Government of Karnataka
Department of Technical Education

Diploma in Automobile Engineering.

C-25 Scheme of Studies

(Effect from the AY 2025-26)

Government of Karnataka

DEPARTMENT OF TECHNICAL EDUCATION

Curriculum Structure

I Semester Scheme of Studies-Automobile Engineering

Sl. No.	Teaching Department	Course Code	Course Name	Hours per week			Total Contact Hours/week	Credits	CIE Marks		Theory SEE Marks		Practice SEE Marks		Total Marks
				L	T	P			Max	Min	Max	Min	Max	Min	
Integrated Courses															
1	SC	25SC11I	Engineering Mathematics-I	4	0	4	8	6	50	20	50	20	-	-	100
2	ENG	25EG01I	Essential English Communication	4	0	4	8	6	50	20	-	-	50	20	100
3	ME	25ME01I	Computer Aided Engineering. Drawing	3	0	4	7	5	50	20	-	-	50	20	100
4	AT	25AT11I	Elements of Automobile Engineering.	4	0	4	8	6	50	20	50	20	-	-	100
Audit Course															
5	AT	25AT12T	Environmental Sustainability	2	0	0	2	2	50	20	-	-	-	-	50
6	Personality Development		NCC/NSS/YOGA/SPORTS...	Students are expected to engage in any one of these activities from 1st semester to 6th semester(No Credits)											
Total				**17**	**0**	**16**	**33**	**25**	**250**	**-**	**100**	**-**	**100**	**-**	**450**

Government of Karnataka
DEPARTMENT OFTECHNICAL EDUCATION

Curriculum Structure

II Semester Scheme of Studies- Automobile Engineering

Sl. No.	Teaching Department	Course Code	Course Name	Hours per week			Total Contact Hours/week	Credits	CIE Marks		Theory SEE Marks		Practice SEE Marks		Total Marks
				L	T	P			Max	Min	Max	Min	Max	Min	
Integrated Courses															
1	SC	25SC21I	Engineering Mathematics-II	4	0	4	8	6	50	20	50	20	-	-	100
2	CS	25CS01I	IT Skills	3	0	4	7	5	50	20	-	-	50	20	100
3	EE	25EE01I	Fundamentals of Electrical & Electronics Engineering.	3	0	4	7	5	50	20	-	-	50	20	100
4	AT	25AT21I	Vehicle Transmission and Stability	4	0	4	8	6	50	20	50	20	-	-	100
Audit Course															
5	AT	25AT22T	Indian Constitution	2	0	0	2	2	50	20	-	-	-	-	50
6	Personality Development		NCC/NSS/YOGA/SPORTS...	Students are expected to engage in any one of these activities from 1st semester to 6th semester (No Credits)											
Total				**16**	**0**	**16**	**32**	**24**	**250**	**-**	**100**	**-**	**100**	**-**	**450**

Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	**Automobile Engineering**	**Semester**	**I**
Course Name	Elements of Automobile Engineering	**Type of Course**	Integrated
Course Code	25AT11I	**Contact Hours**	8 hours/week (104 hours/semester)
Teaching Scheme	L: T:P- 4:0:4	**Credits**	6
CIE Marks	50	**SEE Marks**	50 (Theory)

1. **Rationale:** Make the students to appreciate the materials used in automobiles. Introduce the students to different fasteners and drives used in automobiles. Prepare the students to perform basic service and manufacturing activities.

2. **Course Outcomes:** At the end of the Course, the student will be able to:

CO-01	Make use of different measuring instruments following standard procedures.
CO-02	Identify the properties and applications of different materials used in automobiles.
C0-03	Illustrate the concept of different types of fasteners, bearings and drives in automobiles.
CO-04	Demonstrate the essential manufacturing process used in automobile industries.
CO-05	Illustrate the working of IC Engines and measure the different parameters of the vehicle and engine.

3. **Course Content:**

Week	**CO**	**PO**	**Theory (4 Hours per week)**	**Practice (4 Hours per week)**
1	1	1,4	**Units of measurement System-** Introduction, system of units-CGS, FPS, MKS and SI system. Derived units-area, volume and pressure, Conversion of units from one system to other system.	Practice on use of Vernier caliper, outside micrometer, inside micrometer, telescopic gauge. Calculate the area and volume of regular geometrical objects using measuring instruments.
2	2	1,4,5,7	**Engineering materials-** classification, ferrous materials-properties, types, applications. Cast iron-properties, types, applications. Steel-properties, types, applications. Non-ferrous metals-properties, types, Merits and Demerits, Copper-	Identify the different types of metals. Identify different Ferrous metals. Check and recognise the Physical properties of Ferrous metals.

