

3RD SEMESTER



Government of Karnataka
DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

Curriculum Structure

III Semester Scheme of Studies- Diploma in Automobile Engineering

Sl. No.	Course Category /Teaching Department	Course Code	Course Name	Hours per week			Total contact hrs /week	Credits	CIE Marks		SEE Marks		Total Marks	Min Marks for Passing including CIE	Assigned Grade	Grade Point
				L	T	P			Max	Min	Max	Min				
Integrated Courses																
1	P/AT	20AT31P	Automobile Chassis and Transmission System	3	1	4	8	6	60	24	40	16	100	40		
2	P/AT	20AT32P	Automotive Electrical System	3	1	4	8	6	60	24	40	16	100	40		
3	P/AT	20AT33P	Thermal Engineering and Engine Testing	3	1	4	8	6	60	24	40	16	100	40		
4	P/AT	20AT34P	Automotive Manufacturing Processes	3	1	4	8	6	60	24	40	16	100	40		
Audit Course																
5	AU/KA	20KA31T	ಕಾರ್ನಾಟಕ ಸಿಂಚನ-II/ಬಳಕೆಕ್ಷಯ-II	2	0	0	2	2	50	20	-	-	50	20		
Total				14	4	16	34	26	290	116	160	64	450	180		

*PC: Programme Core:: AU-Audit Course:: KA: Kannada:: L: Lecture:: T: Tutorial:: P: Practice



Government of Karnataka
DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

Programme	Automobile Engineering	Semester	III
Course Code	20AT31P	Type of Course	Programme Core
Course Name	Automobile Chassis and Transmission	Contact Hours	8 hours/week 104 hours/semester
Teaching Scheme	L:T:P: 3:1:4	Credits	6
CIE Marks	60	SEE Marks	40

1.Rationale:

Automobile chassis and transmission forms the core of Automobile Engineering. The course is designed to impart knowledge and skills regarding chassis and transmission that make a complete automobile. The major systems include clutch system, transmission system, drive system, steering mechanism, suspension system, braking system and wheels and tyres without which propulsion of vehicle is not possible.

2. Course Outcomes/Skill Sets: At the end of the course the student will be able to:

CO-01	Examine a given chassis frame, document all frame measurements, compare and align the frame to predefined standards.
CO-02	Repair and/or service a given transmission system, steering system, braking system, suspension system and braking system.
CO-03	Check wheel alignment for a given vehicle and perform the alignment to pre-defined standards.
CO-04	Design or identify alloy wheels after studying the chassis frame and demonstrate repair and replacement of tyres for a given vehicle.

3. Course Content

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			3 hours/week	1 hour/week	4 hours/week (2 hours/batch twice in a week)
1	1,2	1,2,4	1. Frames- purpose- loads acting - types -construction-ladder type-x type-integral, sections used in frames- Channel-Box-Tubular. 2. Materials used for frames & sub frames-need. Checking the alignment of chassis frame. 3. Clutch-Requirements- Classifications. Principle of friction clutch, Clutch Lining materials.	Refer Table 1.	1.a) Instruction on Personal Protection Equipment, Workshop Safety, First Aid, Safety Charts of dos and Don'ts in work area. b) Identification of different sections of chassis frame. 2.a) Analyse different loads acting on the frame. b) Checking the alignment of chassis frame and align it to the predefined standards.
2	2	1,2,4	1. Construction and working -single plate (Coil Spring type & Diaphragm type)	Refer Table 1.	1. Service & troubleshoot a single plate clutch (coil spring type) with faults,

			2.Construction and Working of Centrifugal clutch and Multiplate clutch. 3.Clutch adjustment, clutch troubles and their causes.		causes and remedies. 2. a) Service and troubleshoot a centrifugal clutch by removing it from the vehicle with faults, causes and remedies. b) Clutch adjustment - free play adjustment – adjustment of lever. Replacement of clutch cable.
3	2	1,2,4	1. Gearbox -Necessity-classification. 2. Construction and working of synchromesh gear box. Comparison of synchromesh gear box with other type. 3.Synchroniser-need-construction and working.	0	1. Service & troubleshoot of a multiplate clutch by removing it from the vehicle with faults causes and remedies. 2. Overhauling of a 2-wheeler gearbox & calculation of gear ratio w.r.t number of teeth. (3HRS)
4	2	1,2,4	1. Gear box troubles shooting and their causes. 2. Planetary gear train-construction and working. 3.Front Axle – Types – Construction – Materials - Live (drive shaft) - Dead axle (conventional), Stub axles - Types - construction.	Refer Table 1.	1. Overhauling of a synchromesh gearbox & calculation of gear ratio w.r.t number of teeth. Gearbox troubles shooting and their causes. 2. Demonstration of servicing of planetary gear train/video.
5	2	1,2,4	1. Steering system -mechanisms-types –Ackerman mechanism, steering gear box-need-types. 2. Construction and working- Rack & Pinion 3. Construction and working of recirculating ball type steering gearbox.	Refer Table 1.	1. Overhauling of a front axle & hub greasing. 2. Overhauling of rack & pinion type of steering system.

6	2	1,2,4	<p>1. Steering geometry-definition, define and explain-camber-caster-knuckle pin inclination</p> <p>2. Define and explain-combined angle toe in and toe out, correct steering angle, under steer and over steer</p> <p>3. Define and explain-Wheel base, wheel track, Toe-in, Toe-out, over length, over all height, front over-hang, rear over-hang, ground clearance.</p>	Refer Table 1.	<p>1. Overhauling of a Worm &nut/ Recirculating steering system with different steering gear box with backlash, end-play Adjustment.</p> <p>2.a) Practice on wheel balancing.</p> <p>b) Measurement of Wheel base, wheel track, Toe-in, Toe-out, overall length, over all height, front over-hang, rear over-hang, ground clearance.</p>
7	2	1,2,4	<p>1. Define and explain-Cornering force, self-righting torque, steering linkages, special steering columns (tilt, length & collapsible).</p> <p>2. Wheel alignment and wheel balancing-need- procedure.</p> <p>3. Propeller shaft - function - construction, universal joints & slip joints.</p>	Refer Table 1.	<p>1. Practice on checking of wheel alignment and adjustment (computerized/mechanical) & prepare the detailed trouble shooting chart.</p> <p>2. Servicing of a propeller shaft & universal joint.</p>
8	2	1,2,4	<p>1. Function- types construction & working - cross or spider type - flexible ring type - Rzepa joint - Tripod joint.</p> <p>2. Final drive- Purpose- types. Differential- necessity- principle</p> <p>3. Differential - construction & working. backlash, differential lock, inter-axle differential, transaxle types.</p>	Refer Table 1.	<p>1. Checking of constant velocity joint for wear & tear and replace it with new one.</p> <p>2. Overhauling of differential with backlash adjustment & calculate the gear ratio.</p>
9	2	1,2,4	<p>1. Rear axle- loads acting- types - construction and operation - hotch</p>	Refer Table 1.	<p>1. Servicing and troubleshooting of Rear axle of fully floating axle housing.</p>

			kiss - torque tube drive, rear axle drive. 2. Construction of rear axle shaft supporting- fully floating and semi floating arrangements, axle housings, trouble shooting. 3. Brakes - Type. Internal expanding Drum Brake- Construction & Working. Disc Brake (Calliper types) - Construction & Working (slider calliper type). Parking Brake- Types-Operating Mechanism.		2. Servicing and troubleshooting of Rear axle of semi -floating axle housing.
10	2	1,2,4	1. Hydraulic Brakes- principle. Master Cylinder- Working. 2. Tandem Master Cylinder- working. 3. wheel cylinder- Types- Working.	Refer Table 1.	1. Servicing & trouble shooting of a drum brake & Disc brake. 2. Servicing of a Tandem master cylinder.
11	2	1,2,4,7	1. Bleeding of brakes- Brake lining materials- Brake adjustment. 2. Suspension System - Construction & Working of Leaf spring and Coil Spring Suspension system. 3. Working of - Hydraulic Suspension & Telescopic suspension.	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Bleeding of hydraulic brake system, free-play & brake shoe adjustments. 2. Overhauling leaf spring & re-cambering.
12	2,3,4	1,2,4,7	1. Working of Independent Suspension- Front Wheel & rear Wheel.	Refer Table 1, Study the latest technological changes in	1. Overhauling of an independent suspension system. 2. a) Practice on using different jacks to remove

			2. Wheels - Types of wheels, construction, structure and function, wheel dimensions. 3. Constructional details-wire-disc. Alloy wheel- Construction, choosing right alloy wheel for the vehicle, changing of the steel wheel to alloy wheel.	this course in this course and present the impact of these changes on industry.	wheels from (different) vehicle(s).
13	3,4	1,2,4,7	1. Tyres -Types- Construction (Tube & Tubeless). Cross ply tire construction, Radial ply tire construction. 2. Tyre thread pattern, Tyre selection. Tyre pressure and Wear, Tyre maintenance 3. Changing of the tyre, Precaution to be taken while removing tyre. Rotation of the tyre - Need-procedure.	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Practice on Changing the steel wheel to alloy wheel. 2. a) Practice on removal of tyre from disc and mending the punctured tubes using hot patch and cold patch. b) Repair of tubeless tyre.
Total in hours			39	13	52

Note: At the end of each practical student has to prepare trouble shooting chart and prepare repair estimation.

