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(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I   Semester : I   Branch of Study : Common to All

Subject Code	Subject Name	L	T	P	Credits
19AES0301	Engineering Graphics Lab	1	0	3	2.5

Course Outcomes:

CO: 1   Draw various curves applied in engineering.
CO: 2   Show projections of solids and sections graphically.
CO: 3   Draw the development of surfaces of solids.
CO: 4   Use computers as a drafting tool.
CO: 5   Draw isometric and orthographic drawings using CAD packages.

Manual Drawing

UNIT I
Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions.
        a) Conic sections including the rectangular hyperbola- general method only,
        b) Cycloid, epicycloids and hypocycloid
        c) Involutes
Projection of points, lines: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line.

UNIT II
Projections of Planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.
Projections of Solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

UNIT III
Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.
Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Computer Aided Drafting:

UNIT IV
Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations.

UNIT V
Orthographic Projections: Systems of projections, conventions and application to orthographic projections.
Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids.

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18. Design a Python Script to convert a given number to roman number.
19. Design a Python Script to generate the frequency count of words in a text file.
20. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
21. Design a Python Script to implement Gaussian Elimination method.
22. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
23. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

Text Book:

http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO3: Design/Development of Solutions	3.1	3.1.4
CO2	PO3: Design/Development of Solutions	3.1	3.1.4
CO3	PO2: Problem analysis	2.2	2.2.2
CO4	PO2: Problem analysis	2.2	2.2.2
	PO3: Design/Development of Solutions	3.1	3.1.4
CO5	PO3: Design/Development of Solutions	3.1	3.1.4

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MECHANICAL ENGINEERING (ME)

Year: I   **Semester : I**   **Branch of Study : Common to all**

Subject Code	Subject Name	L	T	P	Credits
19AES0503	Problem Solving and Programming Lab	0	0	3	2

Course outcomes: Student should be able to
1. Create interactive visual programs using Scratch.
2. Develop flowcharts using raptor to solve the given problems.
3. Develop Python programs for numerical and text based problems
4. Develop graphics and event based programming using Python
5. Develop Python programs using beautiful Pythonic idiomatic practices

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.
3. Design a Memory Game in Scratch which allows the user to identify positions of similar objects in a 3 x 3 matrix.
4. Construct flowcharts to
   a. calculate the maximum, minimum and average of N numbers
   b. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
5. Construct flowcharts with separate procedures to
   a. calculate simple and compound interest for various parameters specified by the user
   b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
6. Construct flowcharts with procedures to
   a. generate first N numbers in the Fibonacci series
   b. generate N Prime numbers
7. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
8. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
9. Design a flowchart to determine the number of characters and lines in a text file specified by the user
10. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
11. Design a Python script to determine if a given string is a Palindrome using recursion
12. Design a Python script to sort numbers specified in a text file using lists.
13. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 <= YYYY <= 9999$, $1 <= MM <= 12$, $1 <= DD <= 31$) following the leap year rules.
14. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
15. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.($0 <= HH <= 23$, $0 <= MM <= 59$, $0 <= SS <= 59$)
16. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e) of a given number using infinite series of the function.
17. Design a Python Script to convert a given number to words

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Year: I	Semester: I				Branch of Study: PEED
Subject Code	Subject Name	L	T	P	Credits
19DMC9902	Sanskrit for Technical Knowledge	2	0	0	0

Course Outcomes:

CO1   Understanding basic Sanskrit language

CO2   Ancient Sanskrit literature about science & technology can be understood

CO3   Being a logical language will help to develop logic in students

UNIT I

   a. Alphabets in Sanskrit,

   b. Past/Present/Future Tense,

   c. Simple Sentences

UNIT II

   1) Order

   2) Introduction of roots

   3) Technical information about Sanskrit Literature

UNIT III

   1. Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Text Books :

1. "Abhyaspustakam" – Dr. Vishwas, Samskrita - Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

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PRODUCTION ENGINEERING AND ENGINEERING DESIGN (PEED)

Year: I	Semester: I			Branch of Study: PEED	
Subject Code	Subject Name	L	T	P	Credits
19DMC9901	English for Research Paper Writing	2	0	0	0

Course Outcomes:

CO1   Improve writing skills and level of readability

CO2   Learn what to write in each section, avoiding plagiarism

CO3   Understand the review of research literature

CO4   Apply skills in writing a Title, abstract and literature

CO5   Learn the skills of drafting Summations

UNIT I
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

UNIT III
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check. Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature

UNIT IV
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V
Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Text Books:

1. Goldbort R, Writing for Science, Yale University Press (available on Google Books)
2. Day R, How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM.
4. Adrian Wall work, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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PRODUCTION ENGINEERING AND ENGINEERING DESIGN (PEED)

Year: I   **Semester: I**   **Branch of Study: PEED**

Subject Code	Subject Name	L	T	P	Credits
19DPC0309	Mechanisms and Robotics (Virtual) Lab	0	0	3	1.5

List of Experiments:
1. Movemaster
2. Forward Kinematics of PUMA 560
3. Inverse Kinematics of PUMA 560
4. KGP 50
5. Oldham Coupling Mechanism
6. A quick return mechanism
7. CAM follower mechanism

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Year: I	Semester: I			Branch of Study: PEED	
Subject Code	Subject Name	L	T	P	Credits
19DPC0302	Mechanical Vibrations Lab	0	0	3	1.5

Course Outcomes:

CO1   Determine the radius of gyrations in suspension types.