			properties, applications.	
3	2	1,4,5,7	**Aluminum**-properties - application, **steel Alloys**-Concept, need, applications. **Copper alloys**-types, properties, applications. **plastics**-properties, types.	Identify different non-ferrous metals. Check and recognise the Physical properties of nonferrous metals.
4	2	1,4,5,7	**Thermoplastic**-properties, applications. thermoset plastic-properties, applications. Environmental effects of plastics. **Glass**- properties, applications. **Ceramics**- properties, applications, **Composite materials**- list types, applications, merits, and demerits.	Identification of different plastics, glasses, composites, and ceramics. Check and recognise the physical properties of different materials. Practice on riveting and de-riveting.
5	3	1,4	**Fasteners** –concept, types. **Riveting**- Introduction, types, butt joint and lap joint, applications. **Welding**-concept, list different types, applications. **soldering**- concept, applications. **brazing**-concept, applications.	Identify different parts of rivet and types of riveting. Practice on riveting and de-riveting. Practice on soldering process.
6	3	1,4	Screw thread terminology, Types of screw fastenings, Types of locking methods. Forms of screw threads- British standard Whitworth (B.S.W.) thread, square thread, ACME thread	Identify and Practice on removal and refitting of bolts, screws, and studs. Practice tightening fasteners with specified torque using a torque wrench. Practice locking bolts and nuts using different locking methods. Identification of different types of thread and check the pitch using a pitch gauge.
7	3	1,4	**Keys**-concept, types. Construction of Tapered sunk key and woodruff Key. Splines-applications. **Couplings**-concept, types. Unprotected type flange coupling-working, applications.	Practice on identification and replacement of different types of keys. Practice on removal and refitting of machine parts from splines. Practice on removal and refitting of flange coupling.
8	3	1,4	**Shaft**- concept, types, applications. **Power transmission** – introduction, types. Working of Belt drive - open and cross belt drives, working of chain drives, Working of gear drives – simple and compound gear trains. Comparison of belt drives, chain drives, gear drives and applications.	Identification of different types of belts, Practice on replacement of belts, and adjustment of belt tension. Practice on replacement and tension adjustment of Chain drives. Lubrication of chain drives. Calculation of speed ratio of belt, chain, and gear drive.
9	3	1,4	**Bearings**-need, types. Construction-shell bearing, ball bearing, roller bearing, thrust bearing, Applications.	Identify different parts of the bearing. Practice on checking, removing, and refitting shell and ball bearings using

				appropriate tools.
10	4	1,4	**Casting**-concept, list types, applications. Pattern- concept, list types. **Forging**-concept, list types, applications. **Extrusion**-concept, list types, applications.	Practice on making molds using molding sand. Practice on creating a pointed rod using the forging process.
11	5	1,4	**Automobile** – introduction, classification. Vehicle terminology – Wheelbase, wheel track, ground clearance, front and rear overhang, overall height, overall width, overall length, gross weight, Kerb weight. Chassis layout – 2-wheeler and 4-wheeler.	Measurement of wheelbase, wheel track, ground clearance, front and rear overhang, overall height, and overall width. Locate the engine & chassis number in a vehicle and get their impression (VIN).
12	5	1,4	**Engine terminologies** – bore, stroke, TDC, BDC, swept volume, clearance volume, total volume, and compression ratio. **IC engines** – introduction, classification.	Measurement of the bore, stroke length, swept volume, clearance volume, and total volume. Find the compression ratio.
13	5	1,4	Working of 4-stroke SI and CI engine, 2-stroke petrol engine, Comparison of 2 and 4 stroke engine, comparison of SI and CI engine.	Dismantling and assembly of single-cylinder petrol engine and identifying different components of the engine.

4. References:

1. Automobile Engineering vol-2, Kripal Singh Standard publications
2. Automobile Engineering, R B Gupta Satya Prakashan
3. Automotive Engines, S Srinivasan Tata McGraw-Hill
4. Automotive Technology, H M Sethi Tata McGraw-Hill
5.Automotive Mechanics Crouse and Anglin Tata McGraw-Hill
6. Automotive Engineering vol-2, Anil Chikara Satya Prakashan
7. The Automobile, Harbans Singh rayat S Chand
8. Automobile Engineering, Er.A.K. Babu, Er Ajit Pal Singh S Chand
9. Automobile Engineering, Er S.K. Gupta S. Chand
10. Automotive mechanics by W.H Crouse and Anglin
11. Automobile engineering by N.K Giri
12. Automobile engineering by Ramalingam K. K