* PO= = Program Outcome as listed and defined in year 1 curriculum and PO - CO mapping with strength (Low/Medium/High) has to be mapped by the course Co-Ordinator. (Above only suggestive)

Table 1: = Suggestive Activities for Tutorials: (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 relevant to the topic and on the availability of such resources at their institution).

Sl.no	Week	Suggested Activities
1	1	Sketch/draw the layout of chassis frames of cars, bus (front engine & rear engine), truck and articulated vehicles
2	2	Study and present at least one of the latest technologies in clutch, transmission, suspension and brakes.
3	3	Integrated with practical.
4	4	List the factors that helps you decide type of axle or CVT transmission for a given vehicle and submit it as an assignment.
5	5	Create 10 groups in class so that each group will present at least one type of steering gearbox used in a vehicle.

6	6	Select a race track and an appropriate car model to calculate the turning circle radius of that car and demonstrate the suitability for that race track.
7	7	Study the effects of worn steering linkages from available incident reports and present remedial solutions to identify the wearing along with appropriate materials and suggest right lubricant.
8	8	Study and propose alternative materials for differential and justify the benefits of using such material.
9	9	Study any two research papers about different loads acting on the rear axle and present the impact of those loads for any given vehicle.
10	10	Study and present at least one of the latest technologies on braking systems.
11	11	Study and present the suspension system used in modern heavy commercial vehicles.
12	12	Visit the nearest alloy wheel replacement center, identify the different type of alloy wheels used and understand how alloy wheels were replaced for given vehicle types.
13	13	Study the different treading patterns used in different vehicle models and justify why certain patterns are used for specific purposes like sports, adventure, off road, farming, earthmoving, etc.

4.CIE and SEE Assessment Methodologies

Sl. No	Assessment	Test Week	Duration In minutes	Max marks	Conversion
1.	CIE-1 Written Test	5	80	30	Average of three tests 30
2.	CIE-2 Written Test	9	80	30	
3	CIE-3 Written Test	13	80	30	
4.	CIE-4 Skill Test-Practice	6	180	100	Average of two skill tests 20
5	CIE-5 Skill Test-Practice	12	180	100	
6	CIE-6 Portfolio continuous evaluation of Activity through Rubrics	1-13		10	10
Total CIE Marks					60
Semester End Examination (Practice)			180	100	40
Total Marks					100

5. a) Format for CIE written Test

Course Name	Automobile Chassis and Transmission	Test	I/II/III	Sem	III/IV
Course Code	20AT31P	Duration	80 Min	Marks	30

Note: Answer any one full question from each section. Each full question carries 10 marks.

Section	Assessment Questions			Cognitive Levels	Course Outcome	Marks
I	1					
	2					
II	3					
	4					
III	5					
	6					

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.

5. b) CIE Skill Test-I Scheme of Evaluation

Duration: 180 min.

SL. No.	CO	Particulars/Dimension	Marks
1	1	One question on "chassis frames used in Automobile and alignment of the frame". a) Identification of the chassis frame – 5 marks b) Skill based question - 5 marks.	10
2	2	One questions on "Troubleshoot, Repair and service transmission system". a) Identification of the defect. – 10 m b) Troubleshooting. –35 m	45
3	2	One questions on "Troubleshoot, Repair and service steering system". a) Identification of the defect. – 05 m b) Service/Troubleshooting. –20 m	25
4	1,2	Viva-voce	10
5	1,2	Portfolio evaluation of practical session (1-6 weeks)	10
		Total Marks	100

5. c) CIE Skill Test-II Scheme of Evaluation

Duration: 180 min.

SL. No.	CO	Particulars/Dimension	Marks
1	2	One questions on "Troubleshoot, Repair and service propeller shaft/ final drive rear axle". a) Identification of the defect. – 05m b) Service/Troubleshooting. –20 m	25
2	2	One questions on "Troubleshoot, Repair and service Brakes/Suspension system". a) Identification of the defect. – 10 m b) Troubleshooting. –20 m	30
3	2,3,4	One question on "wheels / tyres" for the given case a) Skill test question on wheels/ tyres/ alloy wheels – 20 m b) Setting the alignments - 05 m	25
4	2,3,4	Viva-voce	10
5	2,3,4	Portfolio evaluation of practical session (6-12 weeks)	10

					Total Marks	100
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6. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
		Average Marks=(8+6+2+2)/4=4.5					5

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

7.Reference:

Sl. No.	Description
1	Automobile Engineering by R B Gupta (Satya Publication)
2	Automobile Engineering Vol I By Kirpal Singh (Standard publication).
3	The Automobile Engineering Vol-2 By K.M Gupta (Umesh publications)
4	Automobile Engineering by Er S K Gupta (S Chand)
5	Automotive Technology by Jack Erjavec (CENGAGE Learning)

8. SEE Scheme of Evaluation

Duration: 180 min.

SL. No.	CO	Particulars/Dimension	Marks
1	1,3,4	One question on "chassis frames used in Automobile and alignment of the frame". a) Identification of the chassis frame – 05 marks b) Skill based question - 15 marks. Or One question on "wheels / tyres" for the given case a) Skill test question on wheels/ tyres/ alloy wheels – 10 marks. b) Alignment - 10 marks.	20
2	2	One questions on "Troubleshoot, Repair and service transmission system/ Steering system/ Suspension system / Braking system". a) Identification of defects - 10 m b) Servicing/ Troubleshooting. - 40 m	50
3	1,2,3,4	Portfolio evaluation of practical session (1-13)	10
4	1,2,3,4	Viva-voce	20
		Total Marks	100

9. Equipment/software list with Specification for a batch of 20 students

Sl. No.	Particulars	Specification	Quantity
1	Chassis frames of different types (ladder type, x type, integral type).		2 each
2	Different types of clutches (single plate, multiplate and centrifugal clutches).		5 each
3	Gear boxes (motor cycle & synchromesh mesh).		5 each
4	Front axle assembly with wheels.		5
5	Steering gearbox assemblies (Worm and nut, rack and pinion, recirculating ball type)		5 each
6	Computerized wheel balancing machine.		1
7	Computerized wheel alignment machine.		1
8	Propeller shaft assembly.		5
9	Rear axle housings (fully floating and semi-floating)		3 each
10	Mechanical brake assemblies		3
11	Hydraulic brake system.		3
12	Master Cylinder-Single piston and Tandem master cylinder.		5 each
13	Wheel cylinders-single piston and double piston.		5 each
14	Drum brake assemblies.		5
15	Disc brake assemblies.		5
16	Hydraulic brake bleeding kit.		5
17	Independent & leaf spring suspension system.		3
18	Telescopic shock absorber (cut-section model).		2
19	Conventional and Radial tyres with tubes & wheels.		5 Each
20	Tubed and tubeless tyre puncture kit.		5
21	Major tool kit		3
22	Alloy Wheels		2
23	Automatic tyre changing machine		5
24	Vulcanizing machine		5
25	Two post lift		1

24	Tyre pressure gauge		5
25	Vehicle: Four-wheeler (Scrap with all parts)		1



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DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

1.Rationale: The course aims to impart basic skills and understanding of automotive electrical systems,

Programme	Automobile Engineering	Semester	III
Course Code	20AT32P	Type of Course	Programme Core
Course Name	Automotive Electrical System	Contact Hours	8 hours/week 104 hours/semester
Teaching Scheme	L: T: P:: 3:1:4	Credits	6
CIE Marks	60	SEE Marks	40

equipment and their working details. Automobile electrical system has gradually evolved over the years. The automobiles electrical system comprises of wiring technologies that are used for distributing power to other parts of a vehicle and various electrical components for production, storage and distribution of electrical power.

2. Course Outcomes/Skill Sets: At the end of the course the student will be able to:

CO-01	Test a battery, identify the problem, service and charge it using the right method suitable for that battery type.
CO-02	Test charging, cranking, ignition systems and dashboard instruments and service or troubleshoot it for any problems identified.
CO-03	Diagnose the electrical system, estimate the cost of repairing or replacement and make recommendation of either repair or replace based on cost benefit analysis.
CO-04	Study a given wiring diagram, list all the components, build the wiring circuits, test and repair to ensure the circuit provides the necessary output/result as required.