CO2   Study the pressure profile at different conditions of loads

CO3   Determine different frequency of undamped torsional vibrations.

CO4   Determine frequency of damped force vibration

CO5   Determine undamped free vibration of spring mass system.

List of Experiments:

1. To study the forced vibration of the beam for different damping.
2. To determine the radius of gyration 'k' of a given compound pendulum.
3. To determine the radius of gyration of trifilar suspension.
4. To determine the radius of gyration of given bar using bi-filler suspension.
5. To verify the dunker lay's rule viz.
6. To study the pressure profile of lubricating conditions of load and speed.
7. To determine the natural frequency of undamped torsional vibration of a single rotor shaft system.
8. To determine the natural frequency of undamped torsional vibration of two rotor shaft system.
9. To determine the frequency of undamped free vibration of an equivalent spring mass system.
10. To determine the frequency of damped force vibration of a spring mass system

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Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Grammar and Vocabulary: Verbs -tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

UNIT IV

To be, or not to be by William Shakesphere:

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicate processes or display complicated data.

Writing: Information transfer; describe, compare, contrast, identify significance / trends based on information provided in figures / charts / graphs / tables.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms.

UNIT V

The Accompanist by Anitha Desai:

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts -without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO6: Engineer and Society	6.1	6.1.1
CO 2	PO10: Communication	10.1	10.1.1
CO 3	PO9: Individual and Teamwork	9.2	9.2.1
CO 4	PO10: Communication	10.1	10.1.1
CO 5	PO10: Communication	10.3	10.3.1
CO 6	PO10: Communication	10.2	10.2.1

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Year: I   Semester : II   Branch of Study : Common to All

Subject Code	Subject Name	L	T	P	Credits
19AHS9901	Communicative English I	2	0	0	2

Course Outcomes:
1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.
2. Formulate sentences using proper grammatical structures and correct word forms.
3. Speak clearly on a specific topic using suitable discourse markers in informal discussions.
4. Write summaries based on global comprehension of reading / listening texts.
5. Produce a coherent paragraph interpreting a figure/graph/chart/table.
6. Take notes while listening to a talk/lecture to answer questions

UNIT I
Technology With a Human Face – Schumacher:
Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; Introducing one self and others.
Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.
Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

UNIT II
I have three visions for India: Presidential Speech by Abdul Kalam:
Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs / small groups on specific topics, followed by short structured talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.
Grammar and Vocabulary: Cohesive devices -linkers, sign posts and transition signals; use of articles and zero article; prepositions.

UNIT III
The Gold Frame by RK. Laxman:
Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

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Year: I　　　　　　**Semester : II**　　　　　　**Branch of Study : ME**

Subject Code	Subject Name	L	T	P	Credits
19ALC0302	Mechanical Engineering Workshop	0	0	2	1

Course Outcomes:
CO: 1　Make moulds for sand casting
CO: 2　Develop different weld joints
CO: 3　Assemble or disassemble of machine components
CO: 4　Make plastic components
CO: 5　Use power tools and find applications of hydraulic and pneumatic circuits

I　Foundry Practice: (2 Sessions)
1. (a) Determination of average grain size for sand sample using sieve shaker
   (b) Preparation of a green sand mould using single piece pattern
2. Preparation of a green sand mould using split piece pattern with core and demonstration of casting.

II　Welding Practice: (2 Sessions)
i) Lap joint, butt joint and T joint using arc welding.
ii) Lap joint using resistance spot welding
iii) Lap and butt joints using gas welding

III　Assembling/Disassembling Practice: (3 Sessions)
i) Bicycle
ii) Clutch and carburetor
iii) Two wheeler engine

IV　Manufacture of a Plastic Component (2 Sessions)
i) Use of injection moulding machine
ii) Joining of plastic components

V　Design and manufacture any two domestic utility products with any material (2 Sessions)

VI　Use of Power Tools (2 Sessions)

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.4	1.4.1
CO: 2	PO 3: Design/Development of Solutions	3.1	3.1.1
CO: 3	PO 5: Modern tool usage	5.3	5.3.1
CO: 4	PO 3: Design/Development of Solutions	3.1	3.1.1
CO: 5	PO 5: Modern tool usage	5.3	5.3.1

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Year: I   Semester : II   Branch of Study : Common to All

Subject Code	Subject Name	L	T	P	Credits
19AHS9902	Communicative English Lab	0	0	2	1

Course Outcomes:
CO1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO2: Apply communication skills through various language learning activities.
CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

UNIT I
1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

UNIT II
1. JAM
2. Small talks on general topics
3. Debates

UNIT III
1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

UNIT IV
1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

UNIT V
1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

List of COs	PO No. and keyword	Competency	Performance Indicator
CO 1	PO10: Communication	10.2	10.1.1
CO 2	PO10: Communication	10.3	10.3.1
CO 3	PO10: Communication	10.2	10.2.1
CO 4	PO 9: Individual & Team Work	9.2	9.2.1
CO 5	PO10: Communication	10.2	10.2.1

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Year: I　　　　　　　**Semester : II**　　　　　**Branch of Study : ME**

Subject Code	Subject Name	L	T	P	Credits
19ALC0302	Mechanical Engineering Workshop	0	0	2	1

Course Outcomes:

CO: 1　Make moulds for sand casting

CO: 2　Develop different weld joints

CO: 3　Assemble or disassemble of machine components

CO: 4　Make plastic components

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CO: 4	PO 3: Design/Development of Solutions	3.1	3.1.1
CO: 5	PO 5: Modern tool usage	5.3	5.3.1

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Course Outcomes:

CO1   Study of Shrimad – Bhagwad – Geeta will help the student in developing his personality and achieve the highest goal in life

CO2   The person who has studied Geeta will lead the nation and mankind to peace and prosperity

CO3   Study of Neeti shatakam will help in developing versatile personality of students

UNIT I
Neetisatakam - Holistic development of personality
- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)
- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT II
Approach to day to day work and duties.
- Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35
- Chapter 18-Verses 45, 46, 48.

