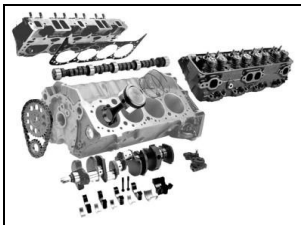	**Course Title**: **Engine Recondition Lab**		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course &Code: 15AT65P
	Type of Course: Tutorial and practice	Credit :03	Core/ Elective: **Core(practice)**
CIE- 25 Marks			SEE- 50 Marks

Prerequisites:

Knowledge of Automobile Engineering lab I&II.

Course Objectives:

Demonstrate Fault finding, dismantling, cleaning, inspection, rectifying and reassembling of components of Automobile Engine.

On successful completion of the course, the students will be able to attain CO:

Course Outcome		CL	Experiments linked	Linked PO	Teaching Hrs
CO1	Fault diagnosis of Engine.	***U/A/An/E***	1	2,3,4,6,10	**6**
CO2	Practice dismantling & cleaning of all parts/ systems of Engine.	***U/A/An/E***	2,3,7,10,	2,3,10	27
CO3	Practice Inspection, measuring and re-conditioning of Engine parts.	***U/A/An/E***	4,5,6,8,9,12,	2,3,10	27
CO4	Practice Re-assembling of engine parts and systems.	***U/A/An/E***	11,13,14	2,3,10	18
		Total sessions			**78**

COURSE PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Automobile transmission and control systems lab	-	3	3	1	-	**1**	-	-	-	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed

Course Content:

UNIT-I

Tutorials:

Tutorial class for every graded exercise should include the followings.

1. Precautions to be taken during conduction of each exercise.
2. Proper tools to be used and sequence to conduct each exercise.
3. Any measurements/adjustments to be made in each exercise.
4. Discussion on trouble shooting of each system.

UNIT-II

Lab exercises

Sl. No	List of Graded Exercises:	Hrs. Allotted.
1	Analyse the engine condition by checking exhaust gas using smoke meter/ exhaust gas analyser and OBD II/ Engine analyser / scan tools.	6
2	Inspect and Analyse the cylinder head condition after Dismantle, Cleaning and decarburizing.	9
3	Practice on Re-conditioning of valve mechanism –(Removing valve, valve seats and valve guides- Check for stem bend, Check the condition of valve spring , Measure the valve face angle , Recondition of valve using valve refacing machine).	9
4	Reconditioning of valve seat by using valve seat cutter kit/ vibro-centre kit & Valve lapping.	3
5	Check crack, warp-age in the cylinder head and practice surface grinding.	3
6	Measure the ovality and taperness of cylinder bore.	6
7	Open ended exercise:	3
8	Practice on cylinder ridge reaming and cylinder reboring process.	9
9	Practice on Cylinder Honing using honing machine.	3
10	Inspect and Service the Crank shaft, connecting rod and piston.	6
11	Assemble the engine by using specified torques.	9
12	Adjust valve timing and valve tappet clearance.	3
13	Setting of ignition timing or injection timing and start the engine.	6
14	Open ended exercise:	3
	Total Hrs.	**78**

Note:

1. Open ended experiments have to be performed using the skills learnt in the Laboratory.
2. These experiments could be extended versions of the standard experiments.
3. Lecturer should know the end results of open ended experiments and only acts as a guide and students has to establish the procedure and conduct experiments.

Examples : 1) Engine valve inspection.
2) Various Simple tests to see if there are any leaks in the crankcase.
3) Instant troubleshooting; most common problems and possible causes of engines.

Course Delivery:

The course will be delivered through tutorials, demonstration and hands on practices.

Important Note:

1. Overhauling includes Dismantling, Cleaning, Inspection, Repair / Replacement of worn parts, reassembling with necessary adjustments.
2. For every Exercise mention the Job Sheets.
3. The lab-record must have the following contents for each exercise :
   - Aim
   - Tools & Equipments required
   - Procedure
   - Precautions if any
   - Results / Reports
   - Troubling shooting chart.

Reference Books:

Sl No	Title of the book	Author Name	Publisher
01	Basic Automotive Servicing (4 Wheelers) - (with DVD), Diesel Fuel Injection Technician	-	National Instructional Media Institute, Chennai.(NIMI)
02	Automobile Engineering Practical	**N. Malhotra**	Computech Publications Ltd.
03	Maintenance of Automotive Engines	**Tim Gilles**	CENGAGE Learning.
04	Automobile Engineering Practices.	N.Malhotra	Asian publishers
05	Vehicle Maintenance &Garage Practice	Jigar A Doshi	PHI Learning,Delhi
06	Automotive Mechanics	W. H. Crouse & Anglin	Tata MCgraw-Hill
07	Automotive Engineering Engine Performance- Shop Manual	Ken Pickerill	CENGAGE Learning
08	Automotive Technology	Jack Erjavec	CENGAGE Learning
09	Automobile Engineering.	Harban Singh Rayath	S Chand
10	Charts and cut section models		