3. Course Content

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			3 hours/week	1 hour/week	4 hours/week (2 hours/batch twice in a week)
1	1,4	1,2,4	1. Earth Return System: Introduction-Earth return and insulated systems, 6 volts and 12 volts system. 2. Fusing of circuits, low and high voltage automobile cables, cable specifications and sizes, Colour cables, Circuit tracing 3. Diagram of typical wiring system, Wiring Harness. Tracing fault in wiring, Fault location test. Symbols used in automobile electrical systems.	Refer Table 1	1. a) Demonstrate the wiring flow pattern in the Vehicle. b) Demonstrate the wiring color code used for different circuits. 2. a) Study a given wiring diagram and list all the components b) Practice on troubleshooting of wiring defects.

2	1	1,2,4	<p>1. Battery -purpose-types, construction and working-Lead acid.</p> <p>2. Methods of charging the Battery and how to choose which type of Charging method.</p> <p>3. Battery capacity-Battery efficiency, ratings.</p>	Refer Table 1	<p>1.a) Test the battery charge condition using hydrometer, Voltmeter, Test the battery condition using battery tester.</p> <p>b) Practice on preparation of electrolyte.</p> <p>2. a) Charging of Lead acid battery by constant voltage method.</p> <p>b) Practice on Charging multiple batteries</p>
3	1	1,2,4	<p>1. Battery maintenance and troubleshooting.</p> <p>2. Construction and working of Lithium-ion battery.</p> <p>3. Maintenance-free batteries.</p>	Refer Table 1	<p>1. a) Practice on Charging multiple batteries by trickle charging</p> <p>b) Practice on finding the defects and troubleshooting of batteries.</p> <p>2. Practice on Servicing of lithium-ion battery.</p>
4	3	1,2,4	<p>1. Estimation & Costing: Introduction, Procedure of Estimation.</p> <p>2. Introduction to Costing, Elements of cost, Components of cost.</p> <p>3. Procedure of Costing.</p>	Refer Table 1	<p>1. Estimate the cost of repairing or replacement the battery/Wiring system, make recommendation of either repair or replace based on cost benefit analysis.</p> <p>2. Case study on estimation of servicing/repair of any one electrical component in vehicle.</p>
5	2	1,2,4	<p>1. Charging system-purpose-circuit diagram. DC generator- principle, construction and working.</p>	Refer Table 1	<p>1. Practice on servicing of the Alternator.</p> <p>2. Test the stator, rotor and rectifier for</p>

			2. Alternator charging circuit with alternator principle, construction and working. 3. Regulator for A.C. Generators- Construction and working.		continuity, short and open circuit using Multifunction Tester/ Test lamp.
6	2,3	1,2,4	1. Electronic voltage regulators- Construction and working. 2. Defects and troubleshooting Alternators. 3. Starting system -requirements- circuit diagram-working principle.	Refer Table 1	1. Practice on testing of voltage regulators. 2. Practice on finding the Defects and troubleshooting of alternators and estimate the same.
7	2	1,2,4	1. Construction and working: series, shunt wound motor. 2. Construction and working of Bendix drive. 3. Construction and working of positive engaging drive with shift lever.	Refer Table 1	1. Practice on servicing of the starter motor. 2. Servicing of Bendix drive.
8	2,3	1,2,4	1. Construction and working of overrunning clutch drive 2. Construction and Working of Axial Sliding armature drive. 3. Solenoid switch with two winding- construction and working.	Refer Table 1	1. Test field windings, brush holder's armature and solenoid switch for continuity, short and open circuit using growler/ Multifunction Tester. 2. Repair and Service Estimation of the stator motor.
9	2,3	1,2,4	1. Ignition System: Fundamentals- Ignition timing (with respect to load & speed). Types of ignition systems, components. 2. Construction & Working of battery Ignition system. Construction & working of magneto ignition systems.	Refer Table 1	1. a) Diagnose Ignition problems and demonstrate the trouble shooting of the same b) Repair/Service estimation the same. 2. Checking and setting ignition timing and starting the engine.

			3. Construction & Working of Electronic Ignition system. Distributer less ignition system (DIS).		
10	2,3	1,2,4	1. Spark plug-classification 2. construction-Types-specification. 3. Spark plug gap, heat range and reach- definition and importance.	Refer Table 1	1. Servicing of the DIS and repair/Service estimation of the same. 2. a) Servicing of the sparkplug cleaning, testing and adjusting gap. b) Service estimation of the same.
11	3,4	1,2,4,7	1. Principle of automobile illumination. 2. Different bulbs used in automobile, fuses and relay. 3. Head lamp mounting and construction -Types.	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Practice on replacement of bulbs, fuses and relays and estimate the cost of replacement of the same. 2. Practice on aiming of head lights.
12	2,3	1,2,4,7	1. Working and Construction of windscreen-wipers. Working of Horn. 2. Working of electrical fuel pump, fuel gauge. 3. Working of oil and temperature gauge.	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Practice on servicing of the Wiper and horn & service estimation of the same. 2. Practice on testing of fuel gauge, oil gauge & Temperature gauge.

13	2,3	1,2,4,7	1. Speedometer, odometer, etc. (Dash board instruments). 2. Wiring diagram of 2-wheeler - Circuit & construction. 3. Wiring diagram of 4-wheeler- Circuit & construction.	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Practice on Circuit building of electrical Components, test and repair to ensure the circuit provides the necessary output/result as required. 2. Practice on testing of dashboard instruments.
Total in hours			39	13	52

Note: At the end of each practical, student has to prepare trouble shooting chart and prepare repair estimation.

* PO= Program Outcome as listed and defined in year 1 curriculum and PO – CO mapping with strength (Low/Medium/High) has to be mapped by the course Co-Ordinator. (Above only suggestive)

Table 1: Suggestive Activities for Tutorials: (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 relevant to the topic and on the availability of such resources at their institution).

Sl. No.	Week	Suggested Tutorial
1	1	Study and present different ampere ratings of fuses used in different Vehicle.
2	2	Study any one research papers about "Environmental impact on battery recycling of automobile batteries" and present the environmental effects of battery recycling.
3	3	Study on different types of batteries used for electric vehicles compare their durability and present the materials used in positive and negative plates and electrolyte and how long each battery lasts.
4	4	Visit the nearby service center and note down the estimation procedure followed for the servicing or repairing of electrical parts and component of the vehicle.
5	5	Study whether alternators are used in electric vehicle, justify your answer. With proper documentation submit the report as an assignment.
6	6	Document what are the symptoms of faulty working of the regulators and how it can be troubleshooted.
7	7	Study starting system used in any one of the heavy vehicles and present how they differ from the starting system used in cars.
8	8	Build a starter solenoid relay circuit in given vehicle and test for its working.
9	9	Study the ignition system of the given vehicle, note down the causes of ignition coil failure and demonstrate the remedial solution for the diagnosed fault.
10	10	Study and present at least one of the latest technologies in ignition innovation.
11	11	Study and present the innovation on "Night Vision Technology."
12	12	Study any one journal on windscreen wiper and present the advancements in the wiper.
13	13	Study and present on automobile lighting technology for modern automobile.

4. CIE and SEE Assessment Methodologies

Sl. No	Assessment	Test Week	Duration In minutes	Max marks	Conversion
1.	CIE-1 Written Test	5	80	30	Average of three tests 30
2.	CIE-2 Written Test	9	80	30	
3	CIE-3 Written Test	13	80	30	
4.	CIE-4 Skill Test-Practice	6	180	100	Average of two skill tests 20
5	CIE-5 Skill Test-Practice	12	180	100	
6	CIE-6 Portfolio evaluation of Activity through Rubrics	1-13		10	10
Total CIE Marks					60
Semester End Examination (Practice)			180	100	40
Total Marks					100

5. a) Format for CIE written Test

Course Name	Automotive Electrical System	Test	I/II/III	Sem	III/IV
Course Code	20AT32P	Duration	80 Min	Marks	30

Note: Answer any one full question from each section. Each full question carries 10 marks.

Section	Assessment Questions	Cognitive Levels	Course Outcome	Marks
I	1			
	2			
II	3			
	4			
III	5			
	6			

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.

5. b) CIE Skill Test-I Scheme of Evaluation

Duration:180min.

SL. No.	CO	Particulars/Dimension	Marks
1	1,4	One Skill oriented question on Earth return system/wiring system based on the given Condition. a) Identification of the color code - 05m b) Identification of the defect - 05 m c) Troubleshooting - 10m	20
2	1	One Skill oriented question on Battery based on the given Condition. a) Analyzing/finding the faults and recording it - 10 m b) Servicing/ troubleshooting - 10 m	20
3	3	Question on the given case (case study) a) Identification of the key facts in the case - 05m b) Identification of the key issues - 05m	20

		c) Evaluate and recommend the course of action -10m	
4	2,3	One question on “Troubleshoot and Service the Charging systems used in automotive vehicles and its service estimation”.	
		a) Identification of the fault and recording it - 05 m	30
		b) Troubleshooting/ Servicing - 20 m	
		c) Service Estimation - 05 m	
5	1,2,3,4	Portfolio evaluation of practical session (1-6) week	10
Total Marks		100	

5. c) CIE Skill Test-II Scheme of Evaluation

Duration:180min.