UNIT III
- Statements of basic knowledge.
- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

Suggested reading
1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi

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Year: I	Semester: II			Branch of Study: PEED	
Subject Code	Subject Name	L	T	P	Credits
19DMC9905	Stress Management by Yoga	2	0	0	0

Course Outcomes:
CO1   Develop healthy mind in a healthy body thus improving social health
CO2   Improve efficiency
CO3   Understanding the role of yoga in mental hygiene
CO4   Develop strong mental health
CO5   Understand the role of yoga in stress management

UNIT I
Definitions of Eight parts of yoga. (Ashtanga)

UNIT II
Yam and Niyam - Do's and Don't's in life - Ahinsa, Satya, Astheya, Bramhacharya and Aparigraha - Shaucha, Santosh, Tapa, Swadhyay, Ishwarpranidhan

UNIT III
Asan and Pranayam - Various yoga poses and their benefits for mind & body - Regularization of breathing techniques and its effects-Types of pranayam.

UNIT IV
Mental Hygiene and Yoga - Mental health: A Yogic Perspective - Mental hygiene and role of Yoga in mental hygiene - Yogic principles for the management of stress (Prayer and meditation for mental health).

UNIT V
Yogic Management of Stress: Specific practices for stress management: Yogasana, Breath awareness, Shvasana, Yoganidra, Pranayama and Meditation

Text Books:
1. 'Yogic Asanas for Group Tarining - Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata.

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Year: I	Semester: II			Branch of Study: PEED	
Subject Code	Subject Name	L	T	P	Credits
19DMC9906	Personality Development through Life Enlightenment Skills	2	0	0	0

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Reference Books:

1. Cecil Jensen, Jay Helsel and Donald D.Voisinet, Computer Aided Engineering Drawing, Tata McGraw-Hill, NY, 2000.
2. James Barclay, Brain Griffiths, Engineering Drawing for Manufacture, Kogan Page Science, 2003.
3. K.L.Narayana, Production Drawing, NewAge International Publishers, 3/e, 2014

List of COs	PO No. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 3: Design/development of solutions	3.4	3.4.2
CO: 2	PO 2: Problem analysis	2.1	2.1.2
CO: 3	PO 3: Design/development of solutions	3.3	3.3.1
CO: 4	PO 5: Modern tool usage	5.1	5.1.2
CO: 5	PO 1: Engineering knowledge	1.1	1.1.2

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MECHANICAL ENGINEERING (ME)

Year: II   Semester : I   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
19ALC0303	Computer Aided Machine Drawing Lab	0	0	3	1.5

Course Outcomes:

CO: 1   Demonstrate the conventional representations of materials and machine components

CO: 2   Model riveted, welded and key joints using CAD system

CO: 3   Create solid models and sectional views of machine components

CO: 4   Generate solid models of machine parts and assemble them

CO: 5   Create manufacturing drawing with dimensional and geometric tolerances

The following contents are to be done by any 2D software package

Unit – I

Conventional representation of materials and components:
Detachable joints: Drawing of thread profiles, hexagonal and square-headed bolts and nuts, bolted joint, bolted joint with washer and locknut, stud joint, screw joint.
Riveted joints: Drawing of rivet, lap joint, butt joint with single strap, single riveted, double riveted double strap joints.

Unit – II
Welded joints: Lap joint and T joint with fillet, butt joint with conventions.
Keys: Taper key, sunk taper key, round key, saddle key, feather key, woodruff key. Shaft coupling, bushed pin-type flange coupling, universal coupling, Oldhams' coupling.

Unit – III
The following contents to be done by any 3D software package
Sectional views: Creating solid models of complex machine parts and create sectional views.

Unit – IV
Assembly drawings: (Any four of the following using solid model software)
Lathe tool post, tool head of shaping machine, tail stock, machine vice, gate valve, carburettor, piston, connecting rod, eccentric, screw jack, plumber block, axle bearing, pipe vice, clamping device, Geneva cam, universal coupling,

Unit – V
Manufacturing drawing: Representation of limits, fits and tolerances for mating parts. Use any four parts of above assembly drawings and prepare manufacturing drawing with dimensional and geometric tolerances.

Text Books:
1. K. L. Narayana, P. Kannaiah, A text book on Engineering Drawing, SciTech Publications, 2014
2. N. D. Bhatt, Machine Drawing, Charotar, 50/e, 2014.

