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ShriAcharyaratnaDeshbhooshanShikshanPrasarakMandal, Kolhapur

MahavirMahavidyalaya, Kolhapur (Autonomous)

Affiliated to Shivaji University, Kolhapur

Syllabus for Choice Based Credit System (CBCS) Advance Diploma (B. Voc.)Programme

Programme	**Advance Diploma inAUTOMOBILE.**
Part	**II**
Semester	**IV**
Course Code	**ADC41**
Course Name	
Course Title	**--**
Paper No.	**--**

Under the Faculty of Interdisciplinary Studies

(To be introduced from Academic Year 2022 – 23 onwards)
Subject to the revisions& modifications made from time to time

MahavirMahavidyalaya, Kolhapur (Autonomous)

Affiliated to Shivaji University, Kolhapur

(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE.**		
Part	**II**	Semester	**IV**
Course	**Fluid Mechanics and Machines**	Course Code	**ADC41**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**03**	Contact Hours	**04 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To give fundamental knowledge of fluid.
ii)	To acquire knowledge properties and behaviour under various conditions of internal and external flows.
iii)	To acquire knowledge Hydraulic TurbinesandPumps.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Units	**CR**	**IH**
Unit I : Properties of Fluid and Fluid Pressure	0.75	12
1.1.Properties of Fluid- Density, Specific gravity, Specific volume, Specific Weight, Dynamic viscosity, Kinematic viscosity		
1.2.Surface tension, Capillarity, Vapour Pressure, Compressibility Fluid pressure, Pressure head, Pressure intensity		
1.3.Simple and differential manometers, Bourdon pressure gauge		
Unit II : Fluid Flow	0.75	12

2.1. Construction of venturimeter, principle of working venturimeter, orifice and pitot tube		
2.2.Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform, Bernoulli's theorem non uniform		
Unit III:Hydraulic Turbines.	0.75	12
3.1.Explain working principle of various hydraulic turbines		
3.2. Layout and features of hydroelectric power plant, surge tanks and its need.		
3.3. Classification of hydraulic turbines and their applications. Construction and working principle of Pelton wheel, Francis and Kaplan turbine.		
Unit IV : Pumps	0.75	12
4.1. DefinePumps, types of pump, Construction, principle of working, priming methods and Cavitations, Types of casings and impellers.		
4.2.Construction, working principle and applications of single and double acting reciprocating pumps		

D) Reference Materials	
D1) Text Books for Reading	
1.	"Fluid Mechanics", K. L. Kumar, S. Chand Publication. New Delhi,2nd Edition , 2000
2.	"Theory and Applications of machines", K. Subramanya, , Tata McGraw Hill Publication,1993
3.	"Fluid Mechanics", R. K. Bansal, Laxmi publications. New Delhi, 1998.
D2) Books for Reference	
1.	"Fluid Mechanics", V. L. Streeter and E. B. Wylie, Tata McGraw Hill Pvt Ltd. New Delhi, 2nd Edition, 1997.
2.	"Introduction to Fluid Mechanics", Edward J. Shaughnessy, Oxford University press
3.	"Mechanics of Fluid", Merle C. Potter, Prentis Hall of India,New Delhi ,2nd Edtion .

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Seminars

F) Course Outcomes:		**Blooms Taxonomy**
CO1	Students will be able to determine and analyze the fundamental of fluid.	
CO2	The student will understand properties and behaviour under various conditions of internal and external flows.	
CO3	The student will understand Turbine and their types, pumps and their types.	
CO4	Determine the fluid pressure and use various devices for measuring fluid pressure.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.	Group discussion	
3.	Unit test ,Online test	
4.	Industrial Visit	
5.	**Total Marks**	**10**

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	**Total Marks**	**40**

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MahavirMahavidyalaya, Kolhapur (Autonomous)

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(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE.**		
Part	**II**	Semester	**IV**
Course	**Heat Transfer**	Course Code	**ADC42**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**03**	Contact Hours	**04 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	This course is designed to introduce a basic study of the phenomena of heat transfer
ii)	To acquire basic knowledge of Heat exchangers.
iii)	To acquire basic knowledge of Conduction, Convection &Radiation
iv)	To study the needs and essential requirements Heat Transfer.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Units	**CR**	**IH**
Unit I:Heat Transfer.	0.75	12
1.1. Modes of heat transfer: - Conduction, convection and radiation.		
1.2. Conduction Fourier's law, thermal conductivity, conduction through cylinder, thermal resistance, and composite walls		
1.3.Thermal Radiation, Absorptivity, Transmissivity, Reflectivity, Emissivity, black and graybodies,Stefan-Boltzman law		