Rubrics for Portfolio evaluation Level of Achievement						
Assessment Parameter		**Excellent (10)**	**Very Good (8)**	**Fair (6)**	**Poor (4)**	**Score**
AP1	**Organization of Report and Timely Submission**	Lab report is well organized as directed and submitted on time	Lab report is well organized but not submitted on time	Report contains few errors and not submitted on time them	Poor organization and late submission	
AP2	**Knowledge of Tools and Procedures**	Demonstrates deep knowledge of tools and procedures; answer the related questions with explanations and elaboration	Adequate knowledge of most tools and procedures; answer the related questions, but fails to elaborate	Superficial knowledge of tools and procedures; able to answer only some of the related basic questions	Lack of information about most of the tools and procedures; cannot even answer basic related questions	
AP3	**Team Working Skills**	Positive in interacting with all group members, encourages such interaction in others, and always sensitive to the abilities and feelings of others' contributions; Actively helps to identify group goals and works effectively to meet them in assigned roles	Interacts with all group members spontaneously and contributes in a way that is sensitive to the abilities and feelings of others; Demonstrates commitment to group goals and carries out assigned roles effectively	Interacts with other group members if prompted, but sometimes expresses opinions which are insensitive to the abilities and feelings of others; Demonstrates commitment to group goals, but has difficulty performing assigned roles	Rarely interacts within a group, even with prompting, and shows frequent lack of sensitivity to others' feelings and abilities in opinions expressed; Shows little commitment to group goals and fails to perform assigned roles	
AP4	**Result Analysis and Data Interpretation**	Excellent insight and well-focused results and discussion; Data completely and appropriately interpreted and no over interpretation	Adequate insight but missed some important points in results and discussion; Interpreted most data correctly but some conclusions may be suspect or over-interpreted	Little insight and analysed only the most basic points; Interpreted some data correctly but significant errors, omissions still present.	No insight and entirely missed the point of the experiment; Little or no attempt to interpret data or over interpreted data.	
AP5	**Task Management**	Very Effective in managing the assigned task and allow experimenter(s) to achieve all goals	Somewhat effective in managing the assigned tasks and allow experimenter(s) to achieve most goals.	Somewhat ineffective in managing the assigned task and allow experimenter(s) to achieve only few goals.	Very ineffective and would not allow experimenters to achieve any goals	

5. CIE and SEE Assessment Methodologies:

Sl. No	Assessment	Test Week	Duration (minutes)	Max marks	
1	CIE-1 Theory Test	4	90	50	**Average of all CIE=50 Marks**
2	CIE-2 Practice Test	7	180	50	
3	CIE-3 Theory Test	10	90	50	
4	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of all the activities through Rubrics	1-13	-	50	
Total Continuous Internal Evaluation (CIE)					50 Marks
Semester End Examination (SEE) -Theory			90	50	50 marks
Total Marks					**100 Marks**
Note: *1) Minimum marks to pass in CIE & SEE is 40% individually* *2) Minimum number of activities to be performed are two.*					

5. SEE - Theory Assessment Methodologies

Sl. No	SEE – Theory Assessment	Duration	Exam Paper Max marks	Exam Paper Max Marks scale down to (Conversion)	Min marks to pass
1.	Semester End Examination-Theory	3 Hours	100	50	20

6. CIE Theory Test model question paper:

Program	**Automobile Engineering**		**Semester I**	
Course Name	Elements of Automobile Engineering		**Test**	I
Course Code	25AT11I	**Duration:**90 min	**Marks**	50
Name of the Course Coordinator:				
Note: Answer any one full question from each section. Each full question carries 25 marks.				

Q. No	**Questions**	**Cognitive Level**	**CO**	**Ma4rks**
	Section - 1			
1	a) Convert 100mm into meters. -5M b) Classify the engineering materials used in automobiles -10M c) Compare Ferrous and non-ferrous metals -10M	L2	1, 2	25
2	a) Convert 10 N/mm2 into kg/Cm2. -10M b) Compare thermosetting plastic and thermoplastic -5M c) Classify composites -10M	L2	1, 2	
	Section - 2			
3	a) Explain the screw thread terminology with a neat sketch -10M b) Explain double nut locking type method with sketch-10M c) Compare temporary and permanent fastenings -5M	L2, L3	3	25
4	a) Explain the open belt drive with a neat sketch – 10M b) Explain the compound gear drive with a neat sketch -10M c) Compare Belt drive and chain drive – 5M	L2, L3	3	

Note: *Each question may have one, two or three subdivisions. Optional questions in each set shall carry the same weightage of marks, cognitive level and course outcomes.*