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MECHANICAL ENGINEERING (ME)

Year: II   **Semester : I**   **Branch of Study : Common to all**

Subject Code	Subject Name	L	T	P	Credits
19AES0303	Design Thinking and Product Innovation Lab	0	0	2	1

Practice Problems use software wherever applicable.
1) (a) Study of mechanisms: linear motion to rotary motion and rotary motion to linear motion and their applications.
   (b) Study of eccentric, cam, linear actuator.
2) Study of motion transmission through belts, chains and gears.
3) Study of mechanical advantage through pulleys and other mechanisms.
4) Study of different electrical equipments such as mechanical calculators, automotive devices such as wiper.
5) To design a device for measurement of Temperature/ pressure.
6) Open any mechanical part to identify bad features and improve the design.
7) Exercise in 3D printing of a design
   Ex: Institute emblem, small toy car or any other item of student choice.
8) To design a device for Water Level Indicator.
9) Design and Simulation of a Hydraulic Shaper.
10) Design of simple pneumatic and hydraulic circuits using basic components.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO1: Engineering knowledge	1.3	1.3.1
CO: 2	PO2: Modern tool usage	2.1	2.1.3
CO: 3	PO4: Conduct investigations of complex problems	4.1	4.1.2
CO: 4	PO2: Problem analysis	2.1	2.1.2
CO: 5	PO7: Environment and sustainability:	7.1	7.1.2

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PRODUCTION ENGINEERING AND ENGINEERING DESIGN (PEED)

Year: II	Semester: I	Branch of Study: Common to all			
Subject Code	Subject Name	L	T	P	Credits
19DOE9002	Operations Research	3	0	0	3

Course Outcomes:

CO1   Understand the characteristics and phases, types of models, allocation in linear programming

CO2   Apply the concept of optimal solution, unbalanced problem, degeneracy and Transportation problem & sequencing.

CO3   Understand the concept of replacement of items and related problems, theory of games related problems

CO4   Apply the concept of the knowledge of queuing models, inventory management models.

CO5   Apply the knowledge of dynamic programming, the concept of the simulation and simulation languages.

UNIT I
Optimization Techniques, Model Formulation, models, General LP Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

UNIT II
Formulation of a LPP - Graphical solution revised simplex method - duality theory – dual simplex method - sensitivity analysis - parametric programming.

UNIT III
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT IV
Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT V
Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:
1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Year: II	Semester: I	Branch of Study: Common to all, TIRUPATI			
Subject Code	Subject Name	L	T	P	Credits

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compressors, (iv). Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

Reference:
1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, McGraw Hill Publication.
4. Foundation Engineering Handbook, Winter korn, Hans, Chapman & Hall London

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Year: II	Semester: I	Branch of Study: Common to all			
Subject Code	Subject Name	L	T	P	Credits
19DOE9001	Industrial Safety	3	0	0	3

Course Outcomes:

CO1   Analyze the basics of industrial safety.

CO2   Understand the Fundamentals of maintenance engineering

CO3   Apply the methods of prevention of corrosion and wear.

CO4   Understand the Fault tracing and their applications.

CO5   Understand the methods of preventive measures and maintenance

UNIT I
Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and fire fighting, equipment and methods.

UNIT II
Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT III
Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, (i). Screw down grease cup, (ii). Pressure grease gun, (iii). Splash lubrication, (iv). Gravity lubrication, (v). Wick feed lubrication (vi). Side feed lubrication, (vii). Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT IV
Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, (i). Any one machine tool, (ii). Pump (iii). Air compressor, (iv). Internal combustion engine, (v). Boiler, (vi). Electrical motors, Types of faults in machine tools and their general causes.

UNIT V
Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: (i). Machine tools, (ii). Pumps, (iii). Air

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Year: II	Semester: I	Branch of Study: Common to all			
Subject Code	Subject Name	L	T	P	Credits
19DOE5801	Business Analytics	3	0	0	3

Unit I
Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst.
Stakeholders: the project team, management, and the front line, Handling Stakeholder Conflicts.

Unit II
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.
Forming Requirements: Overview of requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.

Unit III
Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

Unit IV
Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements. Managing Requirements Assets: Change Control, Requirements Tools

Unit V
Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

Text Book:
1. Business Analysis by James Cadle et al. Project Management:
2. The Managerial Process by Erik Larson and, Clifford Gray
3. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
4. Business Analytics by James Evans, persons Education.

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1. Product Design and Development, Kari T. Ulrich and Steven D. Eppinger, McGraw Hill International Edns. 1999.
2. Effective Product Design and Development, Stephen Rosenthal, Business One Orwin, Homewood, 1992, ISBN, 1-55623-603-4.

Reference Books:
1. Concurrent Engineering, integrated Product development, Kemnneth Crow , DRM Associates, 26/3, Via Olivera, Palos Verdes, CA 90274(310)377-569, Workshop Book.

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Year: II	Semester: I			Branch of Study: PEED	
Subject Code	Subject Name	L	T	P	Credits
19DPE9008	Product Design and Development	3	0	0	3

Course Outcomes:

CO1   Understand a product design brief
CO2   Know how to communicate product design ideas and concepts
CO3   Be able to develop product design proposals
CO4   Be able to realize outcomes to a design brief

UNIT- I:
Introduction: Need for IPPD – strategic importance of product development – integration of customer, designer, material supplier and process planner, Competitor and costumer – behavior analysis. Understanding customer – promoting customer understanding – involve customer in development and managing requirements – Organization – process management and improvement – Plan and establish product specification.

UNIT II
Concept generation and concept selection: Activity of concept generation – Structured approaches – Five step Method: clarify – Search-Externally and internally – explore systematically – reflect on the solutions and processes – Concept selection – Integral part of PDD process-methodology – benefits. ROBUST DESIGN-introduction, various steps in robust design.

UNIT III
Industrial design: Assessing the need for industrial design, impact – design process Integrate design process – assessing the quality of industrial design. Investigation of customer needs – conceptualization – refinement – management of the industrial design process – technology driven products – user – driven products – assessing the quality of industrial design.

