

## VCE (A) :: Department of Mechanical Engineering

Following are the details of Open Elective courses (OE-I, II, III & IV) offered to **B.E. (III, IV, V & VI semester) 2020-21** students from the Department of Mechanical Engineering.

OE	Sem.	Name of the Open Elective Course with Code No.	Name of the Dept. offering	No. of credits	Faculty Assigned & Contact No.	Brief note about the Open Elective
OE-I	III	Geometric Modelling (U19OE310ME)	MED	2	Mr. S. Sreekrishna (9494872379)	Eligible for all branches of students
		Mechanical Technology (U19OE320ME)	MED	2	Mr. S. Venkateswarulu (8985639463)	Eligible for Civil Engineering branch students
		Basic Heat Transfer for Electronic Systems (U19OE330ME)	MED	2	Mr. Md. Luqman (9553557869)	Eligible for all branches of students
OE-II	IV	Optimization Methods (U19OE410ME)	MED	3	Mr. B. Sandeep	All Branches
OE-III	V	Introduction to Robotics (U18OE510ME)	MED	3	Dr. P.V.S. Subhashini (9866802894)	Eligible for all branches of students
		Introduction to Automobile Engineering (U18OE520ME)	MED	3	Mr. Md. Luqman (9553557869)	Eligible for all branches of students
		Advanced Course in Entrepreneurship (U18OE530EH)	H&SS	3	Mr. K.I. Spurgeon (9704822207)	Eligible for those who have taken the prerequisite course Basics of Entrepreneurship (Open Elective-II)
OE-IV	VI	Additive Manufacturing and its Applications (U18OE610ME)	MED	Mr. T. Krishna Chaitanya		All Branches
	VI	Industrial Administration and Financial Management (U18OE620ME)	MED	Dr. S. Vekataiah		ECE & EEE
	VI	Introduction to Automobile Engineering (U18OE630ME)	MED	Mr. Md. Luqman		All Branches

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Mechanical Engineering****GEOMETRIC MODELLING (Open Elective-I)**

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: <b>U19OE310ME</b>
Credits :02	CIE Marks:40	Duration of SEE:03Hours

<b>COURSE OBJECTIVE</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
The objective of this course is to understand wire-frame modelling & transformations, surface, solid modelling and assembly modelling techniques.	1 define various geometric modelling techniques and development of wire frame modelling for synthetic entities by using mathematical equations. 2 formulate 2D transformations for geometric model by matrix approach. 3 development of various surfaces using surface modelling. 4 development of solid models using various solid modelling schemes and Study various Assembly constraints, Assembly tree and develop few assembled models.

**UNIT-I: INTRODUCTION TO CAD**

product life cycle, conventional design and computer aided design.

**Wire Frame Modelling:** wire frame entities and their definitions. Interpolation and approximation of curves. Concept of parametric and non-parametric representation of circle and helix curves, demonstration of 2D geometry through CAD software.

**UNIT-II: SYNTHETIC CURVES**

Parametric representation of cubic spline, Bezier and B-spline curves, continuity, properties and characteristics of splines. Concepts of NURBS, synthetic curves demonstration.

**2D transformation and their mathematics:** Translation, scaling, rotation, Homogeneous coordinates, Concatenated transformations.

**UNIT-III: SURFACE MODELING**

Analytical surfaces: Definitions of planar, surface of revolution, Tabulated cylinder. Synthetic surfaces: Cubic and Bezier surfaces, visualization of different surfaces.

**UNIT-IV: SOLID MODELLING**

C-rep and B-rep and feature instancing, Octree encoding, spatial enumeration, cell decomposition, sweeping approaches. Euler's representation of solid models, creation of solid model in CAD software.

**ASSEMBLY MODELING:** Assembly constraints, assembly tree, top down assembly, bottom up assembly, development of a history tree for a simple assembly, demonstration of simple assembly.

**Learning Resources:**

1. Ibrahim Zeid, "CAD/CAM- Theory and Practice", McGraw-Hill Inc. New York, 2011.
2. Steven Harrington, "Computer graphics: a programming approach", McGraw-Hill, 1987.
3. David Rogers, J. Alan Adams, "Mathematical elements for computer graphics", McGraw Hill, 1990.
4. McConnell, J. J. "Computer graphics theory into practice", Jones and Bartlett Publishers, 2006.

