In Pursuit of Excellence	**Course and Faculty Details**	SESSION-2019-2020
		SEM-7th

Faculty Details

Name of the Faculty: Prashant Singh

Designation: Assistant Professor

Department: Mechanical Engineering

Course Details

Name of the Programme: B.Tech. Batch: 2016-2020

Branch: Mechanical Engineering Section: 2019-20

Name of Subject: Automobile Engineering Subject Code: RME-702

Category of Course: Core Deptt.

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In Pursuit of Excellence	**Index**	SESSION-2019-2020 SEM-7th

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Vision

- To develop competent and skilled Mechanical Engineers having moral values and ethics for the fulfillment of fast changing global needs.

Mission

- **M1:** To nurture continuous enhancement in teaching learning process for imparting strong fundamental knowledge of core, engineering science, and interdisciplinary subjects to students.
- **M2:** To provide state-of-the-art laboratories for providing hand-on experience of technology, and to provide platforms for leadership and overall personality development.
- **M3:** To develop strong mentor-mentee relationship for the professional and personal growth of students and also to inculcate moral values and ethics for serving the society.

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In Pursuit of Excellence	**Vision &Mission Of Department**	SESSION-2019-2020
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Vision of Department

To develop competent and skilled Mechanical Engineers having moral values and ethics for the fulfilment of fast changing global needs.

Mission of the Department

- To nurture continuous enhancement in teaching learning process for imparting strong fundamental knowledge of core, engineering science, and interdisciplinary subjects to students.
- To provide state-of-the-art laboratories forproviding hand-on experience of technology, and to provide platforms for leadership and overall personality development.
- To develop strong mentor-mentee relationship for the professional and personal growth of students and also to inculcate moral values and ethics for serving the society.

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In Pursuit of Excellence	Program Education Objectives	SESSION-2019-2020
		SEM-7th

Program Educational Objectives (PEOs):

The objectives of the Department are to produce graduates who will have the:

PEO1: Employability & entrepreneurial skills for making career in industries, academia, government services and as an entrepreneur.

PEO2: Potential to apply fundamental concepts of mechanical engineering, engineering science and practical training in solving engineering problems and to contribute in development of technologies.

PEO3: Skills to apply leadership, managerial and administrative qualities to lead the projects professionally and ethically.

Program specific outcomes (PSOs):

Mechanical Engineering graduates will be able to

PSO1: Identify and solve problems of thermal engineering, strength of materials, fluid mechanics, refrigeration & air conditioning, design, dynamics of machines, mathematics and engineering science.

PSO2: Get fundamental knowledge and hand-on experience of different manufacturing processes, material testing techniques and CAD/CAM tooling to apply in various industries.

PSO3: Learn quality and industrial management concepts, communication and soft skills along with other interdisciplinary subjects such as programming language, electrical engineering and basic electronics to enhance their employability.

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In Pursuit of Excellence	**Program Outcomes**	SESSION-2019-2020
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Program Outcomes

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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In Pursuit of Excellence	**Program Specific Outcomes**	SESSION-2019-2020
		SEM-7th

Mechanical Engineering graduates will be able to

- Identify and solve problems of thermal engineering, strength of materials, fluid mechanics, refrigeration & air conditioning, Design, dynamics of machines, mathematics and engineering science.
- Get fundamental knowledge and hand-on experience of different manufacturing processes, material testing techniques and CAD/CAM tooling to apply in various industries.
- Learn quality and industrial management concepts, communication and soft skills along with other interdisciplinary subjects such as programming language, electrical engineering and basic electronics to enhance their employability.

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In Pursuit of Excellence	**Academic Calendar**	SESSION-2019-2020 SEM- 7th

S. No.	Particulars	Date	Responsibility
1.	Time Table (a) Display on Notice Boards (b) Distribution to concerned Teachers	 29 July 2019 29 July 2019	O.C. Time — Table
2.	Distribution of class lists to teachers	29 July 2019	O.C. Class / DR
3.	**Registrations** (a) 3rd / 5"' /7"' Semester (b) List of unregistered students to various department (c) Notifying unregistered students for getting registered at the earliest (through class O.Cs, / Faculty)	 1,2,3 Aug.2019 20 Aug 2019 22 Aug 2019	 Concerned Teachers OS Academic Concerned HODs
4.	Commencement of Classes 3rd ' 5"' / 7" Semester	2,3,4 Aug 2019	Concerned Teachers
5.	Blow up submission to HODs	30 July 201 9	Concerned Teachers
6.	Announcement of Test series dates	16Aug 2019	Dean Academics
7.	(a) Collection of Examination forms from University and ahnouncensent of date for availability of forms (b) Last date for submission of forms to office (c) Submission of forms to University	30 Aug 2019**	OS Academic to take timely action as per University directions.
8.	Procurement of stationary & materials for Test Series for ftill semester (a) Requirement (b) Actual Procurement	 3 i Aug 2019 5 Sept 2019	Convener Test Series Committee O.S. Academics
9.	(a)Short attendance compilation and information to parents and undertaking format handed over to students (b)Collection of Short attendance undertaking	09 Sept 2019 11 Sept 2019	O.C. Class
10.	1" Test Series Thu, Fri, Sat	**12, 13,14, S pt 2019**	
	(a) Announcement of Test Series schedule, lnvigilation Programlne, Seating arrangement etc.	1 I Sept 2019	Class Test Committee
	(b) After completion of Test Series- Evaluation of test copies & showing of copies to students (c) Submission of test copies in Nodal Centre (d) Report of poor performance of students to class OCs	21 Sept 2019 25 Sept 2019 26 Sept 2019	Concerned Teachers Concerned Teachers Concerned Teachers
	(e)Short attendance compilation, display on notice board and information to parents	19 Oct 2019	O.C. Class ''
11.	2nd Test Series Wed, Thus, Fri	**23,24, 2 Oct** 2019	

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	(b) After completion of Test Series - Evaluation o*test copies & showing of copies to **students** (c) Submission of test copies in Nodal Centre (d) Report of poor performance of students to"class OCs	02 Nov 2019 04 Nov 2019 05 Nov 2019	Concerned Teachers Concerned Teachers Concerned Teachers
12.	Filling of student feedback forms for current semester	27 Nov 2019	Concerned HODs
13.	Requirement of additional Faculty (to be conveyed to Director) (for even semester)	30 Nov 2019	Concerned HODs
14.	(a) Floating the electives for even semester (b) **Last** date for students choice	26 Nov 2019 30 Nov 2019	Concerned HODs
15.	Announcement of dues list and its last date for clearing d Us (Current semester)	22 Oct **2019**	Accounts/ OS Academic
i6.	Date up to which final attendance is to be counted	29 Nov 2019	Concerned teachers
17.	Submission of consolidated list of shortage of attendanc'e to Director and information to Parents	30 Nov 2019	Class O.Cs
18.	**3" Test Series** Thu, **Fri,** Sat	**28,29,30** Nov	**2019**
	(a) Announcement of Test Series schedule, Invigilation Programme, Seating arrangement etc.	27 Nov 2019	Class Test' Committee
	(b) After completion of Test Series- Evaluation of test copies & showing of copies to students (c) Submission of test copies in Nodal Centre (d}Report of poor performance of students to **class** OCs	03 Dec2019 04 Dec 2019 04 Dec 2019	Concerned Teacher Concerned Teachers Concerned Teachers
19.	**Submission of** sessional **marks:** (a) Meeting of Dean Academics, , all HODs and Director regarding attendance and performance of students.	04 Dec 2019	Oean Academics
	(b) Checking of Teachers' Records by HODs	05 Dec 2019	Concerned HODs
	(c) Finalization of sessional marks	05 Dec 2019	Concerned Teachers
	(d) Submission of Award list after final checking and uploading to OS Academics for further necessary actiofl	As per date announced by AKTU	HODs Concerned Teachers
20.	**Theory Examinations:** (a) Collection of Admit Cards / Roll Nos. from University (b) Preparation of Roll lists (c) Collection of stationery such as copies, practical copies drawing sheets, graph paper etc. from University. (c) Procurement of stationery and other materials locally as necessary.	As per AKTU schedule	OS Academics to take appropriate actions as per University directions.
	(a) Announceiaient of Test Series schedule, Invigilation Progiaiiiire, seating arrangement etc	22 Oct 2019	Class Test Committee

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21.	**Practical** Examinations:	As per AKTU schedule	Concerned HODs
	(a) Appointment of Internal Examiners	3 days before the practical exam schedule	Concerned HODs
	(b) Obtaining list of panel of External Examiners fi om AKTU & preparation of schedule of practical examination.	As per AKTU schedule	OS Academics
	(d) Dispatch of letters/contactit4g the eKternal examiners	Within 2 days of list obtained from AKTU	HODs and concerned teachers

22.	Preparation for Even Semester (a) Load Distribution by Department (b) Submission to O.C. Time-Table (c) Display of Time Table on Notice Board	 10 Dec 2019 12 Dec 2019 18 Jan 2020	 Concerned Coordinators O.C. Time Table
23.	Registration for Even semester [20 t 9 — 20]	To be announced**	OS Academic
24.	Announcement of Academic calendar for Even semester [2019 — 20]	5 Days before the start Even sem.	Dean Academics

**May be revised as per AKTU Schedule.

Director

Dean Academics

Copy to:

1. Chairman	2. Secretary	3. P.A. to Directtffor Direqor's older
4. All HODs	5. DOSW	6. Controller Examinations° <
7. Associate Dean Academics	8. Registrar	@. All Faculty Members tough Ds
IO. O.S. Academics	I I. A.S. Examinatons	12. Accounts Section ,
13. T & P Cell	14. Librarian	15. Con *ner Test Series/ Time Table