SL. No.	CO	Particulars/Dimension	Marks
1	2,3	One question on “Troubleshoot and Service the Cranking systems used in automotive vehicles and its service estimation”.	
		d) Identification of the fault and recording it - 05 m	30
		e) Troubleshooting/ Servicing - 20 m	
		f) Service Estimation - 05 m	
2	2,3	One question on “Troubleshoot and Service the Ignition systems used in automotive vehicles and its service estimation”.	
		c) Identification of the fault and recording it - 05 m	40
		d) Troubleshooting/ Servicing - 30 m	
		e) Service Estimation - 05 m	
3	2,3	One question on “Troubleshoot and Service dashboard instruments used in automotive vehicles and its service estimation”.	
		d) Identification of the fault and recording it - 05 m	20
		e) Troubleshooting/ Servicing - 10 m	
		f) Service Estimation - 05 m	
4	2,3	Portfolio evaluation of practical session (7-12) week	10
Total Marks		100	

6. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
	Average Marks= (8+6+2+2)/4=4.5						5

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

7. Reference:

Sl. No.	Description
1	Automobile Engineering Vol-2 by Kirpal Singh (Standard Publications).
2	Automobile Electrical Equipment by P.M. Kohli (Tata McGraw-Hill).
3	The Automobile Engineering by Harban Singh Reyath (S Chand & Co).
4	The Automobile Engineering Vol-2 by K.M Guptha (Umesh publications).
5	Automobile Electrical and Electronic systems by Tom Denton (SAE publication).
6	Vehicle Maintenance & Garage Practice by Jigar A. Doshi (PHI Learning, Delhi).
7	Mechanical Estimating and Costing by S.C. Sharma & T.R.Banga (KHANNA PUBLISHERS).

8. SEE Scheme of Evaluation

Duration:180min

SL. No.	CO	Particulars/Dimension	Marks
1	1,3,4	<p>One Skill oriented question on Battery based on the given Condition.</p> <p>a) Analyzing/finding the faults and recording it - 10 m b) Servicing/ troubleshooting - 10 m</p> <p>or</p> <p>One question on “cables/ bulbs/ fuses/colour codes, circuit construction and faults arising in automotive wiring and lighting system also to repair & estimate”</p> <p>a) Identification of the different cables/ bulbs/ fuses - 05 m b) Fault finding - 05m c) Replace/ repair - 10 m</p>	20
2	2,3	<p>One question on “Troubleshoot and Service the Charging/ Cranking/ Ignition systems used in automotive vehicles and its service estimation”.</p> <p>g) Identification of the fault and recording it - 10 h) Troubleshooting/ Servicing - 30 i) Service Estimation - 10</p>	50
4	1,2,3,4	Portfolio evaluation of practical session (1-13)	10
5	1,2,3,4	Viva-voce	20
Total Marks			100

9. Equipment/software list with Specification for a batch of 20 students:

Sl. No.	Particulars	Specification	Quantity
1	Lead acid batteries.		3

2	lithium-ion batteries.		3
3	Battery chargers.		2
4	Cut-section model of DC generators.		1
5	Alternators.		5
6	Electronic voltage regulators for alternators.		3
7	Starting motors of different starting drives (Bendix, axially sliding armature, overrunning clutch type).		2 each
8	Spark plug testing machine.		2
9	Digital timing light.		3
10	Distributor assemblies.		4
11	Ignition coils.		5
12	Magneto assembly.		3
13	Fuel, Oil, Temperature gauges.		2 each
14	Wiper motors.		3
15	All types of bulbs, fuses, relays.		5 each
16	Petrol engine with coil ignition system.		2
17	Recent make 4-wheeler.		1
18	Electrical test bench.		2
19	Growlers		5
20	Battery tester		5
21	Bench vice		5
22	Hydraulic Press (10 ton)		3
23	Demo model of 2 & 4-wheeler Vehicle Electrical system		1 Each
24	Modern engine with electronic ignition/ DIS		1 Each



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1.Rationale: The course will enable the students to learn the principles, concepts and application of

Programme	Automobile Engineering	Semester	III
Course Code	20AT33P	Type of Course	Programme Core
Course Name	Thermal Engineering and Engine Testing	Contact Hours	8 hours/week 104 hours/semester
Teaching Scheme	L:T:P :: 3:1:4	Credits	6
CIE Marks	60	SEE Marks	40

thermodynamic laws and air standard cycles which is needed to look after an IC engine. The operating behavior of an IC engine on test bed is the common purpose to learn various parameters like fuel consumption, various powers and efficiency. This course enables us to run internal combustion engines under realistic conditions and examine new combustion processes under part and full load conditions and various rotation speeds.

2. Course Outcomes/Skill Sets: At the end of the course the student will be able to:

CO-01	Explain the concept of thermodynamics and demonstrate its application through simple experiments.
CO-02	Test lubrication and cooling systems and service or troubleshoot it for any problems identified.
CO-03	Draw, label and compare SI and CI engines in terms of their operations, efficiency, fuel, speed, pressure and knocking.
CO-04	Explain abnormal combustion process and demonstrate with experiments both how it occurs and its prevention for a given engine.
CO-05	Conduct an engine performance test, draw its performance characteristics and measure friction power, air / fuel ratio and efficiencies.

3. Course Content

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			3 hours/week	1 hour/week	4 hours/week (2 hours/batch twice in a week)
1	1	1,2,3	1. Fundamentals of thermodynamic - System, surroundings, intensive and extensive property. 2. Laws of thermodynamics- Zeroth, First and Second law. 3. Gas Laws - Boyle's law - Charles's Law - Avogadro's law - Joule's law.	Refer Table 1	1. Illustration of system and surrounding using simple experiments/ Virtual simulations, Video demonstration & documentation. 2. Illustrate the principles of the laws of thermodynamics using simple experiments/ Virtual simulations, Video

				demonstration & documentation.
2	1	1,2,3	<p>1.Relationship between the two specific heats- characteristic gas constant R. Adiabatic index Y.</p> <p>2. Definition of enthalpy and entropy.</p> <p>3. Introduction to thermodynamic processes - PVT relations -work done, heat transfer, change in internal energy, change in enthalpy and entropy for constant volume and constant pressure process.</p>	<p>Problems on thermodynamic processes.</p> <p>1. Case study on enthalpy and entropy.</p> <p>2. Simple experiments on work and heat, Video demonstration & documentation.</p>
3	1	1,2,3	<p>1. PVT relations -work done, heat transfer, change in internal energy, change in enthalpy and entropy for isothermal process.</p> <p>2. PVT relations -work done, heat transfer, change in internal energy, change in enthalpy and entropy for isentropic process.</p> <p>3. Air standard cycles. Types, assumptions made in air standard cycles.</p> <p>Note: No derivations are needed.</p>	<p>Refer Table 1</p> <p>1.Virtual exposure on thermodynamic processes.</p> <p>or</p> <p>Drawing of PV diagrams of process and cycles using software and find various parameters.</p> <p>2. Virtual exposure on thermodynamic processes/ Drawing of PV diagrams of process using software and find various parameters.</p>
4	1	1,2,3	<p>1. Explanation of PV and T-S diagrams of Carnot cycle.</p> <p>2. Explanation of PV and T-S diagrams of Otto cycle.</p> <p>3. Explanation of PV and T-S diagrams of Diesel cycle.</p> <p>Note: No derivations are needed.</p>	<p>Problems on Air standard cycles.</p> <p>1.Virtual exposure on the otto Cycle or</p> <p>Drawing of PV diagrams of cycles(otto) using any software and find various parameters.</p> <p>2.Virtual exposure on the Diesel Cycle or</p>

					Drawing of PV diagrams of cycles (Diesel) using any software and find various parameters.
5	2	1,2,4	1.Lubrication System: Need- Types-Layout of pump feed system. 2. Oil Pump-Types- Gear pump- Rotor type- Vane type. 3. Oil filter- need- Types- Construction and working of cartridge type oil filter.	Refer Table 1	1. Find the Oil level and replace the engine oil and oil filter and Quality checking 2. Servicing of oil pumps and filters Note: Prepare the trouble shooting chart.
6	2	1,2,4	1.Cooling System: Need- types- Comparison- Layout of pump circulation system. 2. Construction and working of Water pump- radiator 3. Thermostat - Need-Types- Construction & Working of Wax type	Refer Table 1	1. Servicing of cooling system. 2. Servicing of water pump and radiator. Note: Prepare the trouble shooting chart.
7	3,4	1,2,4	1. Combustion in engines - Stages of combustion in SI engines and Diesel engines. 2. SI engine detonation & pre-ignition- process- effects 3. Controlling methods of SI engine detonation & pre-ignition.	Refer Table 1	1. Case study on detonation and preignition for SI engine and write a report on the study conducted. 2. Using engine scanner, identify the knocking in SI engine.
8	3,4	1,2,4	1. CI engine detonation 2. Knocking- process- effects. 3. Controlling methods of CI engine detonation.	Refer Table 1	1. Case study on detonation and preignition for CI engine and write a report on the study conducted. 2. Using engine scanner, identify the knocking in CI engine.
9	3,5	1,2,4	1.Engine performance- determination of IP- BP - MEP-	Refer Table 1	1. Determine the Compression pressure