Useful Links:

http://www.e34.de/tips_tricks/haynes/02b.pdf

http://www.abss.k12.nc.us/cms/lib02/NC01001905/Centricity/Domain/2007/Engine%20Repair%20Study%20Guide.pdf

Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECTASSESSMENT	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two IA Tests (Average of two Tests)	10	Blue books	1,2,3,4
				Record writing (Average marks of each exercise to be computed)	10	Lab Records	1,2,3,4
				Activity	05	report	1,2,3,4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4
INDIRECTASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1 & 2 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3,4 Effectiveness of Delivery of instructions & Assessment

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Activity /Student activities.

SUGGESTED STUDENT ACTIVITY

1. Each student should submit report on any one of the following type of activities or any other similar activity related to the course. Before taking up, it should be approved by concerned Teacher and HOD.

   Sample Activities:

1. Inspect, analyse and rectify the problems in the existing engines in the laboratories and prepare a report.
2. Prepare the cut section/ working models of engine components.
3. Collect/ download the information's regarding the different types of OBD II and prepare a hand written report
4. Collect/ download the information's regarding the scan tools and prepare a hand written report.

MODEL OF RUBRICS FOR ASSESSING REVIEWS OF PROJECT FOR CIE

RUBRICS MODEL

Student Name:					Reg NO:	
RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	Unsatisfactory	Developing	Satisfactory	Good	Exemplary	Student Score
	1 Mark	2 Mark	3 Mark	4 Mark	5 Mark	
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	5
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	2
Average / Total marks=(4+5+3+2)/4=14/4=3.5=4						

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the given activity.

SCHEME OF EVALUATION

Note: Lab Record is compulsory for Practical Examination.

Serial no	Description	Marks
1	**Writing procedure** a) One exercise from list of exercises 1-6 b) One exercise from list of exercises 08-13	(05+05) = **10**
2	**Conducting & Performance** a) One exercise from list of exercises 1-6 b) One exercise from list of exercises 08-13	(15+15) =**30**
3	**Viva-voce**	**10**
	Total	**50**

Note: Open ended experiments are only for viva-voce.

LIST OF COMPONENTS REQUIRED

SL No	Description of Component/Tools/Equipments	Quantity
1	Four stroke multi cylinder Petrol engine with carburettor	02
2	Four stroke multi cylinder petrol MPFI engine	02
3	Four stroke multi cylinder Diesel Engine with inline pump	02
4	Four stroke multi cylinder Diesel Engine with turbo charger	02
5	Major tool kit	03
6	Compression gauge	03
7	Vacuum gauge	03
8	Cylinder Leakage Tester	02
9	Engine Analyzer, Scan Tools, OBD II Scanner	01
10	Two post lifter 3 ton capacity	01
11	Telescopic gauge , Outside Micrometer , Internal Micrometer , Depth micrometer, Vernier Calliper, Micrometer Set, Dial Bore Gauge	02 each

12	Engineers Stethoscope	02
13	Torque wrench, torque wrench dial gauge(Torque Angle Gauge)	02 each
14	Ultrasonic nozzle cleaning equipment	01
15	Decarbonising kit	01
16	Cylinder honing set	02
17	Feeler gauges	10
18	Magnetic spark plug socket	02
19	Diesel injector socket set	02
20	Oil filter remover	02
21	Universal flywheel puller	02
22	Timing belt tension gauge	02
23	Universal sprocket holding wrench	02
24	Engine timing & locking kit	02
25	Adjustable Valve Guide Cleaner	02
26	Valve Seat Cutting Kit	02
27	Ridge Reamer	02
28	Universal Puller for Wet Type Sleeves	02
29	Piston Ring Service Set (Piston ring compressor, Piston Ring Expander, Piston Ring Groove Cleaner)	02 each
30	Universal Piston Pin Remover & Installer	02
31	Valve spring compressor	04
32	Universal Pulley & Camshaft Holding Tool	02
33	Crankshaft Pulley & Camshaft Pulley Puller	02
34	Universal Cam Shaft Bearing Tool	02
35	Injector & Sensor Switch Socket Set	02
36	Transverse Engine Support Bar	02
37	Engine Stand	03
38	Radiator Pressure Tester Sets-	02
39	Anti-Freeze Coolant Tester	02

40	Fuel Injection Test Sets	02
41	Engine & Transmission Oil Pressure Testers	02
42	FIP test Bench along with a set of special tools for repairing & Testing different types of FIPs	01
43	FIP Bosch servicing kit	02
44	Air impact wrench	02
45	Smoke meter	01
46	Exhaust gas analyser	01