Course Coordinator **Programme Coordinator.** **IQAC Chairman**

7. CIE-1 Practice Test model question paper:

Program	**Automobile Engineering**			**Semester**	I
CourseName	Elements of Automobile engineering			**Test**	II/IV
Course Code	25AT11I	**Duration**	180 min	**Marks**	50
Name of the Course Coordinator:					
Questions				**CO**	**Marks**
1. Find the volume of the cylindrical object using Vernier caliper. 2. Perform riveting and de-riveting operation on the given job. OR 1. Measure the dimension of the given object using inside and outside micrometers. 2. Replace the given chain drive, adjust tension and lubricate the same.				1, 3 1, 3	50 50
Scheme of assessment: a) Procedure writing- 3+3=6 b) Conduction-10, troubleshoot-3/calculation-3, results-2, 10+3+2 (15 x 2 experiments = 30) c) Viva voce - 10 d) Portfolio evaluation of practical record – 4					
				Total Marks	**50**

Signature of the Course Coordinator **Signature of the HOD**

8. Suggestive Activities:

The List is only shared as an Example and not inclusive of all possible activities of the course. Student and Faculty are encouraged to choose activities that are relevantto the topic and on the availability of such resources at their institution.

Sl. No.	**Suggestive Activities for Tutorials**
01	Collect information on different measuring instruments and prepare a report.
02	Collect different samples of materials and descriptions of each.
03	Collect different types of bearings, and compare and list their applications.
04	Collect the specifications of different vehicles
05	Collect different types of gear and list their application
06	Collect different components of the IC engine and list their features.

9. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1	Collection of data/ Material	Limited information	Collects basic information	Collects more information	Collects developed information	Collects a great deal of information	8
2	Quality of data	Irrelevant	Less relevant	Needs improvement	Satisfactory	Very relevant	6
3	Quality of report	Not planned	Less organized	Moderately organized	Organized	As per the standards	4
4	Timely submission	Late submission	Submits after due date	Submits after reminders	Submit after a reminder	On time submission	2
5	Data references	No references.	Irrelevant references.	Given References not from authentic source.	Given references are from authenticated sources.	Enough authenticated references are given.	6
	Example: Total Marks=(8+6+4+2+6)=26						**26/50**

Note: *a) The respective course coordinator shall define dimension and Descriptor as per the activities*
b) Activities should be typed report.

11. Equipment/software list with Specification for a batch of 30 students

SN	Particulars	Specification	Quantity
1	Open end spanner set.	Drop forged (6 to 32mm) 12 pc	02
2	Ring spanner set.	Drop forged (6 to 32mm) 12 pc	02
3	Tubular spanner set.	Drop forged (6 to 32mm) 12 pc	02
4	Socket set.	Drop forged (6 to 32) 27 pc	02
5	Allen key set.	1.5 to 10mm (9 pc)	02
6	Pipe wrench.	10 inches	02
7	Adjustable screw wrench.	0 to 30mm 10 inch	01
8	Adjustable screw wrench	0 to 19mm 6 inch	01
9	Torque wrench.	20 to 100Nm	02
10	Water pump pliers.	250mm	02
11	Vice grip pliers.	250mm	02
12	Combination pliers.	200mm	02
13	Nose pliers.	165mm	02
14	Circlip pliers. (inside, outside, straight bent)	180mm	02 each
15	screw driver (star, flat).	8 pc	02 set
16	Hammers (ball peen, sledge).	500g, 5kg	02 each
17	Mallets.	Steel handle 500g	02
18	Wheel spanners.	18 mm	02
19	Tyre levers.	18 inches	02 each
20	Pneumatic wrench.	340 Nm	02
21	Electrical wrench.	188Nm	02
22	Spark plug spanner.	6-22 mm	02
23	Chisels.	12 to 38mm 5pc	02 each
24	Punches (hallow, solid)	7 pc	02 each
25	scrapers.	Triangular scrapers	02 each