			IMEP-BMEP- Engine Torque - piston speed. 2.Friction power- types of measuring friction power. 3. A/F ratio- Requirement of A/F ratio for different operating conditions of engine.		and vacuum pressure of multi cylinder engine 2.To determine A/F Ratio on the four-stroke diesel engine.
10	3,5	1,2,4	1. Volumetric efficiency. Methods for increasing volumetric efficiency. 2. Simple problems on IP, BP, IMEP, BEMP. 3. Simple problems on FP, A/F ratio and Volumetric efficiency.	Refer Table 1	1. To determine volumetric Efficiency on the four-stroke diesel engine. 2. To determine volumetric Efficiency on the four-stroke diesel engine.
11	5	1,2,4,7	1. Determination of IP of a multicylinder engine using Morse test. 2. TFC-SFC- BSFC- ISFC- Importance. 3. Simple problems.	Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Conduct the experiment to determine indicated power of multicylinder engine using Morse test. 2. Conduct the experiment to determine indicated power of multicylinder engine using Morse test.
12	3,5	1,2,4,7	1. Efficiency-Mechanical efficiency -Thermal efficiency- indicated thermal efficiency- brake thermal efficiency. 2. Methods to improve thermal efficiency of engine. 3. Simple problems.	Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Conduct experiment to determine the different efficiencies of two stroke SI engine at Constant load and constant speed condition 2. Conduct experiment to determine the different efficiencies of four stroke SI engine at Constant load and constant speed condition.
13	3,5	1,2,4,7	1. Performance characteristics V/s Engine speed.	Study the latest technological changes in this	1. Conduct experiment to determine the

		<p>2. SI engine-Heat balance sheet. Performance Curves.</p> <p>Study of engine behavior using performance curves.</p> <p>3. CI engine-Heat balance sheet and performance curves.</p> <p>Study of engine behavior using performance curves.</p>	<p>course in this course and present the impact of these changes on industry.</p>	<p>performance of four stroke SI engine at constant load and constant speed condition.</p> <p>Compute heat balance sheet for SI engine</p> <p>2. Conduct experiment to determine the performance of four stroke CI engine at constant load and constant speed condition.</p> <p>Compute heat balance sheet for CI engine.</p>
Total in hours		39	13	52

* PO= Program Outcome as listed and defined in year 1 curriculum and PO - CO mapping with strength (Low/Medium/High) has to be mapped by the course Co-Ordinator. (Above only suggestive).

TABLE 1: Suggestive Activities for Tutorials: (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 relevant to the topic and on the availability of such resources at their institution).

Sl. No.	Suggested Activity
1	Prepare and submit a report on applications of Laws of Thermodynamics in automobile engines as an assignment.
2	Collect information regarding maximizing volumetric efficiency of an IC engine by referring to one of the journal papers and present the details collected.
3	Collect/download information from the internet regarding how different efficiencies affect the engine performance and prepare a report as an assignment.
4	Collect/download information and present the techniques used to reduce frictional power to improve engine performance.
5	Visit nearby KSRTC workshop/depot and collect information regarding abnormal combustion/detonation or knock and prepare a report and submit as an assignment.
6	Visit nearby car service centre/showroom and make a note of fault codes detected using engine onboard diagnostic tools and submit a report on procedure used for diagnosing the fault codes.

4. CIE and SEE Assessment Methodologies

Sl. No	Assessment	Test Week	Duration In minutes	Max marks	Conversion
1.	CIE-1 Written Test	5	80	30	Average of three tests 30
2.	CIE-2 Written Test	9	80	30	
3	CIE-3 Written Test	13	80	30	
4.	CIE-4 Skill Test-Practice	6	180	100	

5	CIE-5 Skill Test-Practice	12	180	100	Average of two skill tests 20
6	CIE-6 Portfolio continuous evaluation of Activity through Rubrics	1-13		10	10
Total CIE Marks					60
Semester End Examination (Practice)		180	100	40	
Total Marks					100

5. a) Format for CIE written Test

Course Name	Thermal Engineering and Engine Testing	Test	I/II/III	Sem	III/IV
Course Code	20AT33P	Duration	80 Min	Marks	30

Note: Answer any one full question from each section. Each full question carries 10 marks.

Section	Assessment Questions	Cognitive Levels	Course Outcome	Marks
I	1			
	2			
II	3			
	4			
III	5			
	6			

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.

5. b) CIE Skill Test-I Scheme of Evaluation

SL. No.	CO	Particulars/Dimension	Marks
1	1	Question on Concepts of Thermodynamics /Processes a) PV diagram or cycle b) Illustration of the stated law or any one cycle	30
2	2	One skill-oriented question on "lubrication system" for the given case. a) Fault detection b) Troubleshooting/ Servicing	- 10 m - 20 m
3	2	One skill-oriented question on "cooling system" for the given case. a) Fault detection b) Troubleshooting/ Servicing	- 10 m - 20 m
4	1,2	Portfolio evaluation on practical sessions (1-6 week)	10
Total Marks			100

5. C) CIE Skill Test-II Scheme of Evaluation

SL. No.	CO	Particulars/Dimension	Marks
1	3,4	One skill-oriented question on “combustion process, measure and prevent abnormal combustion” for the given case. c) Analyse the situation based on given case. - 10 m d) Measure the parameters - 30 m	40
2	3,5	One skill-oriented question on “performance characteristics of an internal combustion engines, efficiency etc.” for the given case. c) Tabular Column to note down the parameters - 05 m d) Formulas adopted -05 m e) Conduction of experiment -20 m f) Calculation & Result -20 m	50
3	3,4,5	Portfolio evaluation on practical sessions (7-12 week)	10
Total Marks			100

6. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
Average Marks= (8+6+2+2)/4=4.5							5

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

7. Reference:

Sl. No.	Description
1	Thermal Engineering by R.S. Khurmi (S Chand & Co)
2	I C Engines by Mathur &Sharma (Danapat Rai & sons)
3	Thermal Engineering by R K Hegde and Niranjan Murthy (Sapna Publications)
4	Internal Combustion Engines by N Ganeshan (Tata McGraw-Hill)
5	Thermal Engineering by Kodanda Ramanna
6	Automobile Engineering by Kirpal Singh (Vol 1 and II)
7	Basic and Applied thermodynamics by P.K. Nag (Tata McGraw-Hill)

8. SEE Scheme of Evaluation

SL. No.	CO	Particulars/Dimension	Marks

1	1,2,3,4	One skill-oriented question on "lubrication/cooling system" for the given case.	30
		a) Fault detection - 10 m b) Troubleshooting/ Servicing - 20 m OR One skill-oriented question on "combustion process, measure and prevent abnormal combustion" for the given case. a) Analyse the situation based on given case. - 10 m b) Measure the parameters - 20 m	
2	3,5	One skill-oriented question on "performance characteristics of an internal combustion engines, efficiency etc." for the given case. g) Tabular Column to note down the parameters - 05 m h) Formulas adopted -05 m i) Conduction of experiment -20 m j) Calculation & Result -10 m	40
3	1,2,3,4,5	Portfolio evaluation on practical sessions (1-13 week)	10
4	1,2,3,4,5	Viva-voce	20
Total Marks			100

NOTE: Use same format of evaluation for CIE skill test. Portfolio evaluation of practical session should be considered from "Week 1-6" for 1st CIE and "Week 7-12" for 2nd CIE each 10 marks.

9. Equipment/software list with Specification for a batch of 20 students

Sl. No.	Particulars	Specification	Quantity
1	Electronically controlled multi cylinder 4 stroke petrol engine in working condition		1
2	Multi-cylinder petrol engine with electric dynamometer test rig, suitable to determine the performance parameters, morse test and heat balance sheet.		1
3	4-stroke multicylinder Diesel engine with hydraulic dynamometer test rig suitable to determine the performance parameters, morse test and heat balance sheet.		1
4	Single cylinder Diesel engine with Dynamometer test rig.		1
5	Single cylinder 4 stroke Petrol engine with Dynamometer test rig		1
6	Computerized Diesel / petrol engine test rig		1
7	Engine scanner		1
8	Onboard diagnostic tools like OBD2 scanner.		1



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DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

Programme	Automobile Engineering	Semester	III
Course Code	20AT34P	Type of Course	Programme Core
Course Name	Automotive Manufacturing Processes	Contact Hours	8 hours/week 104 hours/semester
Teaching Scheme	L:T:P :: 3:1:4	Credits	6
CIE Marks	60	SEE Marks	40

1.Rationale: Manufacturing process is a branch of professional engineering that shares many common concepts and ideas with other fields of engineering such as mechanical, chemical, electrical, and industrial engineering. The manufacturing or production engineer's primary focus is to turn raw material into an updated or new product in the most effective, efficient & economic way possible. The objective of the course is to develop skill in the most important manufacturing processes in to a context of a production environment.