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In Pursuit of Excellence	**Course Evaluation Scheme**	SESSION-2019-2020
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SEVENTH SEMESTER									
Sl.No.	Subject Code	Subject Name	Department	L-T-P	Th/Lab Marks	Sessional		Total	Credit
					ESE	CT	TA		
1		OPEN ELECTIVE COURSE-1	Other Deptt.	3-0-0	70	20	10	100	3
2		DEPTT ELECTIVE COURSE-3	Core Deptt.	3-0-0	70	20	10	100	3
3		DEPTT ELECTIVE COURSE-4	Core Deptt.	3-1-0	70	20	10	100	4
4	RME701	CAD/CAM	Core Deptt.	3-1-0	70	20	10	100	4
5	RME702	Automobile Engineering	Core Deptt.	3-0-0	70	20	10	100	3
6	RME751	CAD/CAM Lab	Core Deptt.	0-0-2	50		50	100	1
7	RME752	IC Engine & Automobile Lab	Core Deptt.	0-0-2	50		50	100	1
8	RME753	INDUSTRIAL TRAINING	Core Deptt.	0-0-3			100	100	2
9	RME754	PROJECT-1	Core Deptt.	0-0-6			200	200	3
	TOTAL				450	100	450	1000	24

DEPARTMENTAL ELECTIVE-3	
Sub.Code	Subject Name
RME070	Composite Materials
RME071	Power Plant Engineering
RME072	Supply Chain Management
RME073	Additive Manufacturing

DEPARTMENTAL ELECTIVE-4	
S.Code	Subject Name
RME075	Operation Research
RME076	Modelling &Simmulation
RME077	Computational Fluid Dynamics
RME078	Automation & Robotics

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UNIT-I:Introduction:

Basic concepts of Automobile Engineering and general configuration of an automobile, Power and Torque characteristics. Rolling, air and gradient resistance. Tractive effort. Gear Box. Gear ratio determination.

UNIT-II:

Transmission System: Requirements. Clutches. Toque converters. Over Drive and free wheel, Universal joint.Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle.Castor Angle, wheel camber & Toe-in, Toe-out etc... Steering geometry. Ackerman mechanism,Understeer and Oversteer. Hotchkiss drive and Torque tube drive.

UNIT-III:

Braking System: General requirements, Road, tyre adhesion, weight transfer, Braking ratio. Mechanical brakes,Hydraulic brakes. Vacuum and air brakes. Thermal aspects.Antilock braking system(ABS), electronic brake force distribution (EBD) and traction control.

Chassis and Suspension System:

Loads on the frame, Strength and stiffness, Independent front & rear suspension, Perpendiculararm type, Parallel arm type, Dead axle suspension system, Live axis suspension system,Airsuspension & shock absorbers.

UNIT-IV:

Electrical System: Types of starting motors, generator & regulators, lighting system, Ignition system, Horn, Batteryetc.

Fuel Supply System:

Diesel & Petrol vehicle system such as Fuel Injection Pump, Injector & Fuel Pump, Carburettoretc. MPFI.

UNIT-V:

Emission standards and pollution control: Indian standards for automotive vehicles-Bharat I and II, Euro-I and Euro-II norms, fuel qualitystandards, environmental management systems for automotive vehicles, engine emissioncontrol by 3-way catalytic converter system, fueladditives and modern trends in automotive engine efficiency and emission control.

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Alternative Energy Sources:

Alternative energy sources, natural gas, LPG, biodiesel, bio-ethanol, gasohol and hydrogenfuels in automobiles, modifications needed, performance, combustion & emissioncharacteristics of alternative fuels in SI and CI engines, Electric and Hybrid vehicles,application of Fuel Cells. Prevention maintenance and overhauling.

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Syllabus

UNIT-I:

Introduction:

Basic concepts of Automobile Engineering and general configuration of an automobile, Powerand Torque characteristics. Rolling, air and gradient resistance. Tractive effort. Gear Box. Gearratio determination.

***Engine Components,**

***A primer on the differences between conventional gas and hybrid cars**

*** Dynamic Equation and Tire–Ground Adhesion and Maximum Tractive Effort**

UNIT-II:

Transmission System:

Requirements. Clutches. Toque converters. Over Drive and free wheel, Universal joint.Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle.Castor Angle, wheel camber & Toe-in, Toe-out etc... Steering geometry. Ackerman mechanism,Understeer and Oversteer. Hotchkiss drive and Torque tube drive.

UNIT-III:

Braking System:

General requirements, Road, tyre adhesion, weight transfer, Braking ratio. Mechanical brakes,Hydraulic brakes. Vacuum and air brakes. Thermal aspects.Antilock braking system(ABS), electronic brake force distribution (EBD) and traction control.

*** Fundamentals of Regenerative Braking**

Chassis and Suspension System:

Loads on the frame, Strength and stiffness, Independent front & rear suspension, Perpendiculararm type, Parallel arm type, Dead axle suspension system, Live axis suspension system,Airsuspension & shock absorbers.

UNIT-IV:

Electrical System:

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Types of starting motors, generator & regulators, lighting system, Ignition system, Horn, Batteryetc.

Fuel Supply System:

Diesel & Petrol vehicle system such as Fuel Injection Pump, Injector & Fuel Pump, Carburettoretc. MPFI.

UNIT-V:

Emission standards and pollution control:

Indian standards for automotive vehicles-Bharat I and II, Euro-I and Euro-II norms, fuel qualitystandards, environmental management systems for automotive vehicles, engine emissioncontrol by 3-way catalytic converter system, fueladditives and modern trends in automotive engine efficiency and emission control.

* **Emission Regulation And Control Systems**

***Difference between BSIV & BSVI Engine: BS4, BS6 Performance**

Alternative Energy Sources:

Alternative energy sources, natural gas, LPG, biodiesel, bio-ethanol, gasohol and hydrogenfuels in automobiles, modifications needed, performance, combustion & emissioncharacteristics of alternative fuels in SI and CI engines, Electric and Hybrid vehicles,application of Fuel Cells. Prevention maintenance and overhauling.

* **Series Hybrid Electric Drive Train Design**

***Beyond the syllabus Topics**

References:

1. Automotive Engineering- Hietner.
2. Automobile Engineering - Narang.
3. Automobile Engineering –TTTI, Pearson India.
4. Automotive Mechanics- Crouse.
5. Automobile Engineering –Ramakrishna, PHI, India.
6. Kirpal Singh, Automobile Engineering, 7th ed., Standard Publishers, New Delhi, 1997.

Additional References:

1. Automobile Engineering - Newton and Steeds.

Text Books:

1. Automobile Engineering - Kripal Singh.

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In Pursuit of Excellence	Course Outcomes	SESSION-2019-2020
		SEM-7th

COURSE OUTCOMES

Once the student has successfully completed this course, he/she will be able:

RME701.1	Understand the concept on working principles of various systems of auto mobiles.
RME701.2	Analyze the working principles and operations details of transmission and steering systems.
RME701.3	Evaluate the working principles and operational details of braking and suspension systems.
RME701.4	Understand the working principles and operational details of cooling, ignition and electrical systems along with fuel supply systems.
RME701.5	Compare the effects of emissions from automobiles and to know the ways of reducing emissions and understanding of Alternative energy sources, natural gas, LPG, biodiesel, bio-ethanol, gasohol and hydrogen fuels in automobiles.

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In Pursuit of Excellence	**Course Delivery Method**	SESSION-2019-2020
		SEM-7th

Name of Subject: Automobile Engineering Subject Code: RME- 702

Branch: Mechanical Engineering

Course Plan

Delivery Methods: Chalk & Talk, Power Point Presentation, Tutorials, Video Lectures, Analogy, solving Numericals /Design exercises, assignments, seminar, Brainstorming, Group Discussion/Interactive session, Mini Project, Quiz

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Unit 1 by: - Chalk & Talk, Power Point Presentation, Video Lectures, assignments seminar.

Unit 2 by: - Chalk & Talk, Power Point Presentation, Video Lectures, solving Numericals / assignments .

Unit 3 by: - Chalk & Talk, Power Point Presentation, Video Lectures, solving Numericals/Design exercises, assignments.

Unit 4 by: - Chalk & Talk, Power Point Presentation, Video Lectures /Design exercises, assignments,

Unit 5 by: - Chalk & Talk, Power Point Presentation, , Video LecturesDesign exercises, group discussion/Interactive session,

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In Pursuit of Excellence	Mapping	SESSION-2019-2020
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Mapping of Course Outcomes with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
RME702.1	1	2	-	1	-	2	2	1	-	1	1	1
RME702.2	1	2	2	1	1	1	1	2	-	1	-	1
RME702.3	1	2	2	2	1	2	1	1	-	1	-	1
RME702.4	1	1	2	1	2	2	3	3	1	1	1	2
RME702.5	2	2	1	1	3	3	3	3	1	1	2	3
RME702	1.2	1.8	1.4	1.2	1.75	2	2	2	1	1	1.3	1.6

CO	PSO1	PSO2	PSO3
RME702.1	2	1	1
RME702.2	2	1	1
RME702.3	2	1	1
RME702.4	2	3	1
RME702.5	2	2	1
RME702	2	1.6	1

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In Pursuit of Excellence	Time Table	SESSION-2019-2020
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UPDATED & W.E.F. 16/08/2019

RE-UPDATED & W.E.F. 03/09/2019

FACULTY NAME- MR PRASHANT SINGH (PSI)