**The break-up of CIE: Internal Tests+ Assignments + Quizzes**

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
	Duration of Internal Test:	<b>1 Hour 30 Minutes</b>		

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Mechanical Engineering****MECHANICAL TECHNOLOGY (Open Elective-I)**

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: <b>U19OE320ME</b>
Credits :02	CIE Marks:40	Duration of SEE:03Hours

<b>COURSE OBJECTIVE</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
The objective of this course is to learn the basic principles of excavating equipment, conveying equipment hoisting equipment, concrete producing equipment and pneumatic equipment.	1 identify the operations of various earth moving equipments for maintenance and selection with respect to their applications. 2 justify various conveying equipment for transporting material based on working principles. 3 Explain the working principles of various types of hoisting equipment in civil engineering applications. 4 examine various aggregate and concrete producing equipments used in concrete production and working of pneumatic equipment.

**UNIT-I: EXCAVATING EQUIPMENT**

General description, operation, maintenance and selection of Earth moving and Excavating Equipment: Shovels, Dragline, Clamshell, Cable excavator, Bucket wheel excavator, Tractor, Bulldozer, Scraper, Trenchers, Grader, Earth Compactors.

**UNIT-II: CONVEYING EQUIPMENT**

Belt conveyor, Screw Conveyor, Bucket Conveyor, Apron Conveyor and Aerial Ropeway.

**UNIT-III: HOISTING EQUIPMENT**

Hoist winch, Differential and Worm geared chain hoists, Fork lift trucks, Guyed and stiffly derricks, swing and non– swing mobile crane, whirler crane, Construction elevator, passenger lift and Bucket elevators.

**UNIT-IV:****AGGREGATE AND CONCRETE PRODUCING EQUIPMENT**

Crushers – Jaw, Gyratory, Hammer and Roll Crushers, Screens – Stationary, Shaking and Vibrating screens. Concrete mixers and Concrete pumps.

**Pneumatic Equipment:** Reciprocating air– compressor, construction pneumatic tools; jack hammer, paving breaker, Rock drill, concrete vibrator.

**Learning Resources:**

1. R.L. Peurifoy, "Construction Planning Equipment and Methods", 7<sup>th</sup> Edition, McGraw-Hill Publishers, 1956.
2. Mahesh Varma, "Construction Equipment and its planning and application", Metropolitan books Co, Delhi, 2004
3. Goodes Spence, "Building and Civil Engineering Plant", Crosby Lock Wood, 1995.

**The break-up of CIE: Internal Tests+ Assignments + Quizzes**

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
	Duration of Internal Test: <b>1 Hour 30 Minutes</b>			

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Mechanical Engineering****BASIC HEAT TRANSFER FOR ELECTRONIC SYSTEMS (Open Elective-I)**

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: <b>U19OE330ME</b>
Credits :02	CIE Marks:40	Duration of SEE:03Hours

<b>COURSE OBJECTIVE</b>	<b>COURSE OUTCOMES</b>
	<i>On completion of the course, students will be able to</i>
The objective of this course is to study the basic laws of thermodynamics and the cooling of electronic equipment along with basic modes of heat transfer	1 understand and apply the first law of thermodynamics to various engineering problems
	2 understand and apply the second law of thermodynamics to various engineering problems
	3 formulate heat conduction problems in rectangular, cylindrical and spherical coordinate system by transforming the physical system into a mathematical model.
	4 analyse heat transfer processes involved in cooling of electronic components

**UNIT-I: INTRODUCTION TO THERMODYNAMICS**

Basic Concepts-System, Types of Systems, Control Volume, Surrounding, Boundaries, Universe, Macroscopic and Microscopic viewpoints, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi-static process; Zeroth Law of Thermodynamics. Energy in state and in transition-Work and Heat. PMM I – Joule's Experiment – First law of Thermodynamics, First law applied to – process.