2. Course Outcomes/Skill Sets: At the end of the course the student will be able to:

CO-01	Review a given drawing to identify the metal to be used, select the appropriate welding method and the right electrodes to be used.
CO-02	Build a sheet metal model using metal fabrication, brazing, lathe and drilling processes while adhering to all prescribed workshop safety protocols.
CO-03	Inspect the model to identify defects in welding processes using prescribed inspection procedure and also explain press work operation needed for any identified repair.
CO-04	Explain and implement the requirements of ISO standards 9000 series.

3. Course Content

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			3 hours/week	1 hour/week	4 hours/week (2 hours/batch twice in a week)
1	1	3,4	1. Introduction to Welding Technology in Automobile Industry 2. Classification of welding and types of Welding Processes. 3. Arc Welding: Principle of Arc Welding- Types and preparation of materials in welding – Consumable Electrode method & Non-Consumable Electrode method. Steps involved in Arc Welding	Refer Table 1	1. a) Show various safety sign charts and Safety tips to be followed in the machine shop. Note down the Safety tips in the record book. b) Identify and record different Welding Joints in the Vehicle. 2. a) Practice on Material preparation for welding. b) Review the given drawing, Demonstrate and practice on selection of

					electrodes and setting the current, Arc initiation.
2	1	3,4	<p>1. TIG Welding – Construction- Working Principle- Material preparation- Process & Application.</p> <p>2. GTAW- Operation- Equipment & Materials- Joint Design- Application.</p> <p>3. GMAW- Operation- Equipment & Materials- Joint Design- Application.</p>	Refer Table 1	<p>1. Practice on Simple job work on Lap joint using metallic arc welding, GTAW & GMAW and Video demonstration & documentation of the same.</p> <p>2. Practice on Simple job work on butt joint using metallic arc welding, GTAW & GMAW and Video demonstration & documentation of the same.</p> <p>Note: Use Personal Protective equipment & follow the safety practices against fumes and welding gases (Record all the safety tips followed).</p>
3	1	3,4	<p>1. Resistance Welding- Principle- Construction & Working. Types of Resistance Welding.</p> <p>2. Working principle- Spot Welding, Butt Welding</p> <p>3. Seam Welding- Working Principle.</p>	Refer Table 1	<p>1. a) Demonstrate the safety precautions to be Practiced during spot welding and identify the welding method used to join the component in the given drawing.</p> <p>b) Case Study/ Industrial visit to metro, Aircraft outer bodies, Rail coaches etc. on spot welding and write a report on the same.</p> <p>2. a) Demonstrate the safety precautions to be</p>

					Practiced during seam welding. b) Case study/ Industrial visit on Seam welding and write a report on the same.
4	1,3	3,4	<p>1. Gas welding- Working process of Gas Welding and Gas cutting. Types of Gas Welding & Types of flames in Gas welding- Application.</p> <p>2. Welding Defects and remedies.</p> <p>3. NON-DESTRUCTIVE TESTS (NDT): Define NDT, Classify NDT methods, Visual inspection and its remedy.</p>	Refer Table 1	<p>1.a) Practice on Simple job work on Lap joint using gas welding.</p> <p>b) Identify the method of welding used to join the components in the given drawing and note down the electrode/binding material used.</p> <p>2. a) Practice on Gas cutting.</p> <p>b) Practice on Visual inspection of the cracks by Microscope.</p> <p>Note: Use Personal Protective equipment & follow the safety rules (Record all the safety tips followed).</p>
5	2,3	3,4	<p>1. Liquid Penetrant Testing – Basic steps in LPT, types of LPT and its remedy.</p> <p>2. Brazing: Introduction-Types, Joint design, Cleaning the joint</p> <p>3. Selecting the flux, Selection of a Brazing process, Post cleaning and inspections. Difference between brazing and welding.</p>	Refer Table 1	<p>1. Practice on Visual Inspection of the cracks by LPT and Video demonstration & documentation of the same.</p> <p>2. Practice on Brazing of different automobile components and Video demonstration & documentation of the same.</p> <p>Note: Follow the safety rules (Record all the safety tips followed).</p>

6	2	3,4	<p>1. Sheet Metal Technology- Introduction, Fundamentals of sheet metal work, Different hand tools used in automobile body shop.</p> <p>2. Sheet Metal operations: -</p> <p>Cutting operation-producing blanks, cutting holes, progressive, miscellaneous operation.</p> <p>3. Forming operation-bending, Embossing, flanging, hemming, seaming, curling, wiring.</p>	Refer Table 1	<p>1. Demonstrate and record different types of tools used in automobile body shop.</p> <p>2. Practice on Preparation of number plate using Embossing and rivet operation in sheet metal operation.</p> <p>Note: Follow the safety rules (Record all the safety tips followed).</p>
7	2,3	3,4	<p>1. Ribbing, staking, crimping, bulging, beading, enclosing, tube forming.</p> <p>2. Drawing operation- cupping, box drawing,</p> <p>panel drawing, Shallow, deep panel drawing.</p> <p>3. Introduction to Press working. Power press- Types- Working.</p>	Refer Table 1	<p>1. Demonstrate and prepare various sheet metals joint for any one application.</p> <p>2. Practice on any one drawing operation in sheet metal for any one application and Video demonstration & documentation of the same.</p> <p>Note: Follow the Sheet Metal fabrication safety tips.</p>
8	2	3,4	<p>1. Operations performed on press. Work & tool holding devices.</p> <p>2.Casting: Introduction to metal castings and moulding in foundry.</p> <p>3. Use of patterns, pattern materials.</p>	Refer Table 1	<p>1. Demonstrate the press work operation using hydraulic press.</p> <p>2. a) Demonstrate the Selection of right type of foundry tools and equipment.</p> <p>b) Practice on Sand mixing.</p>
9	2	3,4	<p>1. Types of patterns-single, split, loose</p> <p>2. Sweep pattern, skeleton pattern, Gated Patterns – allowances.</p>	Refer Table 1	<p>1. Practice on preparing the Square Mould.</p> <p>2. Practice on preparing the Hexagonal Mould.</p>

			3. Types of moulding sand and properties.		
10	2	3,4	1. Concept of Cope, Drag. Concept of Runner, riser & core. 2. Permanent mould casting -Die casting, Slush Casting. 3. Centrifugal casting, investment casting. Brief explanation of defects in castings.	Refer Table 1	1. Practice on preparing the pattern cavity and provide runner and riser. (To show the concept of cope and drag) 2. Melt Wax cast the same in the prepared pattern of the mould.
11	2	3,4,7	1. Forging: Introduction - Types- Working Processes of different types. 2. Working of Open and Closed Die-Forging. Effects of forging on microstructure. 3. Forging defects and their effects. Steel Forging in Automobile Industries- Need.	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Melt the Aluminium/tin/ Cool drink Tin and cast the same in the prepared pattern of the mould using electric furnace. Note: Follow all the safety precautions. 2. Demonstration of tools and equipment used in Forging operation. List & note down their functions.
12	4	3,4,7	1. ISO 9000 series Quality management system: History of International Organisation for standardization. ISO members. ISO standards and rules. 2. History of ISO 9001. BS 5750. QM principle. 3. The main requirements of ISO 9001.	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	1. Practice on smith Forging of the given Material. 2. Case study on ISO standards related to automotive industry. Note: Follow the safety precautions in the forging lab.

13	2	3,4,7	<p>1. Lathe: Types-Construction & working of engine lathe- Turning, step turning, taper turning & knurling.</p> <p>2. Drilling: Working principle of Conventional drilling operation and its parts.</p> <p>3. Nomenclature of drill tool. Hole drilling operation- Reaming, Boring, Counter boring.</p>	Refer Table 1, Study the latest technological changes in this course in this course and present the impact of these changes on industry.	<p>1. Demonstrate different parts of lathe and practice turning, step turning, taper turning & knurling operations.</p> <p>2. Practice on drilling and counter boring of the given Sample.</p> <p>Note: Follow the safety practices.</p>
Total in hours			39	13	52

* PO= Program Outcome as listed and defined in year 1 curriculum and PO – CO mapping with strength (Low/Medium/High) has to be mapped by the course Co-Ordinator. (Above only suggestive)

TABLE 1: Suggestive Activities for Tutorials: (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 relevant to the topic and on the availability of such resources at their institution).