Unit II: Condensation and Boiling.	0.75	12
2.1.Boiling heat transfer, types of boiling, pool boiling curve and forced boiling phenomenon		
2.2.condensation heat transfer, film wise and drop wise condensation		
Unit III:Heat exchangers.	0.75	12
3.1.Classification and applications		
3.2. heat exchanger analysis–LMTD for parallel and counter flow heat exchanger, effectiveness– NTU method for parallel and counter flow heat exchanger		
Unit IV : Conduction, Convection &Radiation	0.75	12
4.1. Introduction and Basic Concepts. Heat conduction in plane wall, composite slab, composite Cylinder.		
4.2. Fundamentals of convection: Mechanism of natural and forced convection,. Forced convection, Natural Convection.		
4.3. Thermal Radiation: Fundamental concepts of radiation.		

D) Reference Materials	
D1) Text Books for Reading	
1.	"Heat Transfer", J.P. Holman, Tata McGraw Hill Book Company, NewYork, 2nd Edition.
2.	"Fundamentals of Heat and Mass Transfer",R.C. Sachdeva, Willey Eastern Ltd.
3.	"A Text Book on Heat Transfer", Dr. S. P. Sukhatme, Orient Longman PublicationHyderabad.
4.	"Heat and Mass Transfer", S.C.Arrora and S. Dokoundwar, DhanpatRai and Sons,Delhi.
D2) Books for Reference	
1.	"Heat Transfer – A Practical approach",Yunus. A .Cengel, Tata McGraw Hill.
2.	"Heat Transfer" Chapman A.J., Tata McGraw Hill Book Company, NewYork.

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E) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Seminars

F) Course Outcomes:		Blooms Taxonomy
CO1	Understand the basic laws of heat transfer.	
CO2	Understanding the fundamentals of convective heat transfer process.	
CO3	Evaluate heat transfer coefficients for natural convection.	
CO4	Analyze the conduction, convection and radiation	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.	Group discussion	
3.	Unit test ,Online test	
4.	Industrial Visit	
5.	**Total Marks**	**10**

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	**Total Marks**	**40**

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(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE**		
Part	**II**	Semester	**IV**
Course	**Vehicle Body Engineering and Safety**	Course Code	**ADC43**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**03**	Contact Hours	**04 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	Classify the vehicles and define basic terms.
ii)	Select appropriate body material.
iii)	Identify the various safety aspects in a given vehicle.
iv)	To acquire knowledge of Body building Processes, Body repair, finishing and Painting

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Units	**CR**	**IH**
Unit I : Types of bodies		
1.1.Classification of coachwork type, coach and bus body style, layout ofcars, buses and coach with different seating and loading capacity.	0.75	12
1.2.Angle of approach, Angle of departure, Ground clearance, Cross bearers, Floor longitudes, posts, seat rail, waist rail, cant rail	0.75	12

1.3.Roof stick, Roof longitude, Rub rail, skirt rail, truss panel, wheel arch structure, wheel arch, post diagonals, gussets		
Unit II:Vehicle Body Materials.	0.75	12
2.1.Aluminium alloys, Steel, alloy steels, plastics, Metal matrix Composites.		
2.2.structural timbers - properties, glass reinforced plastics And high strength composites, thermoplastics.		
2.3. ABS and styrenes, load bearing plastics, semi rigid PUR foams and sandwich panel construction, nano materials.		
Unit III :Interior Arrangements in Vehicle		
3.1. Introduction, Seating dimensions, Interior ergonomics, ergonomics system design, seat comfort, suspension seats, split frame seating		
3.2. Back passion reducers, dash board instruments, electronic displays, commercial vehicle cabin ergonomics, mechanical package layout, goods vehicle layout		
3.3.Visibility, regulations, drivers visibility, methods of improving visibility, Window winding and seat adjustment mechanisms.		
Unit IV : Body building Processes, Body repair, finishing and Painting	0.75	12
4.1.Introduction , Stepwise description of different processes, tools and technologies		
4.2.Denting and painting, Paints adhesives and their properties		
4.3.Corrosion and their prevention.		