L	T	P
4	0	15 = 19 HRS

TIME / DAY	9.00-10.00 am	10.00-11.00am	11.00 - 12.00 Noon	12.00-01.00pm	01.00-2.00pm	2.00-3.00pm	3.00-4.00pm	4.00-5.00pm
MON	KWS 101 (P), 1ST A3, G-101				L U N C H			
TUE	**5.VP.02 (LAB) B.VOC 1ST B HMT LAB**		RME 702 (L) 7TH E D-307			RME 753, 7TH D, D-305		
WED				RME 702 (L) 7TH E D-306				
THU	**5.VP.02 (LAB) B.VOC 1ST B HMT LAB**		RME 752, 7TH E2, A-103					
FRI		**PLES (L)** 3RD E D-305	RME 752, 7TH D2, A-103					
SAT		RME 702 (L) 7TH E D-306						

Subject Code	Subject Name
RME 702	AUTOMOBILE ENGINEERING
RME752	IC Engine & Automobile Lab
RME 753	INDUSTRIAL TRAINING
KWS 101 (P)	WORKSHOP LAB
PLES	**PATENT LAW FOR ENGINEERS AND SCIENTISTS**
5.VP.02	***Heat Transfer lab.***

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In Pursuit of Excellence	Lecture Plan & Course Coverage	SESSION-2019-2020 SEM- 7th

Total Period: 40

Sr. No.	No. of Periods	Topics/Sub Topics	Reference Books/References	CO Covered	Planned Date	Coverage Date	Sign
1.	1	Introduction to Course Educational Objective, Course Outcomes, Scheme, Adopted Syllabus, PEOs, POs, PSOs Pre-requisite, Vision & Mission of Institute and Department			02/08/19	06/08/19	
2.	4	Basic concepts of Automobile Engineering and general configuration of an automobile ***Engine Components,** ***A primer on the differences between conventional gas and hybrid cars**	[1,4,6] https://en.wikipedia.org/wiki/Automotive_engineering https://www.youtube.com/watch?v=JkLIvuaANS0 https://www.youtube.com/watch?v=hs7bABMtOMI&list=PLyqSpQzTE6M9G2SNxKfsVEj	CO1	04/08/19 06/08/19 08/08/19 13/08/19	07/08/19 13/08/19 14/08/19 14/08/19	

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			cM9MlJau4F https://nptel.ac.in/courses/108/103/108103009/ https://www.youtube.com/watch?v=yI6bGBiL9Fw&list=PLyqSpQzTE6M9G2SNxKfsVEjcM9MlJau4F&index=4				
3.	3	Power and Torque characteristics. Rolling, air and gradient resistance. Tractive effort. Gear Box. Gear ratio determination. ***Dynamic Equation and Tire–Ground Adhesion and Maximum Tractive Effort**	https://x-engineer.org/automotive-engineering/internal-combustion-engines/performance/power-vs-torque/ https://nptel.ac.in/content/storage2/courses/108103009/download/M2.pdf	CO1	17/08/19 21/08/19 27/08/19	17/08/19 21/08/19 27/08/19	
4.	4	Requirements. Clutches. Toque converters. Over Drive and free wheel, Universal joint.Differential Gear Mechanism of Rear Axle. Automatic transmission.	[1,4,6] https://schaeffler-events.com/symposium/lecture/t4/index.html#:~:text=In%20terms%20of%20the%20requirements%20for%20the%20torque,masses%20into%20the%20system%20to%20isolate%20the%20vibrations.	CO2	28/08/19 31/08/19 03/09/19 04/09/19	28/08/19 31/08/19 03/09/19 04/09/19	

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			https://www.theengineerspost.com/overdrive-transmission/ https://auto.howstuffworks.com/automatic-transmission.htm				
5.	4	Steering and Front Axle.Castor Angle, wheel camber & Toe-in, Toe-out etc...Steering geometry. Ackerman mechanism, Understeer and Oversteer. Hotchkiss drive and Torque tube drive.	[1,4,6] http://www.ijirst.org/articles/IJIRSTV1I7011.pdf https://what-when-how.com/automobile/the-ackermann-principle-as-applied-to-steering-automobile/ https://www.youtube.com/watch?v=em1O8mz7sF0	CO2	13/09/19 17/09/19 18/09/19 21/09/19	13/09/19 17/09/19 18/09/19 21/09/19	
6.	3	General requirements, Road, tyre adhesion, weight transfer, Braking ratio. Mechanical brakes,Hydraulic brakes. Vacuum and air brakes. ***Fundamentals of Regenerative Braking**	[1,5] https://www.youtube.com/watch?v=2GoGoalXHxc https://www.youtube.com/watch?v=jRO5EYcjGUc https://www.automotive-technology.com/articles/types-of-braking-systems-and-types-of-brakes https://www.youtube.com/watch?v=ErWV4g1RDL4 https://nptel.ac.in/content/storage2/courses/1	CO3	25/09/19 28/09/19 01/10/19	25/09/19 28/09/19 01/10/19	

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			08103009/download/M11.pdf				
7.	4	Thermal aspects.Antilock braking system(ABS), electronic brake force distribution (EBD) and traction control.	[1,2] https://www.youtube.com/watch?v=98DXe3uKwfc https://www.youtube.com/watch?v=ru4JIZ-x8yo https://www.financialexpress.com/what-is/anti-lock-braking-system-meaning/1767273/ https://www.youtube.com/watch?v=PTPavSBS_OE https://auto.howstuffworks.com/car-driving-safety/safety-regulatory-devices/electronic-brake-force-distribution.htm	CO3	03/10/19 04/10/19 05/10/19 06/10/19	05/10/19 05/10/19 06/10/19 06/10/19	
9.	4	Chassis and Suspension System:Loads on the frame, Strength and stiffness, Independent front & rear suspension, Perpendiculararm type,	[3] https://www.youtube.com/watch?v=AVsBgoU88MU https://www.youtube.com/watch?v=MpMgwbn6ctU	CO3	12/10/19 12/10/19	12/10/19 12/10/19	

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		control. ***Emission Regulation And Control Systems** ***Difference between BSIV & BSVI Engine: BS4, BS6 Performance**					
12.	3	Alternative energy sources, natural gas, LPG, biodiesel, bio-ethanol, gasohol and hydrogenfuels in automobiles, modifications needed,performance, combustion & emissioncharacteristics of alternative fuels in SI and CI engines, Electric and Hybrid vehicles,application of Fuel Cells. Prevention maintenance and overhauling. ***Series Hybrid Electric Drive Train Design**	[1,6] https://www.youtube.com/watch?v=crNg-RUnwp4 https://www.edfenergy.com/for-home/energywise/renewable-energy-sources https://www.greenmatch.co.uk/blog/alternative-energy-sources https://www.nrdc.org/stories/renewable-energy-clean-facts https://nptel.ac.in/courses/108/103/108103009/ https://nptel.ac.in/courses/103/102/103102015/ https://www.fuelcellstore.com/blog-section/intro-fuel-cell-applications#:~:text=Some%20portable%20fuel%20cell%20applications,a%20continuous	CO5	06/11/19 13/11/19 16/11/19 19/11/19	16/11/19 16/11/19 19/11/19 19/11/19	

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			%20supply%20of%20fuel. https://nptel.ac.in/content/storage2/courses/108103009/download/M3.pdf				
13.	1	Previous year question paper discussion.			20/11/19	20/11/19	
	1	Previous year question paper discussion.			23/11/19	23/11/19	

Name & Sign. of Faculty

Sign. of Reviewer

Sign. of HOD

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In Pursuit of Excellence	ASSIGNMENT - 1	SESSION-2019-2020 SEM-7th

Home Assignments

Unit 1[CO- 1]

PART-1

Q1: Name the basic parts and systems in a car. Describe the primary purpose of each.

Q2: List the types of common cylinder arrangements in automobile engine.

Q3: What is a cylinder liner? What if the difference between a dry-liner and wet –liner?

Q4: What are the three functions performed by piston rings?

Q5: Draw an engine valve and name its different parts.

Q6: State the two purposes of flywheel.

PART-2

Q1:Draw valve timing diagram for 4-stroke an 2-stroke diesel engine.
Q2:What are the four basic components of the automobile structure?
Q3:How gear box is important in an automobile?
Q4:Compare single cylinder and 3-cylinder engine of same power for automobiles
Q.5Classify an automobile on the basis of transmission system and wheel drive system
Q.6: A passenger car travelling at 79.50kmph is accelerated up a gradient of 1 in 20. The gross vehicle weight is 11022. 74N. It has a frontal area of 1.898m^2 and air resistance coefficient may be assumed as 0.0017, the rolling resistance is 221.70N. At the above speed, the engine develops B.P. 58. 54kW corresponding to an engine speed of 4400rpm. Rear axle ratio is 5:1, effective wheel radius is 0.3048m. The transmission efficiency is 95%. Calculate: (i) Total tractive resistance (ii) Tractive effort available at the wheels (iii) Acceleration while ascending the above gradient.

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In Pursuit of Excellence	**ASSIGNMENT - 2**	SESSION-2019-2020 SEM- 7th

Unit 2[CO- 1,2]

PART-1

Q1: What do you understand from the term "engine performance"? Illustrate your answer by means of important performance curves.

Q2: What is volumetric efficiency? How does it affect the engine performance?

Q3: Name different resistances encountered by a moving vehicle. Explain any two.

Q4: Derive an expression for weight transfer when brakes are applied on all the four wheels of the vehicle?

Q5: Explain the following terms: Camber, Castor, toe-in or toe out, king pin inclination and combined angle & scrub radius.

Q6: Explain with neat sketch Ackerman steering mechanism.

Q7: What is independent suspension system? Explain Wishbone arm system with neat sketch.

Q8: Explain working principle of differential gear with neat sketch.