26	Files.	Soft grip handle set of 9	02 each
27	Speed handle.	½ inch	02
28	Oil can.	½ pint capacity	02
29	Tyre pressure gauge.	12x5x2 cm	02
30	Compression gauge.	28x25x5 cm	02
31	Vacuum gauge.	38x89x67 mm	02
32	Feeler gauge.	20x20x5 cm	02
33	Bench vice.	6 inches jaw opening	02
34	Leg vice.		01
35	Arbor press.	1 ton capacity	01
36	Two-wheeler lifting platform.	Suitable up to 500Kg	01
37	Spark plug cleaning and testing machine.	Adjustable Spark Tester with Two Spark Plug Socket, 100 240v with Protective Cover Ignition Tester. Heat Resistance Spark Tester Automotive Tools for 10mm,14mm &16mm Spark Plug	01
38	Valve spring compressors.	C Type	02
39	Oil filter wrench.	Chain type & Belt type	01
40	Trays. (1X1mt).	1X1mt	08
41	Two stroke single cylinder petrol engine	50 to 150CC engine	02
43	Four stroke single cylinder petrol engine	150 CC air cooled engine	02
43	Four stroke Multi cylinder petrol engine	800 - 1500 CC water cooled engine	02
44	Four stroke single cylinder diesel engine	350-500CC water cooled engine	02
45	Four stroke Multi cylinder diesel engine	1.5 to 2L engine	02
46	Two-wheeler chassis	Motor cycle	01
47	Three-wheeler chassis	Auto rickshaw	01
48	Four-wheeler chassis	LMV	01
49	High pressure car washer.	Operating pressure -4 to-45bar, Motor rating – 2.5 to 4.5hp, Flow rate -015 to 15 LPM.	01
50	High pressure greasing bucket.	Bucket capacity – 40L, Grease transmission rate – 0.7to 0.85 LPM.	01
51	Air compressor.	Two stages, 3 Phase, tank capacity – 200 to 300L, Discharge pressure – 10 to 12 Bar.	01
52	Bearing Puller	3 Jaw	01
53	Two post lift.	Hydraulic type, Lifting capacity – 4 Tons, Min. lifting height – 100 to 115 mm, Maximum lifting height – 1700 to 1800mm	01
54	Hand greasing gun (lever type, push type).	Lever & Push type	02 each
55	Vulcanizing machine.	Operating voltage 230V	02
56	Steel props	Capacity 500 to 600 Kg.	08
57	Major Mechanic Tool kit	Full set	02
58	Automatic tyre changer	Air Requirement – 8 to 10bar, Internal Rim Clamping -12-to-23-inch, External Rim Clamping- 10-to-20-inch, Maximum Tire Diameter-40	01

		to 41 inches.	
59	Vernier Caliper	15 cm, LC- 0.02	01
60	Dial Vernier Caliper	15 cm, LC – 0.01	01
61	Screw gauge	0-50mm,	01
62	Inside micrometer	0-50mm	01
63	Telescopic gauge	10mm to 100mm wit accessories	1 set
64	Dial bore gauge	0-10mm	01
65	Combination set	-	01
65	Hydraulic jack	2 tones	02

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Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	**Automobile Engineering**	**Semester**	**II**
Course Name	**Vehicle Transmission and Stability**	**Type of Course**	Integrated
Course Code	25AT21I	**Contact Hours**	8 Hrs./week
Teaching Scheme	L: T:P 4:0:4	**Credits**	6
CIE Marks	**50**	**SEE Marks**	**50 (Theory)**

4. Rationale:

The power transmission from engine to wheel decides the vehicle's efficiency and handling. The student should appreciate the need for each component of power transmission system. The student should justify the constructional features of each component of transmission system. The student should be able to troubleshoot and service each transmission and control system component for the safe and efficient use of automobiles.

5. Course Outcomes: At the end of the Course, the student will be able to:

CO-01	Perform maintenance and troubleshooting activities of the transmission system and its components.
CO-02	Perform maintenance and troubleshooting activities for the steering system and its components.
CO-03	Perform maintenance and troubleshooting activities for the Braking system and its components.
CO-04	Perform maintenance and troubleshooting activities for the Suspension system, Wheels, and tyres.

6. Course Content

WEEK	**CO**	**PO**	**Theory**	**Practice**
1	1	1,2,4	**Clutch-** Introduction, purpose**,** requirements, principle, classifications. Clutch Lining materials. Construction and working of -single plate coil spring type & Diaphragm type clutch.	Removal and refitting of clutch from vehicle. Servicing of Coil Spring type single plate clutch. Trouble shooting of single plate clutch.
2	1	1,2,4	Construction and working of Centrifugal clutch and Multi-plate	Servicing of centrifugal and multi-plate clutch.