UNIT IV
Product architecture: Implications – Product change – variety – component standardization – product performance – manufacturability.
Design for manufacturing: Definition – Estimation of Manufacturing cost – reducing the component costs and assembly costs –cost of supporting production. Minimizing System complexity.

UNIT V
Prototyping: Prototype basics – Principles of prototyping – planning for prototypes – Economic analysis. Understanding and representing tasks – baseline project planning – accelerating the project execution.
Competitive Aspects of Product Design: Product Quality, Reliability, Concurrent engineering aspects, Substitution of materials, SQC and SPC

Text Books:

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MECHANICAL ENGINEERING (ME)

Year: II   Semester : II   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
19AES0506	Internet of Things Lab (IoT Lab)	0	0	2	1

Lab Experiments:
1. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication) Note: The client and server should be connected to same local area network.
5. Create any cloud platform account, explore IoT services and register a thing on the platform.
6. Push sensor data to cloud.
7. Control an actuator through cloud.
8. Access the data pushed from sensor to cloud and apply any data analytics or visualization services.
9. Create a mobile app to control an actuator.
10. Identify a problem in your local area or college which can be solved by integrating the things you learned so far and create a prototype to solve it (Mini Project).

Text Book:
1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

Reference Books:
1. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

Reference sites:
https://www.arduino.cc/,https://www.raspberrypi.org/

Course outcomes: At the end of the course, students will be able to
- Choose the sensors and actuators for an IoT application.
- Select protocols for a specific IoT application.
- Utilize the cloud platform and APIs for IoT application.
- Experiment with embedded boards for creating IoT prototypes.

Design a solution for a given IoT application

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO 5: Modern Tool Usage	5.1	5.1.1
CO 2	PO 5: Modern Tool Usage	5.2	5.2.1
CO 3	PO 4: Conduct investigations of complex Problem	4.3	4.3.1
CO 4	PO 3: Design/Development of Solutions	3.4	3.4.1
CO 5	PO 6: Engineer & Society	6.1	6.1.1

AK20 Regulations

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maintain after deleting duplicate string).

c) Write a python script to read N number of student details into nested list and convert that as a nested dictionary.

7) a) Design a function that can perform sum of two or three or four numbers.

b) Write a python script to implement towers of Hanoi problem.

c) Write a Python function primesquare(l) that takes a nonempty list of integers and returns True if the elements of l alternate between perfect squares and prime numbers, and returns False otherwise. Note that the alternating sequence of squares and primes may begin with a square or with a prime. Here are some examples to show how your function should work.

>>>primesquare([4])True
>>>primesquare([4,5,16,101,64])True
>>>primesquare([5,16,101,36,27]) False

8) a) Write a python script to perform arithmetic operations on numpyarrays.

b) Write a python script to perform following matrix operations using numpy.
i)Dot product   ii) Matrix product   iii) Determinant   iv) Inverse

9) a) Write a python script to Create Pandas dataframe using list of lists.

b) Write a python script to load data from a CSV file into a Pandas DataFrame and perform basic operations on it.

10) a) Draw a Scatter Plot by considering an appropriate data set.

b) Draw histograms by considering an appropriate data set.

TEXT BOOK:

1. R. Nageswara Rao, *Core Python Programming*, 2nd edition, Dreamtech Press, 2018.

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Subject Code	Subject Name	L	T	P	Credits
19APC0320	Design & Simulation Lab	0	0	2	1

Course Outcomes:
CO: 1   Design of 2D models using software
CO: 2   Design of 3D models and analysis
CO: 3   Create simulation of any simple components
CO: 4   Design and simulation of machine components
CO: 5   Analysis of any components using software

List of experiments:

1. Any simple 2D drawing using CATIA. (4 Models)

2. 3D modelling using CATIA, Creo, Solidworks, etc., (4 Models)

3. Simulation of simple 3D models. (4 Models)

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MECHANICAL ENGINEERING (ME)

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Depletion, Pollution, Ethics in Manufacturing and Marketing, Media Ethics, War Ethics, Bio Ethics, Intellectual Property Rights.

Text Books:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Professional Ethics: R. Subramanian, Oxford University Press, 2015. 3.Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

Reference Books:

1. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
3. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S PritchaMichael J Rabins, 4e , Cengage learning, 2015.
4. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO2	PO8:Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO3	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO4	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO5	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1

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Year: III   Semester : II   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
19AMC9904	Professional Ethics and Human Values	3	0	0	3

Course Outcomes:

CO: 1   It ensures students sustained happiness through identifying the essentials of human values and skills.

CO: 2   The students will understand the importance of Values and Ethics in their personal lives and professional careers.

CO: 3   The students will learn the rights and responsibilities as an employee, team member and a global citizen.

CO: 4   Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature. □

CO: 5   Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life

UNIT - I: 12hrs

Introduction to Human Values: Need, basic Guidelines, Content and Process for Value Education, Self Exploration - 'Natural Acceptance' and Experiential Validation. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities. Understanding Happiness and Prosperity correctly.

UNIT - II: 12hrs

Understanding Harmony in the Family and Society: Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the harmony in the society (society being an extension of family). Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT – III: 12hrs

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – IV: 15hrs

Professional Practices in Engineering: Work Place Rights & Responsibilities, Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – V: 12hrs

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References:

1. DeVito, J.A. (2009). The Essential Elements of Public Speaking. (3rd ed.)
Boston: Pearson Education, Inc.
2. Lucas, S.E. (2009). The Art of Public Speaking. (10th ed.) New York: McGraw - Hill Co.
3. Zarefsky, D. (2011). Public Speaking: Strategies for Success. (6th ed. Boston: Pearson
Education, Inc).