Q9: Explain with neat sketch sliding mesh gear box?

Q10: Explain with neat sketch constant mesh gear box?

PART-2

Q1:It is possible to make a faster climb in low gear on certain gradients than in top gear. Comment on the validity of this statement.

Q2:Why a clutch is necessary in the transmission system of an automobile?

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Q3:The air resistance and rolling resistance of a vehicle are given by $R_a=0.01V^2$ and $R_r=7.5+0.25V$ respectively. The resistance being expressed in N and speed in kmph. If the transmission efficiency in top gear=90%, find the engine B.P. required at a vehicle speed of 140kmph. Also calculate the vehicle acceleration in m/s^2 at the instant when the vehicle is moving at 55kmph in top gear. Given engine torque at 55kmph=1.3*engine torque at 140kmph. For calculation of force the vehicle can be assumed to be equivalent to weight of 17651N.

Q4:A truck of GVW 48kN is to travel on an upward road grade of 17% at 45kmph in second gear. Its frontal cross sectional area is $5.1m^2$ If transmission efficiency in second gear is 83%, coefficient of rolling resistance and air resistance are 0.017 and 0.044 respectively, then calculate:

(Hint: sinΘ=17/100)

(a) Total tractive resistance in kN

(b) Minimum power required in the engine in kW.

Q5:A motor car weighs 13349.44N. The rolling resistance may be assumed at 44.498N of vehicle weight. The air resistance is given by $0.0017\ AV^2$ where A is the frontal area and V is car speed. The frontal area of the vehicle is $2.312m^2$ and car speed is 47.76kmph. Determine the power required to propel the vehicle on level road. If the tractive effort available at the wheels is 1859.97N, find the maximum gradient which the vehicle can climb.

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In Pursuit of Excellence	ASSIGNMENT - 3	SESSION-2019-2020 SEM- 7th

Unit 3 [CO- 3,4]

PART-1

Q1: Derive the expression for stopping distance and braking efficiency?
Q2: Write down the difference between front wheel drive and rear wheel drive system?
Q3: What are brakes? Write down the braking requirement?
Q4: Explain the terms: pitching, rolling and bouncing.
Q5: What is a shock absorber? Explain its working principle with neat sketch?
Q6: What are the different types of Maintenance done in Automobile?
Q7: What are the Properties of good coolant?

PART-2

Q1:Compare the constructional and operational aspects of disc and drum brakes. Which one is preferred and why?
Q2:For and automobile with wheel base 2.5m, the center of gravity lies 0.6m above the ground and 1.15m in front of the rear axle. The automobile is moving on level ground with a speed of 45kmph. Find the minimum stopping distance when: (a)only rear wheel are braked (b) only front wheels are braked
(c) brakes are applied to all the wheels
Take coefficient of friction= 0.5
(Ans: (a) s= 33.1m (b) s= 30.51m (c) s= 15.94m).

Q3:A vehicle weighing 15000N has a wheel base of 3m. the center of gravity lies 1.5m in front of rear axle and 0.8m above the ground level the vehicle is moving up on an incline of angle whose sine is equal to 0.1. Presuming that vehicle has brakes on all the four wheels and coefficient of friction is 0.5. Calculation for the (a) load distribution between front and rear axle
(b) distance at which vehicle can be stopped while going at a speed of 15m/s.
Presume that only rear wheels are braked.
(Ans: (a) 6584.5N & 8340.3N (b) 35.94m)

Q4:What is meant by bleeding of brakes?
Q5:.Define camber, castor. Explain with a neat sketch.

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In Pursuit of Excellence	**ASSIGNMENT - 4**	SESSION-2019-2020 SEM- 7th

Unit 5 [CO- 4]

Q1: Describe with the neat sketch Multipoint fuel injection system.

Q2: Discuss the Water Cooling System for automotive Engine.

Q3: Discuss in brief the working of carburetor.

Q4: Difference between Dry sump lubrication system and wet sump lubrication system.

Q5: Analyze the performance of D-C generator and alternator for automobile application

Q6: What are the considerations on which the size of starting motor depends?

Q7. How overrunning clutch is used as starting device?

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In Pursuit of Excellence	**ASSIGNMENT - 5**	SESSION-2019-2020 SEM-7th

Unit 4[CO- 4,5]

Q1: Why does the three – way converter not work in case of diesel engines?

Q2: If the opening temperature for the thermostat valve in the engine cooling system is raised, how does it affect the pollution?

Q3: How hydrogen fuel is utilized as alternative fuel?

Q4: Explain the two types of techniques for treating the exhaust gases to reduce the pollutants?

Q5: What are the advantages and disadvantages of Bio-diesel?

Q.6: What do you understand by Euro Norms and Bharat stage norms?

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In Pursuit of Excellence	List of Students	SESSION-2019-2020 SEM-7th

S/N	Roll No.	Name of Students
1	1608240001	Aaryan
2	1608240002	Abhishek Kumar Singh
3	1608240003	Ajeet Morya
4	1608240004	Akash Gautam
5	1608240005	Akash Kumar
6	1608240006	Akash Yadav
7	1608240007	Akash Mathur
8	1608240008	Aman Mathur
9	1608240009	Aman Sisodia
10	1608240010	Amit Kumar S/O V P
11	1608240011	Amitesh Kushwaha
12	1608240012	Anant Tiwari
13	1608240013	Ankit Kumar
14	1608240014	Ankur Singh
15	1608240015	Anuj Panwar
16	1608240016	Arjun Singh
17	1608240017	Arpit Kumar
18	1608240019	Ayush Rajput
19	1608240020	Deepak Pandey
20	1608240022	Dhaneshvar Chauhan
21	1608240023	Dhavesh Saini
22	1608240024	Dinesh Kumar
23	1608240025	Dishant Pratap
24	1608240026	Gajendra Singh
25	1608240027	Gaurav Verma
26	1608240028	Gurdeep Kumar
27	1608240029	Harsh Kaushik
28	1608240030	Harsh Thakur
29	1608240031	Himanshu Choudhary
30	1608240032	Himanshu Sharma
31	1608240034	Jitendra Kumar

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32	1608240035	Jitendra Singh Saini
33	1608240036	Karun Kumar Chauhan
34	1608240037	Kovit Kumar
35	1608240038	Krishna Kumar
36	1608240039	Laksha Kumar
37	1608240040	Maneesh Chauhan
38	1608240041	Mohammad Faizi
39	1608240042	Mohd. Areeb Saifi
40	1608240043	Mohd. Ahtesham
41	1608240045	Mohd. Anas
42	1608240046	Mohd. Ather
43	1608240047	Mohd. Daniyal
44	1608240048	Mohd. Faiz
45	1608240049	Mohd. Faizan
46	1608240051	Mohd. Shazeb
47	1608240052	Mohd. Asim
48	1608240053	Mohd. Faraz
49	1608240054	Mohd. Saddam Husain
50	1608240055	Mudit Yadav
51	1608240056	Mumtaz Khan
52	1608240057	Nawaz Ali
53	1608240058	Neeraj Saini
54	1608240059	Nitesh Kumar Saroj
55	1608240060	Nuzaif Khan
56	1608240061	Ovais Khan
57	1608240062	Prince Tyagi
58	1608240063	Pulkit Dhariwal
59	1608240065	Raja Kanchan
60	1608240069	Raman Kaushik
61	1608240070	Ritesh Singh
62	1608240071	Sachin Kumar S/O S S
63	1608240072	Sachin Bhandari
64	1608240073	Sagar Kumar
65	1608240074	Salman
66	1608240075	Santosh Verma
67	1608240076	Sarabhjeet Singh
68	1608240077	Sarthak Vyas
69	1608240078	Satyam Thakur
70	1608240080	Shashwat Yadav

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71	1608240082	Shubham Kumar
72	1608240084	Sumit Kumar
73	1608240085	Ubaid Ur Rehman
74	1608240086	Utkarsh Tyagi
75	1608240087	Vaibhav Singh
76	1608240088	Varun Rastogi
77	1608240089	Vikas Kumar
78	1608240091	Vishal Chaudhary
79	1608240092	Vishesh Kumar
80	1608240093	Vishnu Kumar Gautam
81	1608240094	Yash Rastogi
82	1608240095	Yasharth Gautam
83	1608240096	Ziaul Mustafa
84	1508240064	Kamal Prakash Singh Lodhi
85	1508240083	Mohd. Anas
86	1508240117	Priyanshu Kumar
87	1508210153	Shrikant Siddharth
88	1608210065	Himanshu Chaudhary
89	1608210083	Mohd. Javed
90	1608210132	Rohan Dhariwal
91	1708240901	Ankur Saini
92	1708240902	Anuj Pal S/o Rajkumar
93	1708240903	Devraj Singh
94	1708240904	Mohammad Junaid
95	1708240905	Mohammad Shariq
96	1708240906	Ravi Arya
97	1708240907	Rishabh Dhyani
98	1708240908	Shubham Raj
99	1708240909	Varun Chhatrawal

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In Pursuit of Excellence	**Record of Monthly Attendance**	SESSION-2019-2020 SEM-7th

MORADABAD INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

4th year E Section Sem- 7th

Attendance

S No.	Roll No.	Name of Student	CT-1		CT-2		CT-3	
			A	H	A	H	A	H
1	1608240069	Raman Kaushik	8	11	20	26	34	37
2	1608240070	Ritesh Singh	7	11	20	26	34	37
3	1608240071	Sachin Kumar S/O S S	9	11	22	26	36	37
4	1608240072	Sachin Bhandari	6	11	22	26	36	37
5	1608240073	Sagar Kumar	6	11	19	26	33	37
6	1608240074	Salman	4	11	17	26	31	37
7	1608240075	Santosh Verma	9	11	23	26	37	37
8	1608240076	Sarabhjeet Singh	2	11	18	26	32	37
9	1608240077	Sarthak Vyas	7	11	21	26	35	37
10	1608240078	Satyam Thakur	8	11	23	26	37	37
11	1608240080	Shashwat Yadav	6	11	18	26	32	37
12	1608240082	Shubham Kumar	7	11	19	26	33	37
13	1608240084	Sumit Kumar	7	11	20	26	34	37