**UNIT-II: SECOND LAW OF THERMODYNAMICS**

Limitations of the First Law; Second Law of Thermodynamics- Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM II, Carnot cycle and its specialties, Clausius inequality, introduction to entropy.

**UNIT-III: HEAT TRANSFER**

Heat Transfer – Different Modes, governing laws and application to heat transfer: Fourier, Newton, Stefan-Boltzmann laws; general heat conduction equation: Cartesian co-ordinates (derivation), Steady state one-dimensional heat conduction through slabs, hollow cylinders and spheres (numericals); Concept of thermal resistance in series and parallel (composite systems), overall heat transfer coefficient; Critical radius of insulation: concept, derivation and numerical: with and without internal heat generation.

**UNIT-IV: INTRODUCTION TO COOLING OF ELECTRONIC EQUIPMENT**

Needs & Goals; Temperature effects on different failure modes; Electronic equipment for airplanes, missiles, satellites and spacecraft; electronic equipment for ships & submarines; electronic equipment for communication systems and ground support system; chassis and circuit boards cooling.

**Learning Resources:**

1. P.K. Nag, "Engineering Thermodynamics", Tata Mc Graw Hill, 4th Edition, 2008.
2. Yunus Cengel & Boles, "Thermodynamics – An Engineering Approach", TMH New Delhi, 2008.
3. Sachadeva R.C., "Fundamentals of Engineering Heat and Mass Transfer", New Age International (P) Ltd Publishers, New Delhi, 2010.
4. Dave S. Steinberg, "Cooling Techniques for Electronic Equipment", Second Edition, John Wiley & Sons, 1991.
5. Yunus Cengel & Afshin J Ghajar, "Heat and Mass Transfer: Fundamentals & its Applications", Mc Graw Hill, 5th Edition, 2013.

**The break-up of CIE: Internal Tests+ Assignments + Quizzes**

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
	Duration of Internal Test:	<b>1 Hour 30 Minutes</b>		

# DEPARTMENT OF MECHANICAL ENGINEERING

## SYLLABUS FOR B.E. IV-SEMESTER

### OPTIMIZATION METHODS (Open Elective-II)

Instruction : 3Hours /week	SEE Marks : 60	Course Code : U19OE410ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to:  understand Linear & non-linear programming, transportation modeling, CPM & PERT for project scheduling and control, and application of various optimization techniques for respective field engineering (Inter disciplinary)	On completion of the course, the student will be able to: <ol style="list-style-type: none"><li>1. Optimization of resources in multi disciplinary areas through linear programming under different conditions.</li><li>2. Sensitivity analysis of a linear programming problem as per customer requirements to suit various Organizations.</li><li>3. Minimization of total cost to apply for transportation techniques for the transshipment of Goods and products and Implement techniques like project management to analyze about material management.</li><li>4. Optimization of resources in multi disciplinary areas through non-linear programming under different conditions.</li></ol>

#### UNIT-I

##### Optimization-An overview

Meaning of Optimization-Origin of Optimization-Introduction to Linear programming problems (LPP) -Formulation of LPP- Graphical method, simplex method.

#### UNIT-II

##### Advanced topics in Linear programming

Duality in LPP, Differences between primal and dual, shadow prices, Dual simplex method, sensitivity analysis. special cases in LPP.

#### UNIT-III

##### Transportation Model

Definition of the transportation model-matrix of Transportation model-Formulation and solution of transportation models- Methods for calculating Initial basic feasible solution-Optimization of transportation model using MODI method.

##### Project Scheduling

Introduction to network analysis, Rules to draw network diagram, Fulkerson rule for numbering events, Critical path method, PERT.

#### UNIT-IV

##### Non linear programming problems

Optimization methods for single variable, multivariable functions, Maxima-Minima

**One Dimensional Minimization:** Uni-modal Function, Unrestricted search, Exhaustive search, Dichotomous search, Interval Halving method, Fibonacci and golden bisection Method, Newton and Quasi Newton method.

#### UNIT-V

**Non Linear - Unconstrained optimization:** classification, scaling of design variables, Random search methods, Univariate search, pattern Directions, Hook Jeeves, Powel method, Rosenbrock method.