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO10: Communicate effectively on complex engineering	10.2	10.2.2
CO2	PO10: Communicate effectively on complex engineering.	10.2	10.2.1
CO3	PO9: Function effectively as an individual	9.2	9.2.1
CO4	PO10: Communicate effectively on complex engineering.	10.2	10.2.2
CO5	PO10: Communicate effectively on complex engineering.	10.3	10.3.1

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MECHANICAL ENGINEERING (ME)

Year: III   Semester : II   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
19AHE9902	Principles of Effective Public Speaking	3	0	0	3

Course Outcomes:

CO: 1   Gain and demonstrate the basic skills of effective oral communication, for use throughout your academic career and beyond.

CO: 2   Learn and develop the skills necessary to maximize public speaking effectiveness, including effective research and organization of information, how to make the most of presentation aids (and not become reliant on them!), and understanding the speaker-audience relationship.

CO: 3   Develop critical thinking and listening skills, enabling you to maximize your own understanding as an audience member, and offer considered and constructive critiques of others' speeches.

CO: 4   Become more confident in public speaking arenas, whether as a formal speech giver or as a participant in group settings. Improvement will be valued over perfection.

Unit -1
Introduction to Public Speaking:

Basic communication concepts, processes, and models Communication concepts and principles and public speaking Steps and methods of speech preparation; Ethics in public speaking

Unit -2
Listening and Speech Criticism:

Effective listening, the listening process, and types of listening; Listening barriers; Identifying and improving listening styles; Evaluating speech and effective speech techniques.

Unit -3
Selecting Topic and Knowing your Audience:

Identifying sources; Tools and techniques for selecting and refining speech topics; Identifying speech purposes; Central idea statement; The central idea; Audience analysis techniques.

Unit – 4
Speaking with a Purpose:
Informative, persuasive, and ceremonial speeches

Unit:5
Delivering your speech and using Visual Aids.

The mechanics of verbal and nonverbal communication in speech delivery; Modes of speech delivery; Speaking style and language; Effective delivery techniques; Incorporating presentation aids.

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Year : II   Semester : I   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
20ASC0301	CATIA Lab	1	0	2	2

Course Outcomes:

1 Design of 2D models using software
2 Design of 3D models and analysis
3 Create simulation of any simple components
4 Design and simulation of machine components
5 Analysis of any components using software

List of experiments:

1. Any simple 2D drawing using CATIA.
2. 3D modelling using CATIA, Creo, Solid works, etc.,
3. Simulation of simple 3D models.

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MECHANICAL ENGINEERING (ME)

List of Cos	PO no. and keyword
CO 1	PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
CO 2	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
CO 3	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
CO4	PO10- Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
CO5	PO10- Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

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MECHANICAL ENGINEERING (ME)

Year: IV   Semester : I   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
19AHE9901	Technical Writing	2	0	0	2

Course Outcomes:
CO: 1   To acquaint students with a variety of forms of writing in science and technology;
CO: 2   Develop research skills;
CO: 3   Discuss and apply writing and formatting techniques

Unit -1
An Introduction to Technical Writing
Technical writing vs. General writing b. Purpose, importance and characteristics of technical writing, Objectives of technical writing: Clarity, conciseness, accuracy, organization, ethics, Audience recognition and involvement: High tech audience, low-tech. audience, gender neutral language

Unit -2
Memorandum
Objectives, difference between memos, letters and emails. Criteria and format for writing and memos, minutes & agenda

Unit -3
Letter Writing
Business letters- (Greetings, salutations, order, complaint, inquiry), Job-applications (Covering letters) Resume writing.

Unit – 4
Report Writing
Characteristics, types and writing of various reports: feasibility reports, inventory report, mishap report, progress report, laboratory report, Project report, clusters & link words.

Unit - 5
Graphic representation of Technical Data, SOP writing, Promotional Writings
Technical Brochure designing, Content writing for Websites (For promotional and troubleshooting purposes), Writing Fliers and Newsletters.

References:
1. Sharon J. Gerson and Steven M. Gerson, Technical writing – process and product, Pearson Education Asia
2. Andrea J. Ratherford, Basic Communication Skills for Technology, Pearson Education Asia
3. Pfeiffer, W.S. and T.V.S. Padmaja. Technical Communication. Pearson.
4. Muralikrishna and Sunita Mishra. Communication Skills for Engineers. Pearson
5. CharlesW.Knisely and KarinI.Knisely.Engineering Communication. Cengage

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Course Outcomes

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

1. Understand the importance of effective technical communication
2. Analyze non-verbal language suitable to different situations in professional life
3. Evaluate different kinds of methods used for effective presentations
4. Create trust among people and develop employability skills
5. Develop skills in speech composition.

List of COs	PO.No. and Key word
CO1	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
CO2	PO12 : Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
CO3	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
CO4	PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
CO5	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

M.Beli

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MECHANICAL ENGINEERING (ME)

Year: IV   Semester : I   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
19AHE9906	Effective Technical Communication	2	0	0	2

Course Outcomes:

CO: 1   To develop awareness in students of the relevance and importance of technical communication and presentation skills.

