET43 - EXPERIMENTAL STRESS ANALYSIS

Credits:	3	Internal Examination Marks: 30
Lectures /Week	4	External Examination Marks: 70

UNIT – I

Introduction: Theory of Elasticity- Plane stress and plane strain conditions- Compatibility conditions. Problems using plane stress and plane strain conditions- Three-dimensional stress strain relations.

Strain Measurement: Introduction- mechanical- optical- pneumatic- acoustic methods of strain measurement. Electrical resistance strain gauges - gauge factor- types- properties of a gauge material-backing material- adhesive material- protective coatings; method of bonding strain gauges- strain gauges lead wire and connections- semiconductor strain gauges.

UNIT – II

Photo Elasticity : Nature of light-harmonic wave- phase amplitude- polarisation. Crystal optics passage of light through crystalline media- absolute and relative phase difference- quarter wave plate-half wave plate-production of plane polarized light.

UNIT – III

Two-dimensional photo elasticity: stress optic law- plane Polaris cope- is chromatics and isocliniccircular polariscope- dark fields and bright field arrangements- isoclinic and isochromatic fringe order at a point.

$\mathbf{UNIT} - \mathbf{IV}$

Bi-refringent Coatings: Introduction to Bi-refringent coating theory and Reflection Polariscope-Moire techniques phenomenon-Moire fringe analysis-Moire techniques in plane problems.

Brittle coatings: Introduction- coating stresses- failure theories- brittle coating crack patterns- crack detection- ceramic based brittle coatings- resin based brittle coatings- test procedures for brittle coatings analysis- calibration procedures- analysis of brittle coating data.

UNIT – V

Moire Methods: Introduction- mechanism of formation of Moire fringes- the geometrical approach to Moire-Fringe analysis- the displacement field approach to Moire-Fringe analysis- out of plane displacement measurements- out of plane slope measurements- sharpening and multiplication of Moire-Fringes-experimental procedure and techniques.

TEXT BOOKS

- 1. Theory of Elasticity by Timoshenke and Goodier Jr.
- 2. L.S. Srinath- M.R. Raghavan- K. Lingaiah- G. Gargesh- K. Ramachandra and B. Pant-
- Experimental Stress Analysis- TMH Publications- New Delhi.

REFERENCES

1. Durelli Philips and Tsao- Theoretical and Applied Stress Analysis- McGraw Hill Publishers-New York.

2. Sadhu Singh- Experimental Stress Analysis-Khanna Publishers- New Delhi.



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3. Abdul Mubeen- Experimental Stress Analysis-DhanpatRai and Sons- New Delhi. IV YEAR B.TECH II SEMESTER