Sl. No.	Week	Suggested Activity
1	1	Study and write a report on different welding methods used in automobile industry and submit as an assignment.
2	2	Study and present the use of Robot arc Welding or advanced arc welding operation in present automotive industries.
3	3	Create 6 groups in a class allow each group to study different arc and resistance welding joints in a given vehicle component. Note down and submit a report on components where the particular type of weld is used and justify with valid answer why that particular welding is done on that joint.
4	4	Study and prepare a report on Automotive NDT applications.
5	5	Study and submit a report on laser welding.
6	6	Study and present how high velocity forming is useful in automobile industry.
7	7	Study and Present on working of Sheet metal stamping and its application in automobile industry.
8	8	Study and write a report on Zinc die casting.
9	9	Study and submit the report on Evaporative pattern casting.
10	10	Study and Compare die casting Vs permanent mold casting or sand casting and submit the report on how each casting is different and their application in industry.
11	11	Study and present on Master bond epoxies used for automobile assembly application.
12	12	Visit nearby industry and know about different Forged components made in automobile and what methods/type of forging are adapted for these parts, submit the report.
13	13	Study and present on Drilling holes in automotive glass and Drilling hole in windshield glass for wiper evolution.

4. CIE and SEE Assessment Methodologies

Sl. No	Assessment	Test Week	Duration In minutes	Max marks	Conversion
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1.	CIE-1 Written Test	5	80	30	Average of three tests 30
2.	CIE-2 Written Test	9	80	30	
3	CIE-3 Written Test	13	80	30	
4.	CIE-4 Skill Test-Practice	6	180	100	Average of two skill tests 20
5	CIE-5 Skill Test-Practice	12	180	100	
k	CIE-6 Portfolio continuous evaluation of Activity through Rubrics	1-13		10	10
Total CIE Marks					60
Semester End Examination (Practice)		180	100	40	
Total Marks					100

5. a) Format for CIE written Test

Course Name	Automotive Manufacturing Processes	Test	I/II/III	Sem	III/IV
Course Code	20AT34P	Duration	80 Min	Marks	30

Note: Answer any one full question from each section. Each full question carries 10 marks.

Section	Assessment Questions	Cognitive Levels	Course Outcome	Marks
I	1			
	2			
II	3			
	4			
III	5			
	6			

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.

5. b) CIE Skill Test-I Scheme of Evaluation

SL. No.	CO	Particulars/Dimension	Marks
1	1	Identify the safety tools used for performing different metal fabrication processes/sheet metal operation/drilling operation. - 10m Identify the appropriate metal to be used, appropriate welding method and the right electrodes to be used for a given component/draft. -5m	15
2	2	One skill-based question on "any one type of Welding operation". a) Safety methods followed -10m b) Performance of the Operation - 30 m c) Accuracy - 05 m	45
3	3	One question on "NDT/ Brazing" a) Identification of defects/ Brazing -10 m b) Remedy/ Procedure followed before brazing -10 m	20
4	1,2,3	Portfolio evaluation of practical session (1-6) week	10

5	1,2,3	Viva-voce	10
		Total Marks	100

5. c) CIE Skill Test-II Scheme of Evaluation

SL. No.	CO	Particulars/Dimension	Marks
1	2	One skill-based question on "Sheet Metal operation operation". a) Safety methods followed -05m b) Performance of the Operation - 25 m	30
2	2	One skill-based question on "Casting/ Forging operation". a) Safety methods followed - 05m b) Performance of the Operation - 25 m	30
3	4	Question based on the given case in ISO standards in Organization management system. a) Identification of the key facts in the case - 05m c) Identification of the key issues - 05m d) Evaluate and recommend the course of action -10m	20
4	2,4	Portfolio evaluation of practical session (7-12) week	10
5	2,4	Viva-voce	10
		Total Marks	100

6. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
		Average Marks= (8+6+2+2)/4=4.5					5

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

7. Reference:

Sl. No.	Description
1	Manufacturing Technology-1By P.C Sharma of S. CHAND Publications.
2	Elements of Workshop Technology Vol-I Manufacturing Process edition-ByHajraChoudry
3	Elements of Workshop TechnologyVol-II Manufacturing Process edition-ByHajraChoudry
4	Work shop technology By R. S KHURMI &J. K GUPTA of S. CHAND&Co.Ltd
5	Welding processes and technology – O.P Khanna
6	Manufacturing Technology: Foundry Forming and Welding, P.N.Rao 2nd Edition TMH
7	Welding and Welding technology, Richard L little, Mc. Graw Hill Education

8. SEE Scheme of Evaluation

SL. No.	CO	Particulars/Dimension	Marks
1	1,3	<p>Identify the safety tools used for performing different metal fabrication processes/sheet metal operation/drilling operation. - 10m</p> <p>Identify the appropriate metal to be used, appropriate welding method and the right electrodes to be used for a given component/draft. -10m</p> <p>Or</p> <p>One question on "Defects in Welding/ press work operation/brazing"</p> <ul style="list-style-type: none"> a) Identification of defects/ press work operation/brazing -10 m b) Remedy/ procedure followed before brazing 10 m 	20
2	2	<p>One skill-based question on "Welding/ Lathe/ Sheet Metal operation/ Casting/ Forging/ Drilling operation".</p> <ul style="list-style-type: none"> a) Safety methods followed -10m b) Performance of the Operation - 30 m c) Accuracy - 10 m 	50
4	1,2,3,4	Portfolio evaluation of practical session (1-13)	10
5	1,2,3,4	Viva-voce	20
Total Marks			100

9. Equipment/software list with Specification for a batch of 20 students

Sl. No.	Particulars	Specification	Quantity
1	Arc welding transformer upto 300Amps with attachments and welding shields.		2
2	Gas welding machine with attachments and oxygen and acetylene cylinders.		2
3	Gas welding and gas cutting torches.		2
4	Electric furnace.		2
5	Spot welding machine with attachments.		1
6	Riveting machine		2
7	Sheet metal embossing machine.		2

8	Molding boxes.		2
9	Rammers.		2
10	Flatteners.		2
11	Trowels.		2
12	Strike off bar.		2
13	Shovels.		2
14	Open hearth furnace.		2
15	Anvil.		2
16	Swage block.		2
17	Flat and round tongs.		2
18	Bench vice.		2
19	Portable vertical drilling machine.		2
20	Lathe machine with attachments		5

ಮೂರನೇ ಸೆಮಿಸ್ಟರ್

ಕನ್ನಡ ಬಲ್ಲ ಡಿಪ್ಲೋಮಾ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪರ್ಯಕ್ಷಮು

(ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿ ಮತ್ತು ಪರಂಪರೆ ಕುರಿತು)

Course Code	20KA31T	Semester : III	Course Group - AU
Course Title	ಸಾಹಿತ್ಯ ಸಿಂಚನ - 2	Category : Audit	Lecture Course
No. of Credits	2	Type of Course	CIE Marks : 50
Total Contact Hours	02 Hrs Per Week 26 Hrs Per Semester	Prerequisites Teaching Scheme (L:T:P)= 2:0:0	SEE Marks : Nil