CO: 2   To prepare the students for placements

CO: 3   To sensitize the students to the appropriate use of non-verbal communication

CO: 4   To train students to use language appropriately for presentations and interviews

Unit 1: Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Unit 2: Technical Writing, Grammar and Editing: Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style.

Unit 3: Self Development and Assessment: Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, taking notes; Complex problem solving; Creativity.

Unit 4: Technical Writing: Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

Unit 5: Speaking with a purpose: Public speaking, Group discussion, Oral presentation, Interviews, Graphic presentation, Presentation aids, Personality Development

TEXT BOOKS/REFERENCES:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey, New York, 2004.

2. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, 2019.

3. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843).

4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

6. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4).

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	responsibilities relevant to the professional engineering practice		
CO2	PO 9: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings	9.2	9.2.1
CO3	PO 10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1
CO4	PO 9: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings	9.2	9.2.1

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Common errors, Rearrangement of sentences:
Web links: https://www.letsstudytogether.co/sentence-arrangement-questions-pdf-for-banking-exams-ibps-sbi-po-and-clerk/
https://www.youtube.com/watch?v=e8nO3zZzkZs

Vocabulary: Resume writing, Pre-interview preparation , Group discussion.

Web links: https://www.youtube.com/watch?v=PfJg-67smf4
https://www.youtube.com/watch?v=-IXjbph22Fk

UNIT – V:

Grammar : Verbal ability tests.
Vocabulary: Mock interviews, Post interview Etiquette.

Verbal ability tests.
Web links: https://prepinsta.com/infosys-english-verbal-questions/
https://www.indiabix.com/online-test/verbal-ability-test/random
https://www.allindiaexams.in/online-test/online-general-english-test/61

Vocabulary: Mock interviews, Post interview Etiquette.

Web links: https://www.youtube.com/watch?v=ZOLCMa2QbdE
https://www.ziprecruiter.com/blog/the-right-way-to-follow-up-after-a-job-interview/
https://www.youtube.com/watch?v=KIoD19uoxt8

Course Outcomes:

Students will be able to:

1. Recognize the importance of verbal and non verbal skills
2. Develop the interpersonal and intrapersonal skills
3. Apply grammatical structures to formulate sentences and correct word forms.
4. Create trust among people and develop employability skills

References:

1. Barun K. Mitra, "Personality Development and Soft Skills", OXFORD Higher Education 2018.
2. Alka Wadkar, "Life Skills for Success", Sage publications 2016.
3. Robert M Sheffield, "Developing Soft Skills", Pearson, 2010.
4. Diana Booher, "Communicate with Confidence" Tata mcgraw hill, 1994.
5. B.N. Gosh, "Managing Soft skills for Personality development", Tata mcgraw hill 2012.
6. Michael Swan, "Practical English Usage", Oxford publications.
7. Raymond Murphy, "English Grammar in Use", Cambridge 5th Edition
8. Norman Lewis, "Word Power Made Easy", Penguin Publishers.
9. Advanced Grammar in Use A Self-Study Reference and Practice Book for Advanced Learners of English 3rd Edition , Cambridge

List of COs	PO.No. and Key word	Competency Indicator: Description	Performance Indicator Description
CO1	PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent	6.1	6.1.1

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Tenses

Web links: https://www.englisch-hilfen.de/en/grammar/english_tenses.htmj; https://onlymyenglish.com/tenses/;
https://www.englishpage.com/verbpage/verbtenseintro.html;
https://www.englishclub.com/grammar/verb-tenses.htm

Idioms and Phrases:

Web links: https://www.britannica.com/list/7-everyday-english-idioms-and-where-they-come-from
https://eslexpat.com/english-idioms-and-phrases/;
https://onlineteachersuk.com/english-idioms/;

One word substitutes:

Web links: https://www.careerpower.in/one-word-substitution.html;
https://www.hitbullseye.com/Vocab/One-Word-Substitute-List.php;
https://englishan.com/one-word-substitution-set-1/;

Public speaking - *Oral presentations*

Web links: https://egyankosh.ac.in/bitstream/123456789/26773/1/Unit-14.pdf;
https://www.skillsyouneed.com/rhubarb/preparing-oral-presentations.html;
https://courses.lumenlearning.com/publicspeakingprinciples/chapter/chapter-12-methods-of-delivery/

Writing skills – *Short Essay writing and E-mail writing.*

Web links: https://www.kibin.com/essay-writing-blog/important-essay-writing-skills/
https://www.scribendi.com/academy/articles/academic_essay_writing_skills.en.html;
https://www.microsoft.com/en-us/microsoft-365/business-insights-ideas/resources/improve-email-writing-skills;

UNIT – III :

Grammar : Direct and Indirect speeches, Active and Passive voice, Drawing inferences (reading comprehensions and listening comprehensions)

Vocabulary: Leadership Skills – Negotiation skills - Team-building – *Debate.* Leadership Skills – Negotiation skills - Team-building

Direct and Indirect speeches:

Web links: https://onlymyenglish.com/direct-and-indirect-speech/
https://learnenglish.britishcouncil.org/grammar/b1-b2-grammar/reported-speech-1-statements
https://www.perfect-english-grammar.com/reported-speech.html

Active and Passive voice,

Web links: https://www.englishclub.com/grammar/passive-voice.htm
https://www.gingersoftware.com/content/grammar-rules/verbs/passive-voice/
https://nps.edu/web/gwc/revising-passive-voice-into-active-voice

Drawing inferences (reading comprehensions and listening comprehensions)