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14	1608240085	Ubaid Ur Rehman	8	11	22	26	36	37
15	1608240086	Utkarsh Tyagi	6	11	22	26	36	37
16	1608240087	Vaibhav Singh	3	11	21	26	35	37
17	1608240088	Varun Rastogi	3	11	17	26	31	37
18	1608240089	Vikas Kumar	8	11	20	26	34	37
19	1608240091	Vishal Chaudhary	9	11	22	26	36	37
20	1608240092	Vishesh Kumar	9	11	21	26	35	37
21	1608240093	Vishnu Kumar Gautam	6	11	23	26	37	37
22	1608240094	Yash Rastogi	7	11	20	26	34	37
23	1608240095	Yasharth Gautam	6	11	21	26	35	37
24	1608240096	Ziaul Mustafa	5	11	23	26	37	37
25	1508240064	Kamal Prakash Singh Lodhi	5	11	17	26	31	37
26	1508240083	Mohd. Anas	5	11	18	26	32	37
27	1508240117	Priyanshu Kumar	6	11	15	26	29	37
28	1508240153	Shrikant Siddharth	2	11	13	26	27	37
29	1608210065	Himanshu Chaudhary	6	11	17	26	31	37
30	1608210083	Mohd. Javed	6	11	21	26	35	37
31	1608210132	Rohan Dhariwal	0	11	16	26	30	37
32	1708240901	Ankur Saini	8	11	23	26	37	37
33	1708240902	Anuj Pal S/o Rajkumar	5	11	22	26	36	37
34	1708240903	Devraj Singh	6	11	22	26	36	37
35	1708240904	Mohammad Junaid	3	11	19	26	33	37
36	1708240905	Mohammad Shariq	10	11	20	26	34	37
37	1708240906	Ravi Arya	7	11	20	26	34	37
38	1708240907	Rishabh Dhyani	2	11	19	26	33	37
39	1708240908	Shubham Raj	8	11	22	26	36	37
40	1708240909	Varun Chhatrawal	6	11	21	26	35	37

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In Pursuit of Excellence	Class Test Papers	SESSION-2019-2020
		SEM- 7th

MORADABAD INSTITUTE OF TECHNOLOGY

Class Test-1

Subject: Automobile Engg. **Subject code: RME-702**

Semester: 7th **Time: 1hr.**

Session – 2019-20 **Max Marks:20**

Note: 1. Attempt all questions.

2. Assume missing data suitably, if any.

SET-1

Ques.No.	1	2	3	4	5	6
CO	1	1	1	1	1	1

SECTION-A[CO-1] (3 * 4 = 12)

Q.1: Define different types of resistances encountered by a moving vehicle. How propelling power is related to these resistances?

Q.2: Name the basic parts and systems in a car. Describe the primary purpose of each.

Q.3: Explain working principle of Constant mesh gear box with neat sketch.

SECTION-A[CO-1] (2 * 4 = 08)

Q.4: A truck of GVW 48kN is to travel on an upward road grade of 17% at 45kmph in second gear. Its frontal cross sectional area is 5.1m^2 If transmission efficiency in second gear is 83%,

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coefficient of rolling resistance and air resistance are 0.017 and 0.044 respectively, then calculate: **(Hint: $\sin\Theta=17/100$)**

(a) Total tractive resistance in kN

(b) Minimum power required in the engine in kW.

Q.5: Discuss any four difference between conventional gasoline automobile and modern electric automobiles.

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MORADABAD INSTITUTE OF TECHNOLOGY

Class Test-1

Subject: Automobile Engg. | **Subject code: RME-702**
Semester: 7th | **Time: 1hr.**
Session – 2019-20 | **Max Marks:20**

Note: 1. Attempt all questions.
2. Assume missing data suitably, if any.

SET-2

Ques.No.	1	2	3	4	5	6
CO	1	1	1	1	1	1

SECTION–A[CO-1] (3 * 4 = 12)

Q.1: Name different resistances encountered by a moving vehicle. Explain any two.

Q.2: Name the basic parts and systems in a car. Describe the primary purpose of each.

Q.3: Explain working principle of Constant mesh gear box with neat sketch.

SECTION – A [CO-1] (2 * 4 = 08)

Q.4: A vehicle weighing 15000N has a wheel base of 3m. the center of gravity lies 1.5m in front of rear axle and 0.8m above the ground level the vehicle is moving up on an incline of angle whose sine is equal to 0.1. Presuming that vehicle has brakes on all the four wheels and coefficient of friction is 0.5. Calculation for the

(a) load distribution between front and rear axle

(b) distance at which vehicle can be stopped while going at a speed of 15m/s. Presume that only rear wheels are braked.

Q.5: The air resistance and rolling resistance of a vehicle are given by $R_a=0.01V^2$ and $R_r=7.5+0.25V$ respectively. The resistance being expressed in N and speed in kmph. If the transmission efficiency in top gear=90%, find the engine B.P. required at a vehicle speed of 140kmph. Also calculate the vehicle acceleration in m/s^2 at the instant when the vehicle is moving at 55kmph in top gear. Given engine torque at 55kmph=1.3*engine torque at 140kmph. For calculation of force the vehicle can be assumed to be equivalent to weight of 17651N.

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In Pursuit of Excellence	Class Test Papers	SESSION-2019-2020
		SEM- 7th

MORADABAD INSTITUTE OF TECHNOLOGY
Department of Mechanical Engineering
Class Test-2

Course: B.Tech.	**Semester: 7th**
Session – 2019-20	**Section: E**
Subject: Automobile Engineering	**Subject Code: RME-702**
Max Marks:20	**Time: 75 Minutes**

SET-1

Ques.No.	1	2	3	4	5	6
CO	3	1	3	2	2	2

Note: 1. Attempt all questions.

2. Assume missing data suitably, if any.

SECTION – A

(2 * 2 = 04)

Q.1: What are brakes? Write down the braking requirement?

Q.2: Arrange the following components according to their participation in drive train of a typical Automobile system. (a) Clutch (b) Differential (c) Flywheel (d) Slip joint (e) Gear Box (f) Propeller Shaft (g) Universal Joint (h) Torque Converter (i) Drive shaft.**(Hint- Power flow from Engine to wheel)**

SECTION – B

(2 * 3 = 06)

Q.3: Explain the terms: Pitching, Rolling and Bouncing.

Q.4: Explain working principle of differential gear with neat sketch.

SECTION – C

(2 * 5 = 10)

Q.5: Explain with neat sketch Ackerman steering mechanism.

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Q.6: Explain the following terms with neat sketch: Camber, Castor, toe-in or toe out, king pin inclination and combined angle & scrub radius.

_____All The Best_____

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MORADABAD INSTITUTE OF TECHNOLOGY
Department of Mechanical Engineering
Class Test-2

Course: B.Tech.	**Semester: 7th**
Session – 2019-20	**Section: E**
Subject: Automobile Engineering	**Subject Code: RME-702**
Max Marks:20	**Time: 75 Minutes**

Ques.No.	1	2	3	4	5	6
CO	3	1	3	2	2	2

SET-2

Note: 1. Attempt all questions.

2. Assume missing data suitably, if any.

SECTION – A **(2 * 2 = 04)**

Q.1: What are brakes? Write down the braking requirement?

Q.2: Arrange the following components according to their participation in drive train of a typical Automobile system. (a) Clutch (b) Differential (c) Flywheel (d) Slip joint (e) Gear Box (f) Propeller Shaft (g) Universal Joint (h) Torque Converter (i) Drive shaft.**(Hint- Power flow from Engine to wheel)**

SECTION – B **(2 * 3 = 06)**

Q.3: Explain the terms: Pitching, Rolling and Bouncing.

Q.4: Explain working principle of differential gear with neat sketch.

SECTION – C **(2 * 5 = 10)**

Q.5: Explain with neat sketch Ackerman steering mechanism.

Q.6: : A vehicle weighing 15000N has a wheel base of 3m. the center of gravity lies 1.5m in front of rear axle and 0.8m above the ground level the vehicle is moving up on an incline of angle whose sine is equal to 0.1. Presuming that vehicle has brakes on all the four wheels and coefficient of friction is 0.5. Calculation for the (a) load distribution between front and rear axle

(b) distance at which vehicle can be stopped while going at a speed of 15m/s . Presume that only rear wheels are braked.

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MORADABAD INSTITUTE OF TECHNOLOGY
Department of Mechanical Engineering
Class Test-3

Subject: Automobile Engineering	**Subject Code: RME-702**
Semester: 7th	**Time: 1hr. 15min**
Session: 2019-20	**Max Marks:20**

SET-1

Ques.No.	1	2	3	4	5	6
CO	3	5	5	5	5	4

Note: 1. Attempt all questions.

2. Assume missing data suitably, if any.

SECTION – A **(2 * 2 = 04)**

Q.1: What is the difference between drum and disc brake?

Q.2: What are the different alternative sources of energy which can be used for an automobile?

SECTION – B **(2 * 3 = 06)**

Q.3: Give a brief description about the BS-IV and BS-VI.

Q.4: Give a brief introduction about the different pollutants which are emitted by an automobile.