			clutch. List types of clutch operating mechanisms, Clutch adjustment.	Practice on clutch pedal free play.
3	1	1,2,4	**Gearbox**-Necessity, classification. Construction and working of constant mesh gear box and synchromesh gear box, Synchronizer-working, list types of gear selector mechanism, working of floor mounted gear shift mechanism.	Servicing of gear box and find gear ratios. Trouble shooting of synchromesh gear box.
4	1	1,2,4	**Propeller shaft**-function, construction of propeller shaft, **Slip joint**-function, **U-Joints**-Need-Construction & working of cross or spider type and flexible ring type U Joints. **Constant velocity joints**-need, types. working of Rzeppa joint and Tripod joint.	Servicing of a propeller shaft & universal joint. Practice on removal and refitting of front axles. Check constant velocity joint for wear & tear.
5	1	1,2,4	**Final drive**- Purpose, types. **Differential**- necessity, principle. construction & working of differential.	Overhauling of differential. Practice on checking and adjustment of Backlash. Calculate the final drive gear ratio.
6	1	1,2,4	Construction and operation – hotch kiss and torque tube drive, **Rear axle**-types of loads acting, Construction of fully floating, semi-floating and ¾ floating.	Practice on servicing of semi-floating and full floating axles. Trouble shooting of axles.
7	2	1,2,4	**Front-Axle**-types, construction of live (drive shaft)-dead axle (conventional), stub axles-types **Steering-system**-purpose, requirements, List types of steering mechanisms, Ackerman mechanism-layout-merits and demerits, **steering gear box**-need, List types. construction and working of Rack & Pinion Steering gear box.	Overhauling of a front axle & hub greasing. Identification different parts of steering mechanism. Servicing of rack & pinion type of steering. Trouble shooting of rack and pinion steering gear mechanism.
8	2	1,2,4	Construction and working of worm and re-circulating ball nut type steering gear box, **Steering geometry**-concept,	Servicing of worm and recirculating ball nut type steering. Check and adjust the wheel alignment of vehicle.

			Meaning and need of camber-caster-king pin inclination-combined angle and toe in and toe out.	
9	3	1,2,4	**Braking system**-purpose, Requirements of automobile brakes, list types of braking systems, Layout of hydraulic braking system, Construction and working of Tandem master cylinders.	Adjustments of mechanical brakes of two-wheeler. Servicing of Tandem master cylinder.
10	3	1,2,4	**Wheel cylinder** –list types, construction and working of double acting wheel cylinder, **Drum brakes**-construction and working of Internal expanding shoe brakes, trailing and leading shoes, shoe materials, **Disc brakes** –List types, construction and working of floating caliper type disc brakes, merits and limitations of disc brakes.	Bleeding of hydraulic brake system, free-play & brake shoe adjustments. Servicing & trouble shooting of a drum brake & Disc brake.
11	4	1,2,4	**Suspension system**-functions, Requirements, Construction and working of rigid axle suspension, McPherson strut, double wishbone, trailing link and Semi-independent suspension systems.	Servicing of rigid axle and independent suspension system. Troubleshooting of suspension system.
12	4	1,2,4	**Springs**-List types, construction of leaf spring, coil spring, and Torsion bar, **Stabilizer bar**-need-construction and working, sprung and un sprung weight-concept. **shock absorber**-functions, Working of Telescopic shock absorber.	Servicing of leaf spring. Checking the stiffness of coil spring. Removing and refitting of telescopic shock absorber.
13	4	1,2,4	**Wheels**-requirements-types, Constructional details-wire-disc-alloy wheel. **Tires**-function-types-construction-tube-tubeless, radial type, treads pattern – need, aspect ratio and	Practice on removing and refitting of wheel from vehicle and identify tyre and disc specifications. Practice on applying Hot and cold tyre puncture Check and repair of puncture in tube

			specifications.	less tyre. Check and adjust wheel balancing.

4. References:

Sl., NO	Title of the book	Author	Publisher
1	Automotive Mechanics	W. H. Crouse & Anglin	Tata MC Graw-Hill
2	Automotive Technology	N.K. Giri	Khanna publications
3	The Automobile Engineering Vol-2	K.M Gupta	Umesh publications
4	Automotive Technology	Jack Erjavec	CENGAGE Learning
5	Automobile Engineering	K.M Gupta	Umesh publications
6	Automobile Engg Vol I	Kirpal Singh	Standard publication
7	Automobile Engineering	**Er S K Gupta**	S Chand
8	Automobile Engineering	Er A K Babu Er Ajit pal singh	S Chand
9	Automobile engineering	R B Gupta	Kanna Publications
10	Automotive engineering Vol-II Power Transmission.	Anil Chikara	Satya Prakashan.