ಸಾಹಿತ್ಯ ಸಿಂಚನ - 2 ಪರ್ಯಕ್ಷಮು - 20KA31T

26 ಗಂಟೆಗಳು

ಪರ್ಯಕ್ಷಮದ ಪರಿವಿಡಿ	ಚೋಧನಾ ಅವಧಿ
1. ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಪ್ರಭಾವಗಳು ಮತ್ತು ಪ್ರೇರಣೆಗಳು	01 ಗಂಟೆ
2. ಹೊಸಗನ್ನಡ ಕಾವ್ಯದ ಪ್ರಕಾರಗಳು -	02 ಗಂಟೆ
<ul style="list-style-type: none"> ನವೋದಯ ಸಾಹಿತ್ಯ - ಲಕ್ಷ್ಮಣಗಳು ಮತ್ತು ಪ್ರೇರಣೆ, ಪ್ರಮುಖ ಕವಿಗಳು ಮತ್ತು ಸಾಹಿತ್ಯದ ಕೊಡುಗೆಗಳು. ನವ್ಯ ಸಾಹಿತ್ಯ - ಲಕ್ಷ್ಮಣಗಳು ಮತ್ತು ಪ್ರೇರಣೆ, ಪ್ರಮುಖ ಕವಿಗಳು ಮತ್ತು ಸಾಹಿತ್ಯದ ಕೊಡುಗೆಗಳು. ಬಂಡಾಯ ಮತ್ತು ಪ್ರಗತಿಪರ ಸಾಹಿತ್ಯ - ಲಕ್ಷ್ಮಣಗಳು ಮತ್ತು ಪ್ರೇರಣೆ, ಪ್ರಮುಖ ಕವಿಗಳು ಮತ್ತು ಸಾಹಿತ್ಯದ ಕೊಡುಗೆಗಳು. ದಲಿತ ಸಾಹಿತ್ಯ, ಮಹಿಳಾ ಸಾಹಿತ್ಯ, ವಿಜಾಂನ ಸಾಹಿತ್ಯ ಮತ್ತು ಇತ್ತೀಚಿನ ಪ್ರಚಲಿತ ಕನ್ನಡ ಸಾಹಿತ್ಯ - ಲಕ್ಷ್ಮಣಗಳು ಮತ್ತು ಪ್ರೇರಣೆ, ಪ್ರಮುಖ ಕವಿಗಳು ಮತ್ತು ಸಾಹಿತ್ಯದ ಕೊಡುಗೆಗಳು. 	03 ಗಂಟೆ
3. ವೈಚಾರಿಕತೆ ಕುರಿತಾದ ಲೇಖನ - ಜಿ ಎಸ್. ಶಿವರುದ್ರಪ್ಪ	01 ಗಂಟೆ
4. ಕಥೆ - ನೇಮಿಚಂದ್ರ	01 ಗಂಟೆ
5. ಪ್ರವಾಸ ಕಥನ - ಹಿ.ಚಿ.ಚೋರಲಿಂಗಯ್ಯರವರ (ಹುಪ್ಪಣಿ ದೈರಿ ಪುಸ್ತಕದಿಂದ)	01 ಗಂಟೆ
6. ಪರಿಸರ, ವಿಜಾಂನ ಮತ್ತು ತಂತ್ರಜಾಂನ ಕುರಿತಾದ ಲೇಖನಗಳು	01 ಗಂಟೆ
7. ಪ್ರಬಂಧ - ಗೌರವರೂ ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರ	01 ಗಂಟೆ
8. ಪ್ರಚಲಿತ ವಿದ್ಯಮಾನಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನ - "ಹೇರು ಮಾರುಕಟ್ಟೆ ಮತ್ತು ಹಣಕಾಸು ನಿರ್ವಹಣೆ" ಕುರಿತಂತೆ	01 ಗಂಟೆ
9. ಕನಾರ್ಟಿಕ ಏಕೀಕರಣ ಚೆಳ್ಳವಳಿ - ಪ್ರೌ. ಜಿ. ವೆಂಕಟಸುಬ್ರಾಹ್ಮ	01 ಗಂಟೆ
10. ಕನ್ನಡ ಸಿನಿಮಾರಂಗ ಬೆಳೆದು ಬಂದ ದಾರಿ ಮತ್ತು ನಾಡು-ನುಡಿ ಹಾಗೂ ನಾಡಿನ ಸಂಸ್ಕೃತಿಯ ಮೇಲೆ ಬೀರಿದ ಪ್ರಭಾವಗಳು	01 ಗಂಟೆ
11. ಕನ್ನಡದ ಸಾಮಾಜಿಕ ಉಪಭಾಷೆಗಳು (ಭಾಷಾ ಪ್ರಭೇದಗಳು)	01 ಗಂಟೆ
12. ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಒಂದು ಅವಲೋಕನ	02 ಗಂಟೆ
ಒಟ್ಟು ಚೋಧನಾ ಅವಧಿ 26 ಗಂಟೆಗಳು	26 ಗಂಟೆಗಳು

**ಕನ್ನಡ ಬಾರದ / ಕನ್ನಡೇತರ ಡಿಪ್ಲೋಮಾ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಕನ್ನಡ ಕಲಿಸಲು
ನಿಗದಿಪಡಿಸಿದ ಪರ್ಯಾಕ್ರಮ**

Course Code	20KA31T	Semester : III	Course Group - AU
Course Title	ಬಳಕೆ ಕನ್ನಡ - 2	Category : Audit	Lecture Course
No. of Credits	2	Type of Course	CIE Marks : 50
Total Contact Hours	2 Hrs Per Week 26Hrs Per Semester	Prerequisites Teaching Scheme (L:T:P)= 2:0:0	SEE Marks : Nil

ಬಳಕೆ ಕನ್ನಡ - 2 ಪರ್ಯಾಕ್ರಮ - 20KA31T

Table of Contents (ಪರಿವಿಡಿ)

26 ಗಂಟೆಗಳು

Part – I	Teaching Hour
Necessity of learning a local language (Continuation). Tips to learn the language with easy methods (Continuation). Easy learning of a Kannada Language: A few tips (Continuation). Hints for correct and polite conversation (Continuation). Instructions to Teachers for Listening and Speaking Activities (Continuation). Instructions to Teachers for Reading and Writing Activities (Continuation).	01 Hour
Part – II	
Key to Transcription for Correct Pronunciation of Kannada Language (Continuation). Instructions to Teachers to teach Kannada Language (Continuation).	02 Hour
Part – III Lessons to teach Kannada Language (Speaking, Listening, Reading and Writing Activities with Explanation)	
Lesson – 1 Personal Pronouns, Possessive Forms, Interrogative words – Part II	02 Hour
Lesson – 2 Permission, Commands, encouraging and Urging words (Imperative words and sentences) – Part II	02 Hour
Lesson – 3 Comparative, Relationship, Identification and Negation Words – Part II	02 Hour
Lesson – 4 Different types of forms of Tense (Use and Usage of Tense in Kannada) – Part II	02 Hour
Lesson – 5 Kannada Helping Verbs in Conversation (Use and Usage of Verbs) – Part II	02 Hour
Lesson – 6 Formation of Past, Future and Present Tense Sentences with Changing Verb Forms	02 Hour
Lesson – 7 Karnataka State and General Information about the State	02 Hour
Lesson – 8 Kannada Language and Literature	02 Hour
Lesson – 9 Do's and Don'ts in Learning a Language	02 Hour
PART - IV Reading and writing Practice of Kannada Language	
Lesson – 10 Kannada Language Script Part – 1	02 Hour
Lesson – 11 Kannada Language Script Part – II (Continuation)	02 Hour
Lesson – 12 Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಷಯೋಗಿ ಕನ್ನಡ ಪದಗಳು - Kannada Words in Conversation (Continuation).	01 Hour
Total Teaching Hours	26 Hour

ಸಾಹಿತ್ಯ ಸಿಂಚನ ಭಾಗ - II ಮತ್ತು ಬಳಕೆ ಕನ್ನಡ ಭಾಗ - II ಈ ಎರಡು ಪರ್ಯಕ್ಷಮಾರ್ಗಳಿಗೆ
CIE - ನಿರಂತರ ಅಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಮಾರ್ಗಸೂಚಿಗಳು :

(Course Assessment and Evaluation Chart - CIE only)

Sl. No	Assessment	Type	Time frame in semester	Duration In minutes	Max marks	Conversion
1.	CIE- Assessment - 1	Written Test - 1	At the end of 3 rd week	80	30	Average of three written tests : 1, 2 & 3 for 30 Marks
2.	CIE- Assessment - 2	Written Test - 2	At the end of 7 th week	80	30	
3	CIE- Assessment - 3	Written Test - 3	At the end of 13 th week	80	30	
4.	CIE- Assessment - 4	MCQ/Quiz	At the end of 5 th week	60	20	Average of three Assessment tests : 4, 5 & 6 for 20 Marks
5	CIE- Assessment - 5	Open Book Test	At the end of 9 th week	60	20	
6	CIE- Assessment - 6	Work book Consolidation & Activities	At the end of 11 th week	60 (Work book Submission)	20	
Total CIE – Continuous Internal Evaluation Assessment Marks						50
Total Marks						50

- ಸೂಚನೆ :** 1.CIE - ನಿರಂತರ ಅಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ 1, 2 ಮತ್ತು 3 ರ ಕಿರು ಪರೀಕ್ಷೆಗಳನ್ನು ಮತ್ತು ಮೌಲ್ಯಮಾಪನದ 4, 5 ಮತ್ತು 6 ರ ಪರೀಕ್ಷೆಗಳನ್ನು ಪ್ರತ್ಯೇಕ ಬ್ರಾಜ್‌ಬ್ರೂಕ್ ಪ್ರಸ್ತರದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳು ಬರೆಯಬೇಕು.
2.ಸೆಮೀಸ್ಪೂರ್ ಅಂತ್ಯದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳು, ತರಗತಿ ಕನ್ನಡ ಭಾಷಾ ಶಿಕ್ಷಕರಿಂದ ಮತ್ತು ವಿಭಾಗಾಧಿಕಾರಿಗಳಿಂದ ದೃಢೀಕರಣಗೊಂಡ ಕಾರ್ಯಪರ್ಯಾಪ್ತಸ್ಕವನ್ನು (Work Book) ಮೌಲ್ಯಮಾಪನ ಭಾಗ- CIE- Assessment - 6 ರ ಪರೀಕ್ಷೆಯ ನಂತರ ಆಯಾ ವಿಭಾಗಕ್ಕೆ ಸಲ್ಲಿಸಬೇಕು.