SECTION – C **(2 * 5 = 10)**

Q.5: Explain the construction and working of catalytic converter?

Q.6: Describe with the neat sketch Multipoint fuel injection system (MPFI).

All The Best

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MORADABAD INSTITUTE OF TECHNOLOGY

Class Test-2

Subject: Automobile Engineering	**Subject Code: RME-702**
Semester: 7th	**Time: 75 Minutes**
Session – 2019-20	**Max Marks:20**

SET-2

Ques.No.	1	2	3	4	5	6
CO	3	4	4	4	4	5

Note: 1. Attempt all questions.

2. Assume missing data suitably, if any.

SECTION – A

(2 * 2 = 04)

Q.1: What are the Properties of good coolant?

Q.2: Discuss the Water Cooling System for automotive Engine?

SECTION – B

(2 * 3 = 06)

Q.3: Discuss in brief the working of carburetor?

Q.4: Difference between Dry sump lubrication system and wet sump lubrication system.

SECTION – C

(2 * 5 = 10)

Q.5: What are the requirements of a charging system.

Q.6: Give a brief introduction about the different pollutants which are emitted by an automobile.

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In Pursuit of Excellence	**Class Test Attendance**	SESSION-2019-2020 SEM-7TH

S/N	Roll No.	Name of Students	CT-1	CT-2	CT-3
1	1608240069	Raman Kaushik	PRESENT	**ABSENT**	PRESENT
2	1608240070	Ritesh Singh	PRESENT	**ABSENT**	PRESENT
3	1608240071	Sachin Kumar S/O S S	PRESENT	**ABSENT**	PRESENT
4	1608240072	Sachin Bhandari	PRESENT	**ABSENT**	PRESENT
5	1608240073	Sagar Kumar	PRESENT	**ABSENT**	PRESENT
6	1608240074	Salman	PRESENT	**ABSENT**	PRESENT
7	1608240075	Santosh Verma	PRESENT	PRESENT	PRESENT
8	1608240076	Sarabhjeet Singh	**ABSENT**	PRESENT	PRESENT
9	1608240077	Sarthak Vyas	PRESENT	**ABSENT**	PRESENT
10	1608240078	Satyam Thakur	PRESENT	**ABSENT**	PRESENT
11	1608240080	Shashwat Yadav	PRESENT	**ABSENT**	PRESENT
12	1608240082	Shubham Kumar	PRESENT	**ABSENT**	PRESENT
13	1608240084	Sumit Kumar	PRESENT	PRESENT	**ABSENT**
14	1608240085	Ubaid Ur Rehman	PRESENT	PRESENT	**ABSENT**
15	1608240086	Utkarsh Tyagi	PRESENT	PRESENT	PRESENT

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16	1608240087	Vaibhav Singh	ABSENT	PRESENT	**ABSENT**
17	1608240088	Varun Rastogi	ABSENT	PRESENT	PRESENT
18	1608240089	Vikas Kumar	PRESENT	PRESENT	**ABSENT**
19	1608240091	Vishal Chaudhary	PRESENT	PRESENT	**ABSENT**
20	1608240092	Vishesh Kumar	PRESENT	PRESENT	PRESENT
21	1608240093	Vishnu Kumar Gautam	PRESENT	PRESENT	**ABSENT**
22	1608240094	Yash Rastogi	PRESENT	PRESENT	**ABSENT**
23	1608240095	Yasharth Gautam	ABSENT	PRESENT	**ABSENT**
24	1608240096	Ziaul Mustafa	ABSENT	PRESENT	PRESENT
25	1508240064	Kamal Prakash Singh Lodhi	ABSENT	PRESENT	PRESENT
26	1508240083	Mohd. Anas	ABSENT	PRESENT	PRESENT
27	1508240117	Priyanshu Kumar	ABSENT	PRESENT	PRESENT
28	1508210153	Shrikant Siddharth	ABSENT	**ABSENT**	PRESENT
29	1608210065	Himanshu Chaudhary	PRESENT	PRESENT	**ABSENT**
30	1608210083	Mohd. Javed	ABSENT	PRESENT	PRESENT
31	1608210132	Rohan Dhariwal	ABSENT	**ABSENT**	PRESENT
32	1708240901	Ankur Saini	PRESENT	PRESENT	PRESENT
33	1708240902	Anuj Pal S/o Rajkumar	ABSENT	PRESENT	PRESENT
34	1708240903	Devraj Singh	ABSENT	PRESENT	PRESENT
35	1708240904	Mohammad Junaid	ABSENT	PRESENT	PRESENT
36	1708240905	Mohammad Shariq	ABSENT	**ABSENT**	PRESENT
37	1708240906	Ravi Arya	PRESENT	**ABSENT**	PRESENT

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38	1708240907	Rishabh Dhyani	ABSENT	PRESENT	PRESENT
39	1708240908	Shubham Raj	ABSENT	PRESENT	PRESENT
40	1708240909	Varun Chhatrawal	ABSENT	PRESENT	PRESENT

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In Pursuit of Excellence	**List of Students having short attendance**	SESSION-2019-2020 SEM- 7TH

Student having attendance less than 75% upto CT-2

1	Kamal Prakash Singh Lodhi
2	Mohammad Anas
3	Priyanshu Kumar
4	Shrikant Siddharth
5	Himanshu Choudhary
6	Rohan Dhariwal
7	Raman Kaushik
8	Ritesh Singh
9	Sagar Kumar
10	Salman .
11	Sarabhjeet Singh
12	Shashwat Yadav
13	Shubham Kumar
14	Sumit Kumar
15	Varun Rastogi
16	Vikas Kumar
17	Yash Rastogi
18	Mohammad Junaid
19	Mohammad Shariq
20	Ravi Arya
21	Rishabh Dhyani

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In Pursuit of Excellence	**Class Test Marks**	SESSION-2019-2020 SEM- 7TH

S.NO	Roll No.	Name of Students	CT-1 TOTAL 20	CT-2 TOTAL 20	CT-3 TOTAL 20
1	1608240069	Raman Kaushik	17	A	15
2	1608240070	Ritesh Singh	12	A	9
3	1608240071	Sachin Kumar S/O S S	9	A	17
4	1608240072	Sachin Bhandari	14	A	17
5	1608240073	Sagar Kumar	13	A	16
6	1608240074	Salman	11	A	11
7	1608240075	Santosh Verma	8.5	12	9
8	1608240076	Sarabhjeet Singh	0	11	10
9	1608240077	Sarthak Vyas	13	A	15
10	1608240078	Satyam Thakur	14	A	18
11	1608240080	Shashwat Yadav	12.5	A	11
12	1608240082	Shubham Kumar	8	A	13
13	1608240084	Sumit Kumar	5.5	15	A
14	1608240085	Ubaid Ur Rehman	0	14	A
15	1608240086	Utkarsh Tyagi	9	15	14
16	1608240087	Vaibhav Singh	0	17	A
17	1608240088	Varun Rastogi	0	19	14
18	1608240089	Vikas Kumar	6	16	A
19	1608240091	Vishal Chaudhary	6.5	13	A
20	1608240092	Vishesh Kumar	16.5	19	17
21	1608240093	Vishnu Kumar Gautam	11	17	A
22	1608240094	Yash Rastogi	9	18	A
23	1608240095	Yasharth Gautam	0	12	A
24	1608240096	Ziaul Mustafa	0	11	17
25	1508240064	Kamal Prakash Singh Lodhi	0	12	12
26	1508240083	Mohd. Anas	0	11	16
27	1508240117	Priyanshu Kumar	0	10	4
28	1508210153	Shrikant Siddharth	0	D	15
29	1608210065	Himanshu Chaudhary	13	11	A
30	1608210083	Mohd. Javed	0	15	11
31	1608210132	Rohan Dhariwal	0	D	16

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32	1708240901	Ankur Saini	11	12	13
33	1708240902	Anuj Pal S/o Rajkumar	0	18	17
34	1708240903	Devraj Singh	0	13	6
35	1708240904	Mohammad Junaid	0	12	12
36	1708240905	Mohammad Shariq	0	A	10
37	1708240906	Ravi Arya	12	A	11
38	1708240907	Rishabh Dhyani	0	18	18
39	1708240908	Shubham Raj	0	16	18
40	1708240909	Varun Chhatrawal	0	12	17

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In Pursuit of Excellence	**List of Weak Students** (Action taken for Improvement)	SESSION-2019-2020
		SEM-7th

S.NO	ROLL NO	NAME	Action taken for Improvement
1	1608240069	Raman Kaushik	(1) A question bank based on the previous years' question papers, is provided to the students for better preparation. (2) Regular monitoring of their progress is done by observing their performance in lectures, tutorials and labs. (3) Important study material is provided to the weak students for better preparation. (4) Regular counseling of weak students to enhance their habit of self learning.
2	1608240070	Ritesh Singh	
3	1608240074	Salman	
4	1608240076	Sarabhjeet Singh	
5	1608240087	Vaibhav Singh	
6	1608240091	Vishal Chaudhary	
7	1608240095	Yasharth Gautam	
8	1508240117	Priyanshu Kumar	
9	1508210153	Shrikant Siddharth	
10	1608210132	Rohan Dhariwal	

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In Pursuit of Excellence	**List of Bright Students** (Action taken for enhancing performance)	SESSION-2019-2020
		SEM- 7TH

S.NO	ROLL NO	NAME	Action taken for enhancing performance
1	1608240069	Raman Kaushik	(1) Students are encouraged to enhance their skills by joining NPTEL/MOOC or any other special training course based on their area of interest. (2) Questions of competitive exam level regularly taught to students. (3) Strong monitoring of self learning activities of students. (a) Students are encouraged to read different books and present various topics as seminar in order to enhance the presentation and communication skills. (b) Students are encouraged to prepare their own notes of each topics. (4) Each topic of the syllabus as well as additional topics/case studies discussed with students thoroughly. They are encouraged to participate in workshops and seminars to gain knowledge on the latest developments
2	1608240072	Sachin Bhandari	
3	1608240073	Sagar Kumar	
4	1608240077	Sarthak Vyas	
5	1608240078	Satyam Thakur	
6	1608240080	Shashwat Yadav	
7	1608240092	Vishesh Kumar	
29	1608210065	Himanshu Chaudhary	

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In Pursuit of Excellence	**Previous Year Question Papers**	SESSION-2019-2020
		SEM- 7th

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Printed Pages: 02
Paper Id: 140702

Sub Code: NME702
Roll No.