**Learning Resources:**

1. Singiresu S. Rao, "Engineering optimization- Theory and Practice", 4<sup>th</sup> Edition, John Wiley and Sons, 2009.
2. NVS Raju, "Optimization methods for Engineers ", PHI Learning Pvt. Ltd., 2014.
3. Prem Kumar Gupta and Dr. DS Hira, "Operations Research ", S.Chand & Company Pvt. Ltd., 2014.
4. R. Paneerselvam, "Operations Research", PHI Learning Pvt Ltd., 2009.
5. Kalyanmoy Deb, Optimization for Engineering Design- algorithms and examples, PHI pvt ltd, 1st edition 2003, Delhi.

**The break-up of CIE: Internal Tests+ Assignments + Quizzes**

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
	Duration of Internal Test: 1 Hour 30 Minutes			

# VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

## DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

### INTRODUCTION TO ROBOTICS (Open Elective-III)

Instruction : 3 Hours	SEE Marks : 60	Course Code : U18OE510ME
Credits : 3	CIE Marks: : 40	Duration of SEE : 3 Hours

Course objectives	Course Out comes
The objectives of this course are to: Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.	On completion of the course, the student will be able to 1. understand the anatomy of the robot and various robot configurations for it's selection depending on the task. 2. classify the end effectors , understand different types of joints,various types of mechanical actuation and robot drive systems for carrying out the assigned job effectively. 3. analyze a planar manipulator through forward kinematics and understand the control of robot manipulator for better reliability and efficiency. 4. classifythe various sensors used in robots for proper selection to an application. 5. summarize various industrial and non-industrial applications of robots for their selection to a particular task.

#### UNIT-I

##### ROBOT BASICS

Robot-Basic concepts, Need, Law, History, Anatomy, specifications.

Robot configurations-cartesian, cylindrical, polar ,articulated and SCARA.

Robot wrist mechanism, Precision and accuracy of robot.

#### UNIT-II

##### ROBOT ELEMENTS

End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system types: Electrical, pneumatic and hydraulic. Position and velocity feedback devices, Robot joints and links-Types, Motion interpolation.

#### UNIT-III

##### ROBOT KINEMATICS AND CONTROL

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation- Scaling, Rotation and Translation, Homogeneous transformation. D-H matrix. Forward kinematics for a 2-link RR planar manipulator.

Control of robot manipulators – Point to point and Continuous Path Control. Robot programming.

#### UNIT-IV

##### ROBOT SENSORS

Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors, Light sensors, Pressure sensors.

Introduction to Machine Vision and Artificial Intelligence.

#### UNIT-V

##### ROBOT APPLICATIONS

Applications of robots in Industries, Medical, Household, Entertainment, Space, Underwater, Defense, and Disaster management.

Applications of Micro and Nanorobots, Future Applications of robots.

##### Learning Resources:

1. MikellP. Groover, Mitchell Weiss, Roger N Nagel and Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", TataMcGraw-Hill Publishing Company Limited , 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw HillPublishing Company Limited, 2010.
3. KlafferR.D, Chmielewski T.A, and Negin. M, "Robotic Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd.,1994.
4. K.S. Fu,R.C. Gonzalez and C.S.G.Lee , "Robotics control, sensing, vision and intelligence",TataMcGraw-Hill Publishing Company Limited, 2008
5. R.K. Mittal and I.J.Nagrath"Robotics and Control", Tata McGraw-Hill Publishing Company Limited,2003.

##### The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: <b>1 Hour 30 Minutes</b>				

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**  
 IBRAHIMBAGH, HYDERABAD – 500 031  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**SYLLABUS FOR B.E. V-SEMESTER**  
**INTRODUCTION TO AUTOMOBILE ENGINEERING (OE-III)**