Web links: https://www.readingrockets.org/strategies/inference
https://www.thoughtco.com/making-inferences-3111201
https://www.comprehensionconnection.net/2019/03/exploring-difference-between-making.html

Vocabulary: Leadership Skills – Negotiation skills - Team-building – *Debate.*
Leadership Skills – Negotiation skills - Team-building

Web links: https://online.hbs.edu/blog/post/negotiation-skills
https://www.bumc.bu.edu/facdev-medicine/files/2014/08/BUSM-Leasership-training.pdf
https://in.indeed.com/career-advice/career-development/negotiation-skills
https://www.thebalancecareers.com/what-is-team-building-1918270

Debate:

Web links: https://noisyclassroom.com/debate-topics/
https://www.collegeessay.org/blog/debate-topics
https://www.edu.gov.mb.ca/k12/cur/socstud/frame_found_sr2/tns/tn-13.pdf

UNIT – IV:

Grammar: Common errors, Rearrangement of sentences.
Vocabulary: Resume writing, Pre-interview preparation , Group discussion.

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Year : III   Semester : 1   Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
20ASA0502	SOFT SKILLS	1	0	2	2

Course Outcomes:

1. To develop awareness in students of the relevance and importance of soft skills
2. To provide students with interactive practice sessions to make them internalize soft skills
3. To enable them to develop employability skills
4. To provide knowledge of grammatical structures and vocabulary students and encourage their appropriate use in speech and writing

UNIT – I:

Grammar: Articles, Prepositions, Antonyms, Synonyms.

Vocabulary: Basics of Communication (Definition, Types of communication). Importance of body language in corporate culture, Body language (Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage – Tone, pitch, pause & selection of words), Impromptu speeches.

Articles:
Web links: https://learnenglish.britishcouncil.org/grammar/a1-a2-grammar/articles-1
https://www.youtube.com/watch?v=ueEp6UStdI1

Prepositions:
Web links: https://www.grammarbook.com/grammar/probPrep.asp

Antonyms, Synonyms.
Web links: https://www.youtube.com/watch?v=-mLRoxWM8dI
https://www.youtube.com/watch?v=lEOrOPVMxiM
https://www.it.iitb.ac.in/~vijaya/ssrvm/worksheetscd/getWorksheets.com/Language%20Arts/syn_ant.pdf

Basics of Communication (Definition , Types of communication).
Web links: https://wikieducator.org/INTRODUCTION_TO_COMMUNICATION

Importance of body language in Corporate culture
Web links: https://www.forwardfocusinc.com/consciously-communicate/the-importance-of-body-language-in-the-workplace/

Body language (Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause & selection of words)
Web links: https://open.lib.umn.edu/communication/chapter/4-2-types-of-nonverbal-communication/
https://en.wikipedia.org/wiki/Nonverbal_communication

Impromptu speeches.
Web links: https://www.write-out-loud.com/impromptu-public-speaking-topics.html;
https://faculty.washington.edu/mcgarrit/COM220/online%20readings/sample%20critique.pdf

UNIT – II :

Grammar: Tenses, Idioms and Phrases, One word substitutes.
Vocabulary: Public speaking - *Oral presentations*, writing skills – *Short Essay writing and E- mail writing.*

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Text Books and Reference Books:

1. K. L. Narayana & P. Kannaiah, Engineering Drawing, 3/e, Scitech Publishers
2. N. D. Bhatt, Engineering Drawing, 53/e, Charotar Publishers
3. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education
5. Basant Agrawal & C. M. Agrawal, Engineering Drawing, Tata McGraw-Hill

Additional Sources

YouTube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.3	1.3.1
CO: 2	PO 3: Design/Development of Solutions	3.2	3.2.1
CO: 3	PO 1: Engineering knowledge	1.3	1.3.1
CO: 4	PO 3: Design/Development of Solutions	3.2	3.2.2
CO: 5	PO 5: Problem analysis	5.1	5.1.1

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Reference Books:

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B.Janakiram and M.Rizwanal "Entrepreneurship Development: Text &Cases", Excel Books, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO1: Engineering Knowledge	1.2 1.3	1.2.1 1.3.1
CO 2	PO3: Design/Development of Solutions	3.2	3.2.1 3.2.2
CO 3	PO11: Project management and finance	11.2	11.2.1
CO 4	PO6: The engineer and society	6.2	6.2.1
CO 5	PO3: Design/Development of Solutions	3.3	3.2.2

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Year: III   Semester : I   Branch of Study : Common to all

Subject Code	Subject Name	L	T	P	Credits
20AOEMB02	Entrepreneurship Development	3	0	0	3

Course Outcomes:

CO: 1 Understand the concept of Entrepreneurship and challenges in the world of Competition

CO: 2 Apply the Knowledge in generating ideas for New Ventures and design business plan structure

CO: 3 Analyze various sources of finance and subsidies to entrepreneurs.

CO: 4 Evaluate the role of central government and state government in promoting women Entrepreneurship.

CO: 5 Study the role of incubations in fostering startups.

UNIT – I

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

UNIT – II

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

UNIT – III

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development.

UNIT – IV

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

UNIT – V

Startups – Definition, Role of startups in India, Governmental initiatives to foster entrepreneurship across sectors. Funding opportunities for startups. Business Incubation and its benefits, Pre-Incubation and Post - Incubation process.

Text Books:

1. D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com
2. Nandan H, " Fundamentals of Entrepreneurship", PHI, 2013.