B. TECH.
(SEM.VII) THEORY EXAMINATION 2018-19
AUTOMOBILE ENGINEERING

Time: 3 Hours *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Be precise in your answer. Draw neat diagrams wherever necessary.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. Define "Automobile" and classify Auto- vehicles from different aspects.
b. Write important events from history of an Automobile.
c. Explain the reason that why big tyres are used in rear of vehicles.
d. What are the various defects in clutch?
e. "Stability and safety in a modern car is greatly improved" comment on the statement.
f. What are the periodic observations, replacement of parts/fillings required over few thousand kilometers running of an Automobile?
g. What is the reason for emitting the white exhaust smoke during start of the vehicle? How will you prevent this?
h. What is the significance of BS 3 and BS 4 engines?
i. What is king pin offset?
j. Compare Hotchkiss drive & torque tube drive.

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

(a) The air resistance and rolling resistance of a car are given by $R_a = 0.01V^2$ and $R_r = 7.5 + 0.2V$, the resistance being expressed in N and speed in km/h. If the transmission efficiency in top gear = 90%, calculate the engine B.P. required at the vehicle speed of 130 km/h. Also find the vehicle acceleration in m/s^2 at the instant when the gear is moving at 50 km/h in top gear. Given engine torque at 50 km/h = 1.3 × engine torque at 130 km/h and for calculation of force the vehicle can be assumed to be equivalent to weight of 17658 N.

(b) A car has pivot pins 114 cm apart, length of each track arm is 15.25 cm and the track rod behind the axle is 104 cm long. Determine the wheel base for true rolling of all wheels, when the inner wheel stub-axle is at 55^0 to the centreline of the car.

(c) Define the following terms and state their significance in respect of vehicle stability:

(i) Pitching
(ii) Rolling
(iii) Bouncing
(iv) Yawing

(d) A petrol engine has a fuel consumption of 10 litre/h. The air-fuel ratio supplied through the carburetor is 15, the choke has diameter of 20 mm. Determine the diameter of the jet of carburetor if the top of the jet is 5 mm above the fuel level in float chamber. The barometer reads 750 mm height of mercury and the temperature is 32^{0}C. Neglecting compressibility of air. Assume C_{da} = 0.85 and C_{df} = 700 kg/m^3.

(e) Write short notes on following:
(i) Preventive maintenance
(ii) Overhauling system

SECTION C

3. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Discuss following types of resistances encountered by a moving vehicle. Which factors influence each of them and how can these resistances be minimized:

(i) Road resistance

(ii) Air or Wind resistance

(iii) Road gradient resistance

(b) A four-speed gear box is to be constructed for providing the ratios of 1.0, 1.46, 2.28 and 3.93 to 1 as nearly possible. The diametral pitch of each gear is 3.25 mm and the smallest pinion is to have atleast 15 teeth. The centre distance between the main and layout shaft is 78 mm. Determine the suitable number of teeth of the different gears and the exact gear ratios thus available.

4. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Explain the working principal of two universal joints to obtain constant velocity.

(b) Explain the principle of Ackermann steering gear. A vehicle using Ackermann steering system has a wheel base 280 cm, front wheel track 122 cm, distance between king pin axes 108 cm. If the maximum defection of the inner front wheel is 45^0, calculate:
(i) The defection of the outer front wheel assuming true rolling motion of air wheels in this position.
(ii) The turning radius of outer front wheel.

5. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Derive the formula for reaction coming on front and rear wheel of a car when it is descending a hill and brake is applied to front wheel only, in terms of coefficient of friction, gradient, weight of vehicle and vehicle dimensions.

(b) Differentiate clearly between the function of spring and a shock absorber in suspension system. Explain the construction and working of a telescopic type of shock absorber with the help of neat diagram.

6. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Why is an ignition system needed in an automobile? What function does it serve? Make comparison between T.C.I. and C.D.I. ignition system.

(b) What are fundamental requirements of a fuel supply system in engine? Sketch and explain the construction and working of a fuel injector.

7. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) What do you know about break down maintenance? If a diesel vehicle stops on road explain the possibility of stopping the vehicle in sequence.

(b) Classify the pollution control devices used in Automobiles? With the help of neat sketch, describe working of any one

— Printed Page 1 of 1 Sub Code: RME'

Paper Id: 140730 Roll No:

B. TECH.

(SEM VII) THEORY EXAMINATION 2019-20

AUTOMOBILE ENGINEERING

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.** 2 x 7 = 14

a. Enumerate the main components of an automobile.

b. An engine develops 10 kg-m torque at 2500 rpm. If gear ratio in gear box is 2.1:1 and speed ratio at differential is 5:1, find the torque at driving wheels and speed of propeller shaft.

c. Enlist various types of gear boxes used in automobiles.

d. Give a broad classification of brakes.

e. Briefly mention the functions of a carburettor.

f. What are the main components of steering system of an automobile?

g. How is CNG better fuel than diesel from the view point of pollution?

SECTION B

2. **Attempt any *three* of the following:** 7 x 3 = 21

a. Explain the construction of fluid flywheel with the help of a neat sketch.

b. A single plate friction clutch has outer diameter of the clutch plate 1.2 times the internal diameter. Make calculations for the dimensions of the clutch plate and axial force provided by the springs. Assume uniform wear, friction coefficient as 0.35 and maximum allowable pressure intensity not to exceed 70 kPa.

c. How are constant mesh transmissions arranged for obtaining torque changes? Discuss the advantages of constant mesh gear box over the sliding mesh type.

d. What is perfect steering? Derive expression for the basic condition for a perfect steering mechanism.

e. What are the advantages of an alternator over the d.c. generator?

SECTION C

3. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) Describe 'semi floating', 'full floating' and 'three quarter floating' types of rear axle mounting methods.

(b) The angle between the axes of two shafts connected by Hooke's joint is 18°. Determine the angle turned through, by the driving shaft when the velocity ratio is maximum and when unity.

4. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) What is sprung mass and unsprung mass? Why is the sprung mass kept as low as possible?

(b) How does the independent suspension system differ from the rigid axle suspension system?

5. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) Compare the constructional and operational aspects of disc and drum brakes in automobiles.

(b) Draw a layout of hydraulic braking system of an automobile and explain its working.

6. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) How many types of steering gears do you know? Explain working of rack and pinion

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Printed Pages—7 EOE084

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199854 Roll No. | | | | | | | | | |

B.Tech.

(SEM. VIII) THEORY EXAMINATION 2013-14

AUTOMATION AND ROBOTICS

Time : 3 Hours *Total Marks : 100*

Note :– Attempt all questions.

1. Answer any two parts of the following : **(10×2=20)**

(a) (i) Give a classification of industrial robots based on arm geometry configurations and control systems. Your answer should be supported by neat sketches.

(ii) Discuss the advantages and disadvantages of the following robot configurations :

(a) Rectangular co-ordinate type

(b) Spherical co-ordinate type

List their areas of applications.

(b) (i) Sketch and explain the working of the following types of grippers :

– Angular type

– Vacuum type.

(ii) A Carton weighing 10 kg is held in a gripper using friction against two opposing fingers. Coefficient of friction = 0.25. Weight of the Carton is directed parallel to finger surfaces. Determine the required gripping force. Assume a g-factor of 2.0.

(c) Discuss the factors to be considered while selecting the drive systems for robots. Compare the relative advantages and disadvantages of the following robot drives:

(i) Electric motor

(ii) Pneumatic system

(iii) Hydraulic motor.

Recommend suitable drives for the following:

- Pick and Place robot (light loads)

- Robot for loading and unloading heavy work-pieces and assembly Robot.

2. Answer any two parts of the following: **(10×2=20)**

(a) Explain in brief the following:

- Kinematics of Manipulators

- Forward Kinematics

- Inverse Kinematics.

A point "u" is rotated by 90° about z-axis to yield point v. This point (v) is rotated by 90° about y-axis to obtain point "w" and finally the point w is translated by -5, 3, 8 along x, y, z axis respectively to obtain the point "x_1".

What is the co-ordinate of x_1 ? Given that $u = \begin{bmatrix} 7 \\ 3 \\ 2 \end{bmatrix} = u$.

(b) Fig. 1 shows a 2-link planer arm. Given that AB = 10 mm, BC = 20 mm, AD = 26.98 mm and CD = 12.6 mm compute the value of θ_2. If AZ = 15.00 mm and AD = 30 mm, what is the value of θ_1 and θ_2 ?

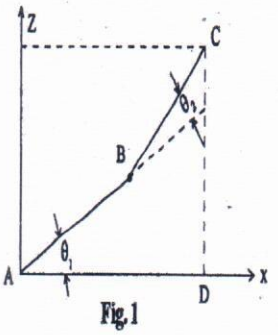

Fig. 1

(c) A single link robot with rotary joint is motionless at θ = 15°. It is desired to move the joint in a smooth manner to θ = 75° in 3 secs. Find the coefficients of a cubic which accomplishes this motion and brings the arm to rest at the goal. Plot the velocity and acceleration profile of the arm.