Instruction : 3Hours	SEE Marks : 60	Course Code : U18OE520ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: <ol style="list-style-type: none"> <li>familiarize the student with the different types of automobiles and engine components.</li> <li>impart adequate knowledge in fuel supply, cooling, lubrication systems of IC engines.</li> <li>understand the steering geometry, steering mechanism and types of suspension systems.</li> <li>gain the knowledge about working of clutch, gear mechanism, brakes</li> <li>make the student conversant with types of wheels, tyres and pollution control techniques.</li> </ol>	On completion of the course, the student will be able to: <ol style="list-style-type: none"> <li>identify types of Automobiles and engine components.</li> <li>describe the engine fuel system in petrol and Diesel engines, cooling, lubrication systems.</li> <li>describe the steering mechanism, suspension systems</li> <li>analyse the working principle and operation of clutch, gear mechanism and brakes.</li> <li>know the pollutants from automobile and pollution control techniques and identify the types of wheels, tyres.</li> </ol>

#### UNIT-I

**Introduction:** Types of automobiles: Hybrid Vehicles, Electrical, gas and Fuel cell vehicles. Chassis and body, Lay out of transmission system, Engine components: cylinder block, cylinder head, crankcase, crank shaft and cam shaft. Types of IC Engines: SI and CI engines, two stroke and four stroke engines.

#### UNIT-II

**Fuel system:** Fuel supply system for SI engines and CI engines. Simple carburettor, Introduction to Multipoint fuel injection system (**MPFI**) of petrol engines and Introduction to **CRDI** system for diesel engines.

**Cooling system:** air cooling, water cooling: Thermo syphon, pump circulation system.

**Lubrication system:** Petroil System, splash system, pressure lubrication: Wet sump and Dry Sump.

**Ignition system:** Battery Ignition System, Magneto Ignition System and Electronic Ignition System.

#### UNIT-III

**Suspension system:** Rigid axle, Independent suspension system: Double wish bone type, Macpherson strut system, Air suspension system.

**Steering system:** front axle, wheel alignment, steering geometry: camber, caster, toe-in, toe-out, steering linkage for vehicle with rigid axle front suspension, steering linkage for vehicle with independent front suspension, Ackermann steering mechanism.

#### UNIT –IV

**Power Train:** Single plate clutch, Multi plate clutch. Manual Gear Box: sliding mesh gear box, constant mesh gear box, synchromesh gear box and Automatic Gear Box. Working principle of Differential.

**Brakes:** Types: Drum and Disc brakes, Mechanical and Hydraulic Brakes, **ABS** system.

#### UNIT –V

**Wheels and Tyres:** Types of Wheels: wire wheels, disc wheels, alloy wheels. Types of tyres: Tube type, tubeless type. **SRS** Airbag system.

**Automobile Emissions and control:** Automobile pollutants and sources of pollution. Pollution Control Techniques: Catalytic Converters, EGR and PCV. Bharath emission Norms.

#### Learning Resources:

- Crouse & Anglin, "Automobile Engineering", 10<sup>th</sup> Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2007.
- Kirpal Singh, "Automobile Engineering", Vol.I& II, 13<sup>th</sup> Edition, Standard Publishers, New Delhi 2013.
- R.B Gupta, "Automobile Engineering" 7<sup>th</sup> Edition, Satya Prakashan, New Delhi, 2015.
- Joseph Heitner, "Automotive Mechanics", 2<sup>nd</sup> Edition, Affiliated East West Pvt. Ltd., 2013.
- C.P. Nakra, "Basic Automobile Engineering", 7<sup>th</sup> Edition, Dhanpat Rai Publishing C (P) Ltd., 2016.

#### The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: <b>1 Hour 30 Minutes</b>				



# VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of H&SS

## ADVANCED COURSE IN ENTREPRENEURSHIP (OE-III)

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: <b>U18OE530HS</b>
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

<b>Course objectives</b> <i>The objectives of this course are to</i>	<b>Course Outcomes</b> <i>On completion of the course the student will be able to</i>
<ol style="list-style-type: none"><li>1. Acquire additional knowledge and skills for developing early customer traction into a repeatable business.</li><li>2. They will learn the tools and methods for achieving sustainable growth, such as refining the product or service and business models, building brand strategy, making a sales and financial plan etc.</li></ol>	<ol style="list-style-type: none"><li>1. Develop an A-team</li><li>2. Refine business models and expand customer segments, brand strategy and create digital presence, channel strategy for customer outreach</li><li>3. Develop strategies to grow revenues and markets, understand Advance Concepts of business finance, do Financial Planning, find Funding for growth</li><li>4. Leverage technologies and platforms for growth stage companies</li><li>5. Develop key metrics to track progress, understand Basics of registering a company.</li></ol>

### Unit I: Pivoting and New Business Model

Introduction to Advance Course and Recapping the key concepts; Revisit of idea/ solution, business model and team members, Need for a mentor; Pivoting and its need; Types of Business models; Refining business model; Analyzing the Business Model of Competitors; Adding new customer segments to existing business model.