D) Reference Materials	
D1) Text Books for Reading	
1.	Sydney F page, "Body Engineering"' Chapman & Hall Ltd, London, 1956
2.	"Giles J Pawlowski", Vehicle body engineering Business books limited, 1989
D2) Books for Reference	
1.	Hand book on vehicle body design – SAE publication

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Seminar.

F) Course Outcomes:		**Blooms Taxonomy**
CO1	To taken knowledge about Classification of vehicles and their basic terms.	
CO2	To taken knowledge about Selection appropriate body material.	
CO3	To taken knowledge about Identify the various safety aspects in a given vehicle.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.	Group discussion	
3.	Unit test ,Online test	
4.	Industrial Visit	
5.	**Total Marks**	**10**

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	**Total Marks**	**40**

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MahavirMahavidyalaya, Kolhapur(Autonomous)

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(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE**		
Part	**II**	Semester	**IV**
Course	**Elements of machine design**	Course Code	**ADC44**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**03**	Contact Hours	**04 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To teach students how to apply the concepts of stress analysis, and material science to analyze, design or select commonly used machinecomponents.
ii)	To illustrate to students the variety of mechanical components available and emphasize the need to continue learning.
iii)	To teach students how to apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Units	**CR**	**IH**
Unit I : Fundamentals of Machine Design	0.75	12
1.1.Concept of Machine design, Types of loads, Factor of safety- its selection and significance.		
1.2.Review of theories of elastic failure and their applications.		
1.3.Basic procedure of design of machine elements, Review and selection of various engineering material properties and I.S. coding for ferrous materials.		

1.4. Factors governing selection ofEngineering materials.		
Unit II:Design of Shaft,Pulley and Selection of Belts	0.75	12
2.1.Design of solid and hollow shafts, splined shafts, ASME code for shaft design		
2.2.Design of Pulley- flat and V belt pulley		
2.3.Selection of flat belt, V-belt as per the standard manufacturer's catalogue, Introduction to timing belts.		
Unit III :Design of springs and Keys	0.75	12
3.1.Types of springs and their applications.		
3.2.Design of Helical Compression Spring subjected to static loading.		
3.3.Types and Design of Keys,		
Unit IV : Couplings	0.75	12
4.1.Types of Couplings, Design of Muff, Rigid Coupling, flexible bushed pin type flanged coupling		

D) Reference Materials	
D1) Text Books for Reading	
1.	"Design of Machine Elements", V.B. Bhandari, Tata McGraw Hill, 3rd Edition.
D2) Books for Reference	
1.	"Machine Design Integrated approach",Robert L. Norton, 5th Edition.

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Seminar.

F) Course Outcomes:		Blooms Taxonomy
CO1	The students will demonstrate the ability to apply the fundamentals of stress analysis, theories of failure and material science in the design of machine components.	
CO2	The students will demonstrate the ability to make proper assumptions, perform correct analysis while drawing upon various mechanical engineering subject areas.	
CO3	Specifically, the students will demonstrate the preceding abilities by performing design shaft,pully ,coupling and screw.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.	Group discussion	
3.	Unit test ,Online test	
4.	Industrial Visit	
5.	**Total Marks**	**10**

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	**Total Marks**	**40**

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MahavirMahavidyalaya, Kolhapur(Autonomous)

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(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE.**		
Part	**II**	Semester	**IV**
Course	**Fluid Mechanics and Machines**	Course Code	**Practical ADC41**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**04**	Contact Hours	**06 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To give fundamental knowledge of fluid.
ii)	To acquire knowledge properties and behaviour under various conditions of internal and external flows.
iii)	To acquire knowledge Hydraulic TurbinesandPumps
iv)	To acquire knowledge industrially importance of Fluid Mechanics and Machines.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Practicals	**CR**	**IH**
1.Study and demonstration of Pressure Measuring Devices.	04	75
2. Calibration of venturimeter/Orifice-meter.		
3. Calibration of notches**.**		
4. Orifice under steady and unsteady flow condition.		
5.Determination of minor losses in pips-fittings		
6.Determination of coefficient of friction in pipes of different materials.		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Visits

E) Course Outcomes:		Blooms Taxonomy
CO1	Students will be able to determine and analyze the fundamental of fluid.	
CO2	The student will understand properties and behaviour under various conditions of internal and external flows.	
CO3	The student will understand Turbine and their types, pumps and their types.	
CO4	Determine the fluid pressure and use various devices for measuring fluid pressure.	

F) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

G) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	Practical (Lab-work)	25
2.	Submission Practical record book & project report	15
3.	Viva-voce	10
4.	**Total**	**50**

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MahavirMahavidyalaya, Kolhapur (Autonomous)

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(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE.**		
Part	**II**	Semester	**IV**
Course	**Heat Transfer**	Course Code	**Practical ADC42**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**04**	Contact Hours	**06 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	This course is designed to introduce a basic study of the phenomena of heat transfer
ii)	To acquire basic knowledge of Heat exchangers.
iii)	To acquire basic knowledge of Conduction, Convection &Radiation
iv)	To study the needs and essential requirements Heat Transfer.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Practicals	**CR**	**IH**
1.Determination of Thermal Conductivity of metal rod.	04	75
2.Determination of Thermal Conductivity of insulating powder.		
3.Determination of Thermal Conductivity of Composite wall.		
4.Determination of heat transfer coefficient in Natural Convection.		
5.Determination of effectiveness of heat exchanger		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Visits.

E) Course Outcomes:		Blooms Taxonomy
CO1	Understand the basic laws of heat transfer.	
CO2	Understanding the fundamentals of convective heat transfer process.	
CO3	Evaluate heat transfer coefficients for natural convection.	
CO4	Analyze the conduction, convection and radiation	

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	Practical (Lab-work)	25
2.	Submission practical record book & project report	15
3.	Viva-voce	10
4.	**Total**	**50**

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MahavirMahavidyalaya, Kolhapur (Autonomous)

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(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE.**		
Part	**II**	Semester	**IV**
Course	**Elements of Machine Design**	Course Code	**Practical ADC43**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**04**	Contact Hours	**06 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To teach students how to apply the concepts of stress analysis, and material science to analyze, design or select commonly used machinecomponents.
ii)	To illustrate to students the variety of mechanical components available and emphasize the need to continue learning.
iii)	To teach students how to apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems.
iv)	To teach students how to apply the concepts of stress analysis, and material science to analyze, design or select commonly used machinecomponents.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Practical's	**CR**	**IH**
1.Selection of materials for various engineering applications showing there is codes, composition and properties.	04	75
2.Design and Drawing of Knuckle joint.		
3.Design and Drawing of flexible bushed pin type flanged coupling.		
4.Design of Power Screw.		
5.Selection of Belts as per the manufacturer's catalogue.		

6.Design of key.		
7.Design of shaft.		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Visits.

E) Course Outcomes:		**Blooms Taxonomy**
CO1	The students will demonstrate the ability to apply the fundamentals of stress analysis, theories of failure and material science in the design of machine components.	
CO2	The students will demonstrate the ability to make proper assumptions, perform correct analysis while drawing upon various mechanical engineering subject areas.	
CO3	Specifically, the students will demonstrate the preceding abilities by performing design shaft,pully ,coupling and screw.	

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	Practical (Lab-work)	25
2.	Submission practical record book & project report	15
3.	Viva-voce	10
4.	**Total**	**50**

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MahavirMahavidyalaya, Kolhapur(Autonomous)

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(New syllabus under Autonomy to be introduced from June, 2022 onwards)

A) Primary Information:			
Programme	**Advance Diploma (B. Voc.) AUTOMOBILE.**		
Part	**II**	Semester	**IV**
Course	**Machine Shop (II)**	Course Code	**Practical ADC44**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2022 – 23**
Total Credits	**04**	Contact Hours	**06 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	Identify and select various tools for holding, assembling or dismantling the work piece.
ii)	Carry out basic workbench such as marking,Milling,Shaping,Grinding ,Tapping,Slotting
iii)	Appreciate accuracy in engineering product to ensure work pieces fitting.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Practicals	**CR**	**IH**
1.To prepare process sheets with working drawings of all components.	04	75
2. To manufacture the components as per the drawing requiring at least four of the Following operations a) Milling, b) Shaping, c) Grinding, d) Tapping, e) Slotting		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Visits.

E) Course Outcomes:		Blooms Taxonomy
CO1	Produce a product through the given technical drawing.	
CO2	Use appropriate engineering tools and equipments in workshop project	

F) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	Practical (Lab-work)	25
2.	Submission practical record book & project report	15
3.	Viva-voce	10
	Total	**50**

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