6. Reference URLs:

- https://www.youtube.com/watch?v=pqF-aBtTBnY
- https://www.youtube.com/watch?v=TcYsV063lk8
- https://www.youtube.com/watch?v=6BaECAbapRg
- https://www.youtube.com/watch?v=zd69cDTZDco
- https://www.youtube.com/watch?v=kpVdQ8CIFsI
- https://www.youtube.com/watch?v=agLa0A8GAfc
- https://www.youtube.com/watch?v=QPaUJfA1KsY
- https://www.youtube.com/watch?v=vOo3TLgL0kM
- https://www.youtube.com/watch?v=IKywZ730JFs
- https://www.youtube.com/watch?v=gIGvhvOhLHU
- https://www.youtube.com/watch?v=pmWbei6beBg
- https://www.youtube.com/watch?v=R-hk9NvFang
- https://www.youtube.com/watch?v=SOgoejxzF8c

- https://www.youtube.com/watch?v=8qeaNQABPQk
- https://www.youtube.com/watch?v=bMg_j5_AGMg
- https://www.youtube.com/watch?v=bnc3VnQ8kUY
- https://www.youtube.com/watch?v=bBwQ-UiveTs
- https://www.youtube.com/watch?v=oUchfOF6EMs
- https://www.youtube.com/watch?v=uTqU35K_8AU

Rubrics for Portfolio evaluation Level of Achievement						
Assessment Parameter		**Excellent (10)**	**Very Good (8)**	**Fair (6)**	**Poor (4)**	**Score**
AP1	**Organization of Report and Timely Submission**	Lab report is well organized as directed and submitted on time	Lab report is well organized but not submitted on time	Report contains few errors and not submitted on time them	Poor organization and late submission	
AP2	**Knowledge of Tools and Procedures**	Demonstrates deep knowledge of tools and procedures; answer the related questions with explanations and elaboration	Adequate knowledge of most tools and procedures; answer the related questions, but fails to elaborate	Superficial knowledge of tools and procedures; able to answer only some of the related basic questions	Lack of information about most of the tools and procedures; cannot even answer basic related questions	
AP3	**Team Working Skills**	Positive in interacting with all group members, encourages such interaction in others, and always sensitive to the abilities and feelings of others' contributions; Actively helps to identify group goals and works effectively to meet them in assigned roles	Interacts with all group members spontaneously and contributes in a way that is sensitive to the abilities and feelings of others; Demonstrates commitment to group goals and carries out assigned roles effectively	Interacts with other group members if prompted, but sometimes expresses opinions which are insensitive to the abilities and feelings of others; Demonstrates commitment to group goals, but has difficulty performing assigned roles	Rarely interacts within a group, even with prompting, and shows frequent lack of sensitivity to others' feelings and abilities in opinions expressed; Shows little commitment to group goals and fails to perform assigned roles	
AP4	**Result Analysis and Data Interpretation**	Excellent insight and well-focused results and discussion; Data completely and appropriately interpreted and no overinterpretation	Adequate insight but missed some important points in results and discussion; Interpreted most data correctly but some conclusions may be suspect or over-interpreted	Little insight and analysed only the most basic points; Interpreted some data correctly but significant errors, omissions still present.	No insight and entirely missed the point of the experiment; Little or no attempt to interpret data or overinterpreted data.	
AP5	**Task Management**	Very Effective in managing the assigned task and allow experimenter(s) to achieve all goals	Somewhat effective in managing the assigned tasks and allow experimenter(s) to achieve most goals.	Somewhat ineffective in managing the assigned task and allow experimenter(s) to achieve only few goals.	Very ineffective and would not allow experimenters to achieve any goals	

7. CIE Assessment Methodologies

Sl. No	CIE Assessment	Test Week	Duration (minutes)	Max marks	
1.	CIE-1TheoryTest	4	90	50	Average of all CIE=50 Marks
2.	CIE-2Practice Test	7	180	50	
3	CIE-3TheoryTest	10	90	50	
4.	CIE-4Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of all the activities through Rubrics	1-13		50	
				Total	**50 Marks**

SEE Theory Assessment Methodologies

Sl. No	SEE – Theory Assessment	Duration	Exam Paper Max marks	Exam Paper Max Marks scale down to (Conversion)	Min marks to pass
1.	Semester End Examination-Theory	3 Hours	100	50	20

8. CIE Theory Test model question paper

Program	**Automobile Engineering**			**Semester - II**	
Course Name	**Vehicle Transmission and Stability**			**Test**	**I/III**
Course Code	25AT21I	**Duration**	**90 min**	**Marks**	**50**
Name of the Course Coordinator:					
Note: Answer any one full question from each section. Each full question carries equal marks.					

Q.No	Questions	Cognitive Level	Course Outcome	Marks
	Section - 1			
1	a) Classify the types of clutches. 5M b) Explain the working of Centrifugal clutch. 10M c) Explain the construction of Diaphragm Spring clutch. 10M	L2	1	25
2	a) List requirements of a good clutch. 5M b) Explain working of Single plate clutch. 10M c) State the troubles, causes and remedies of single plate clutch.	L2	1	
	Section - 2			

3	a) State the necessity of gearbox. 5M b) Explain working of Synchromesh gearbox. 10M c) Explain the construction of propeller shaft. 10M	L3	1	25
4	a) State the functions of universal joint and slip joint. 5M b) Explain Construction of cross or spider universal joint. 10M c) Explain working of gear selector mechanism. 10M	L3	1	
Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.				