### Unit II: Business Planning

Product Management: Need for a product management with examples; Making a sales plan; Building sales organization: Entrepreneur interview, Hiring sales team; Making a people plan for the venture; Introduction and understanding financial planning and forecasting template; Discussing financial planning and revisiting business model; Creating a procurement plan; Negotiation.

### Unit III: Customer Life cycle and Building the A-team

Customer life cycle; identifying secondary revenue streams; Funding Landscape: Funding options for an entrepreneur; Investor hunt: Creating funding plan and designing the pitch deck; Attracting right talent – I: Intro to building the A-team; Examples; Setting the team for success.

### Unit IV: Branding and Channel Strategy, Leveraging Technologies

Creating brand Strategy: Drawing venture's golden circle; Defining the positioning statement: values; Creating a Public Image and Presence of the Venture; Identifying the right channel; Platforms for Marketing and Promotion; Platforms for Communication and Collaboration; Making the Tech Plan.

### Unit V: Measuring Progress, Legal Matters and Role of Mentors & Advisors

Metrics for Customer Acquisition and Retention; Financial Metrics: Finding new revenue streams based on key financial metrics; Re-forecasting financial plan to increase margin; Professional Help and Legal & Compliance Requirements; Selecting IP for organization; Identifying mentors and advisors; Scouting board of directors; Capstone Project.

### Learning Resources:

1. <http://www.learnwise.org>
2. Clancy, Ann L. & Binkert, Jacqueline, "Pivoting- A coach's guide to igniting substantial change" Palgrave Macmillan US 2017
3. Porter, Michael, E., "Competitive Advantage: Creating and Sustaining Superior Performance", Free press, 1<sup>st</sup> edi.
4. Schwetje, Gerald & Vaseghi Sam, "The Business Plan", Springer-Verlag Berlin Heidelberg.
5. LeMay, Matt, "Product Management in Practice", O'Reilly Media Inc.
6. Smart, Geoff & Randy, Street., "Who: The A method of hiring", Ballantine books, 2008.
7. Blokdyk, Gerardus., "Customer Lifecycle Management - A complete guide", 5starcooks, 2018

### The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: <b>1 Hour 30 Minutes</b>				

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**  
 IBRAHIMBAGH, HYDERABAD – 500 031  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**SYLLABUS FOR B.E VI Semester (2020-21)**  
**Additive Manufacturing and its Applications (Open Elective-IV)**

Instruction: 3 Hours / week	SEE Marks:60	Course Code : U18OE610ME
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to : understand the fundamentals of various additive manufacturing technologies and their applications in Engineering Industry.	On completion of the course the student will be able to: 1. understand the fundamentals of prototyping. 2. study the principle, process, advantages and limitations of liquid based AM systems. 3. study the principle, process, advantages and limitations of solid based AM systems. 4. study the principle, process, advantages and limitations of powder based AM systems. 5. study the applications of AMT in various engineering industries.

**UNIT-I**

Introduction, Prototyping fundamentals, Historical development, Fundamentals of rapid prototyping, Advantages of Rapid prototyping, Commonly used terms, Rapid prototyping process chain, 3D modelling, Data Conversion, and transmission, Checking and preparing, Building, Post processing, AM data formats, Classification of AM process

**UNIT-II**

Liquid based AM systems: Stereolithography Apparatus(SLA): Models and specifications, Process, Working principle, photopolymers, Photopolymerisation, Layering technology, laser and laser scanning, Applications, Advantages and disadvantages, Case studies  
 Solid ground curing(SGC): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies

**UNIT-III**

Solid based AM systems: Laminated object manufacturing(LOM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.  
 Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

**UNIT-IV**

Powder based AM systems: Selective laser sintering(SLS): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.  
 Three dimensional printing (3DP): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

**UNIT-V**

Applications of AM systems: Applications in aerospace industry, automotive industry, jewellery industry, coin industry, GIS Application, arts and architecture.  
 RP medical and bio engineering Application: planning and simulation of complex surgery, customized implant and prosthesis , design and production of medical devices, forensic science and anthropology, visualization of bio-molecules.

**Learning Resources:**

1. Chua C.K., Leong K.F. and LIM C.S., "World Rapid prototyping : Principles and Applications", 2<sup>nd</sup> Edition, Scientific Publications, 2004
2. D.T.Pharm and S.S.Dimov, "Rapid Manufacturing", Springer, 2001.
3. AmithabaGhose, "Rapid prototyping", Eastern Law House, 1997.
4. Paul F.Jacobs, "Stereolithography and other RP & M Technologies", ASME Press, 1996.
5. Paul F.Jacobs, "Rapid Prototyping & Manufacturing", ASME Press, 1996.

**The break-up of CIE: Internal Tests+ Assignments + Quizzes**

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
	Duration of Internal Test: <b>1 Hour 30 Minutes</b>			

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 IBRAHIMBAGH, HYDERABAD – 500 031  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**SYLLABUS FOR B.E VI Semester (2020-21)**  
**Industrial Administration and Financial Management (Open Elective-IV)**

Instruction: 3 Hours / week	SEE Marks:60	Course Code : U18OE620ME
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Out comes
The objectives of this course are to: 1. aware about types of business forms, organization structures, plant layouts, merits, demerits and applications. 2. understand method study procedure, PME, time study techniques and wage incentives. 3. importance of PPC and improving quality by control charts and sampling plants. 4. optimization of inventory to minimize total cost and other optimization techniques like LPP, project management techniques. 5. estimate selling price of a product, TVM and budgeting techniques, depreciation methods.	<i>On completion of the course, the student will be able to:</i> 1. understand business forms, organization structures and plant layouts. 2. implementation of method study and estimation of standard time. 3. understand types of production, functions of PPC, quality control by charts and sampling. 4. implement optimization techniques like LPP, assignment and project management techniques. 5. understand BEA, estimation of depreciation, selling price of a product and capital budgeting techniques.

**UNIT – I**

Industrial Organization : Types of various business organisations. Organisation structures and their relative merits and demerits. Functions of management.  
 Plant location and layouts: Factors affecting the location of plant and layout. Types of layouts and their merits and demerits.

**UNIT – II**

Work study: Definitions, Objectives of method study and time study. Steps in conducting method study. Symbols and charts used in method study. Principles of motion economy. Calculation of standard time–by– time study and work sampling. Performance rating factor. Types of ratings. Jobs evaluation and performance appraisal. Wages, incentives, bonus, wage payment plans.

**UNIT – III**

Inspection and quality control: Types and objectives of inspection S.Q.C., its principles quality control by chart and sampling plans. Quality circles, introduction to ISO.  
 Production planning and control: Types of manufacture. Types of production. Principles of PPC and its function. Production control charts.

**UNIT – IV**

Optimisation: Introduction to linear programming and graphical solutions. Assignment problems.  
 Project Management: Introduction to CPM and PERT. Determination of critical path.  
 Material Management: Classification of materials. Materials planning. Duties of purchase manager. Determination of economic order quantities. Types of materials purchase.

**UNIT – V**

Cost accounting: elements of cost. Various costs. Types of overheads. Break even analysis and its applications. Depreciation. Methods of calculating depreciation fund. Nature of financial management. Time value of money. Techniques of capital budgeting and methods. Cost of capital. financial leverage.