Signature of the Course Coordinator **Signature of the HOD** **Signature of the IQAC**

9. CIE-1 Practice Test model question paper

Program	**Automobile Engineering**			**Semester**	**II**
Course Name	**Vehicle Transmission and Stability.**			**Test**	**II/IV**
Course Code	25AT21I	**Duration**	**180 min**	**Marks**	**50**
Name of the Course Coordinator:					
Questions				**CO**	**Marks**
1. Service and trouble shoot the given clutch. 2. Overhauling of differential with backlash adjustment & calculate the gear ratio. OR 3. Servicing of the given gearbox and finding the gear ratios. 4. Servicing of Propeller shaft				**1**	**50**
Scheme of assessment: a) Procedure writing. 3+3=6 b) Conduction/ Trouble shoot/ Calculation and result=10+3+2=15(15x2 Expressions=30) c) Viva -voce 10M d) Portfolio evaluation of practical record 4M					
				Total Marks	**50**

Note: CIE1 Experiment from 1 to 7 weeks

Signature of the Course Coordinator **Signature of the HOD**

10. Suggestive Activities for Tutorials:

The List is an example and not inclusive of all possible activities of the course. Student and Faculty are encouraged to choose activities that are relevant to the topic **Two activities**, each for **50 marks** should be evaluated with proper rubrics.

Sl.No.	Suggestive Activities for Tutorials
01	Visit authorized service station for four-wheeler and prepare a service station layout
02	Collect different types of clutches and prepare a report.
03	Visit nearby garage and collect information on Different types of gear boxes and prepare a report.
04	Visit nearby garage and collect information on Different types of final drives (single reduction and double reduction) and prepare a report.
05	Visit nearby service station and collect information on Different types of steering gear boxes.
06	Visit tyre sale show room and prepare a detailed report containing information on tread pattern, radial, bias, aspect ratio etc.

11.Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1	Collection of data/ Material	Limited information	Collects basic information	Collects more information	Collects developed information	Collects a great deal of information	8
2	Quality of data	Irrelevant	Less relevant	Needs improvement	Satisfactory	Very relevant	6
3	Quality of report	Not planned	Less organized	Moderately organized	Organized	As per the standards	4
4	Timely submission	Late submission	Submits after due date	Submits after reminders	Submit after a reminder	On time submission	2
5	Data references	No references.	Irrelevant references.	Given References not from authentic source.	Given references are from authenticated sources.	Enough authenticated references are given.	6
	Example: Total Marks=(8+6+4+2+6)=26						**26/50**

Note: Dimension and Descriptor shall be defined by the respective course coordinator as per the activities

12. Equipment/software list with Specification for a batch of 30 students:

Sl.No.	Particulars	Specification	Quantity
01	Major mechanic tool kit		4
02	Bearing Puller	2leg,3leg pullers	2each
03	Nylon mallet	1.5 "	4
04	Ball peen hammer	2lb	4
05	Steel props		6
06	Torque wrench (0-200 Nm)		1each
07	Arbor press	2 t0n capacity	1
8	Hydraulic press (20 Tons)		1
10	Hydraulic trolley jack	2 ton	1
11	Dial gauges with magnetic stand, feeler gauges,		1
12	Air compressor	Multi stage 200liters tank	1
13	Electronic Tyre inflators		1
14	Two post hoists	4 ton	1
15	Single plate clutches (Coil & Diaphragm Spring type)	4-wheeler	4
16	Multi plate clutch	2-wheeler	4
17	Gear boxes (constant & synchromesh mesh)	4-wheeler	4
18	Transfer case	4-wheeler	4
19	Propeller shaft assembly	4-wheeler	4
20	Rear axle assembly with wheels	4-wheeler	4
21	Front axle assembly with wheels	LCV	4
22	Steering gearbox assemblies (different types)	4-wheeler	1each
23	Chassis frame with Independent & leaf spring suspension system	4-wheeler	1
24	Mechanical brake assemblies	4-wheeler	1
25	Hydraulic brake system.	4-wheeler	1
26	Master Cylinder-Single piston and Tandem master cylinder.	4-wheeler	4
27	Wheel cylinders-single piston and double piston.	4-wheeler	4
28	Drum brake assemblies.	4-wheeler	4
29	Disc brake assemblies	4-wheeler	4
30	Trainer kits of transmission components.	4-wheeler	1 each
31	Hydraulic Brake trainer kits	4-wheeler	1