**Learning Resources:**

1. Pandey I.M., "Elements of Financial Management", Vikas Publ. House, New Delhi, 1994
2. Khanna O.P., "Industrial Engineering and Management", Dhanapat Rai & Sons.
3. Everrete E Admaa & Ronald J Ebert , "production and Operations Management", 5<sup>th</sup> Ed. , PHI , 2005
4. S N Chary, "Production and Operations Management", 3<sup>rd</sup> Ed. , Tata McGraw Hill, , 2006
5. Pannervselvam, "production and Operations Management", Pearson Education, 2007

**6. The break-up of CIE: Internal Tests+ Assignments + Quizzes**

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: <b>1 Hour 30 Minutes</b>				

# VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

## DEPARTMENT OF MECHANICAL ENGINEERING

### SYLLABUS FOR B.E. VI-SEMESTER

### INTRODUCTION TO AUTOMOBILE ENGINEERING (OE-IV)

Instruction : 3Hours	SEE Marks : 60	Course Code : U18OE630ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 6. familiarize the student with the different types of automobiles and engine components. 7. impart adequate knowledge in fuel supply, cooling, lubrication systems of IC engines. 8. understand the steering geometry, steering mechanism and types of suspension systems. 9. gain the knowledge about working of clutch, gear mechanism, brakes 10. make the student conversant with types of wheels, tyres and pollution control techniques.	On completion of the course, the student will be able to: 6. identify types of Automobiles and engine components. 7. describe the engine fuel system in petrol and Diesel engines, cooling, lubrication systems. 8. describe the steering mechanism, suspension systems 9. analyse the working principle and operation of clutch, gear mechanism and brakes. 10. know the pollutants from automobile and pollution control techniques and identify the types of wheels, tyres.

#### UNIT-I

**Introduction:** Types of automobiles: Hybrid Vehicles, Electrical, gas and Fuel cell vehicles. Chassis and body, Lay out of transmission system, Engine components: cylinder block, cylinder head, crankcase, crank shaft and cam shaft. Types of IC Engines: SI and CI engines, two stroke and four stroke engines.

#### UNIT-II

**Fuel system:** Fuel supply system for SI engines and CI engines. Simple carburettor, Introduction to Multipoint fuel injection system (**MPFI**) of petrol engines and Introduction to **CRDI** system for diesel engines.

**Cooling system:** air cooling, water cooling: Thermo syphon, pump circulation system.

**Lubrication system:** Petroil System, splash system, pressure lubrication: Wet sump and Dry Sump.

**Ignition system:** Battery Ignition System, Magneto Ignition System and Electronic Ignition System.

#### UNIT-III

**Suspension system:** Rigid axle, Independent suspension system: Double wish bone type, Macpherson strut system, Air suspension system.

**Steering system:** front axle, wheel alignment, steering geometry: camber, caster, toe-in, toe-out, steering linkage for vehicle with rigid axle front suspension, steering linkage for vehicle with independent front suspension, Ackermann steering mechanism.

#### UNIT –IV

**Power Train:** Single plate clutch, Multi plate clutch. Manual Gear Box: sliding mesh gear box, constant mesh gear box, synchromesh gear box and Automatic Gear Box. Working principle of Differential.

**Brakes:** Types: Drum and Disc brakes, Mechanical and Hydraulic Brakes, **ABS** system.

#### UNIT –V

**Wheels and Tyres:** Types of Wheels: wire wheels, disc wheels, alloy wheels. Types of tyres: Tube type, tubeless type. **SRS** Airbag system.

**Automobile Emissions and control:** Automobile pollutants and sources of pollution. Pollution Control Techniques: Catalytic Converters, EGR and PCV. Bharath emission Norms.

**Learning Resources:**

6. Crouse & Anglin, "Automobile Engineering", 10<sup>th</sup> Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2007.
7. Kirpal Singh, "Automobile Engineering", Vol.I& II, 13<sup>th</sup> Edition, Standard Publishers, New Delhi 2013.
8. R.B Gupta, "Automobile Engineering" 7<sup>th</sup> Edition, Satya Prakashan, New Delhi, 2015.
9. Joseph Heitner, "Automotive Mechanics", 2<sup>nd</sup> Edition, Affiliated East West Pvt. Ltd., 2013.
10. C.P. Nakra, "Basic Automobile Engineering", 7<sup>th</sup> Edition, Dhanpat Rai Publishing C (P) Ltd., 2016.

**The break-up of CIE: Internal Tests+ Assignments + Quizzes**

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
	Duration of Internal Test:	<b>1 Hour</b>		