3. Answer any **two** parts of the following : **(10×2=20)**

(a) Discuss the working principles and important characteristics of the following types of controls :

- Proportional control
- Integral control
- Derivative control
- PID control
- On-Off control

Describe their relative merits and demerits and mention their applications.

(b) A mechanical device used in a forge press operation follows the following equation of motion :

$$16.3\frac{d^2y}{dt^2} + 87.5\frac{dy}{dt} + 221y = F$$

F = Forcing function, y = response

Examine, if the system response be oscillatory ? Determine the roots of the characteristic equation and damped natural frequency.

(c) (i) Discuss the difference between feed-back control and adaptive control. Differentiate between ACO and ACC types of adaptive control.

(ii) Describe the following in an adaptive control system :

- Identification function
- Decision function
- Modification function.

With the help of a neat sketch explain the help of a neat sketch explain how the three functions are incorporated in an adaptive control system.

4. Answer any **two** parts of the following : **(10×2=20)**

(a) With the help of suitable illustration, explain the following :

- Collision free motion planning
- Robot programming synthesis
- Assembly sequence planning.

(b) A robot is required to drill 16 holes on a 20 × 20 mm grid as shown in Fig. 2. Write a robot operation program for the above in VAL II. Assume speed = 20% of the normal speed.

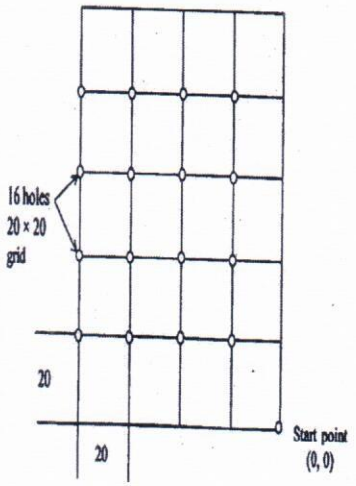

Fig. 2

(c) Discuss the major disadvantages of language based programming. How can task level processing can solve these ? Discuss. Use a suitable illustration to support your answer.

5. Answer any two parts of the following : (10×2=20)

(a) Give a list of factors that should be considered while evaluating a robot for welding capabilities. Give suitable explanations in support of your answer.

(b) Describe the important characteristics of robot grippers for robotic assembly operations. Give a list of design rules for designing a part for robotic assembly.

(c) (i) Table below gives the operation times for a sequential activity related to loading and unloading a press. Compute the cycle time and the number of units produced per 8 hrs. shift for (i) one hand gripper (ii) two hand gripper.

Activity	Time (Secs.)
Machine operation time	25.0
Unload the unit with a robot	1.2
Robot moves to finished part conveyor	1.7
Release the unit	0.2

Activity	Time (Secs.)
Move the arm to input conveyor	2.6
Pick a unit	0.3
Move to machine	1.9
Load the machine	2.1

(ii) Discuss the general characteristics of industrial work situations that tend to promote the substitution of robots for human labour.

Printed Pages : 3

EME-702

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID 140702

Roll No.

B. Tech.

(SEM. VII) (ODD SEM.) THEORY EXAMINATION, 2014-15

AUTOMOBILE ENGINEERING

Time : 3 Hours] [Total Marks : 100

1 Attempt any FOUR parts : 5×4=20

a) What is the function of a clutch? Discuss various factors affecting the torque transmission in a clutch.

b) What is overdrive? Explain its construction and discuss its working briefly.

c) Sketch Front axle of car and show how it is connected with the stub axle.

d) Explain the terms :

I. Camber

II. Castor

III. Toe in

e) List the various factor affecting the over steer and under steer.

f) What is the function of universal joint? List its usage in vehicle.

2 Attempt any TWO parts : 10×2=20

a) Write a ten step procedure for design of a gear box of an automobile.

b) Briefly explain the variation of resistance to the vehicle motion at the various speeds and total resistance to the vehicle motion.

c) Describe the working of a synchromesh gear box with the help of a sketch. What are its merits and demerits?

3 Attempt any TWO parts : 10×2=20

a) Describe the air braking system with a neat sketch. State the advantages of it.

b) Write short notes on :

I. Telescopic shock absorber

II. Leaf Spring.

c) Explain transfer of weight during application. Discuss how it affect wheel skidding.

4 Attempt any TWO parts : 10×2=20

a) Discuss in detail the comparison between the various ignition systems of an automobile.

b) Discuss in detail the future trends for automotive lighting

c) Describe in detail Multipoint Fuel injection system discussing the main system components

5 Attempt any TWO parts : 10×2=20

a) What is the purpose of heating system in an automobile? Describe the heating system with a neat diagram.

b) Write short notes on Preventive maintenance.

c) Discuss in detail the water cooling system for automotive engines.

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2767 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2013-14

AUTOMOBILE ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note :– Attempt **all** the questions. All questions carry equal marks. Use suitable diagram wherever necessary.

1. Write short notes on any **four** parts of the following : **(5×4=20)**
   (a) Firing order
   (b) Over drive
   (c) Weight transfer in Brake
   (d) Periodic maintenance
   (e) Fuel Feed pump
   (f) Universal joint.
2. Attempt any **two** parts of the following : **(10×2=20)**
   (a) Describe different types of Pistons. How does the 2-stroke piston differ from 4-stroke piston of a vehicle ?
   (b) What types of resistance are offered by a vehicle ? Explain with diagram.
   (c) Explain the working of constant mesh gear box with neat sketch. What are its advantages and limitations ?

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) What are the requirements of good braking system ? Explain Hydraulic brake system and master cylinder used in it with proper diagram.

(b) Why suspension system is required in Automobile ? Write different types of suspension system. Explain Telescopic Shock absorber with neat diagram.

(c) Draw a layout of a four-wheeler automobile chassis. What design features are to be considered in making a chassis frame ?

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) What is the resistor bypass circuit ? Draw the wiring system of a typical passenger car lighting system.

(b) Why electronic ignition system is preferred over conventional system ? Make a comparison between transistor assisted ignition system and capacitor discharge ignition system.

(c) What is MPFI ? Explain with neat and clean diagram.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) What are the properties of good coolant ? Explain thermosiphon cooling system with diagram.

(b) List the properties of lubricating oil. Explain splash and pressure lubricating system with suitable sketch.

(c) Write the names of various types of maintenance employed in an automobile. Explain breakdown maintenance in detail.

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2767 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2013-14

AUTOMOBILE ENGINEERING

Time : 3 Hours *Total Marks : 100*

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   (b) Over drive
   (c) Weight transfer in Brake
   (d) Periodic maintenance
   (e) Fuel Feed pump
   (f) Universal joint.

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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2767 **Roll No.** | | | | | | | | | | |

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2012-13

AUTOMOBILE ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note :— *(1) Attempt **all** questions.*

(2) Assume missing data suitably (if any).

(3) Be precise in your answer.

1. Attempt any **TWO** parts of the following :— **(2×10=20)**

(a) (i) What consideration are made in the design of a vehicle ?

(ii) What are the main components of an internal combustion engine ? Give their material of construction and their functions.

(b) Design a sliding type of gear box to obtain following speed ratios :

Top gear ratios = 1 : 1

Third gear ratio = 1.4 : 1

Second gear ratio = 2.24 : 1

Reverse and first gear ratio = 3.8 : 1

Assume countershaft speed = half that of engine speed.

Assume smallest gear to have not less than 15 teeth.

(c) Draw the layout of a 4-wheeler vehicle. Explain how front wheel drive differs from rear wheel drive.

2. Attempt any **TWO** parts of the following :— **(2×10=20)**

(a) With the help of suitable sketches, describe the working of :

(i) Free wheel, and

(ii) Universal joint.

(b) State principle and derive equation for correct steering of a vehicle. Draw Ackerman's steering mechanism and explain wheel lock and steering lock angles.

(c) Explain briefly the following :

(i) Camber angle

(ii) Castor angle

(iii) Toe-in

(iv) King pin inclination

(v) Slip angle.

3. Attempt any **TWO** parts of the following :— **(2×10=20)**

(a) What are the essential requirements of a good brake ? Explain phenomenon of transfer of weight during braking on all the four wheels. How can the weight transfer be reduced ?

(b) (i) Classify different types of brakes.

(ii) Explain working of a vacuum servo brake.

(c) (i) What are the loads coming on a chassis frame ? Explain various types of chassis frame sections and their suitability for chassis frame.

(ii) Sketch and label an independent front suspension system.

4. Attempt any **TWO** parts of the following :— **(2×10=20)**

(a) What is the function of a starting drive ? Describe the construction and working of any one type of Bendix drive.

(b) Describe the working of a jerk type diesel fuel injection pump with the help of a suitable sketch.

(c) (i) Explain the working of an A.C. Generator.

(ii) Discuss the working of Fuel injection system in petrol engines.

5. Attempt any **TWO** parts of the following :— **(2×10=20)**

(a) Explain the working of Car Air conditioning system with help of a neat sketch.

(b) Differentiate between preventive and breakdown maintenance. Discuss maintenance schedule of a vehicle.

(c) Describe :

(i) Semi-pressurised lubrication system, and

(ii) Dry sump lubrication system.

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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER : 2767 Roll No. | | | | | | | | | |

B.Tech.

(SEM. VII) THEORY EXAMINATION 2011-12

AUTOMOBILE ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note :— (i) Answer **all** questions.

(ii) Draw a neat sketch wherever necessary.

1. Answer any **four** from the following : **(5×4=20)**

(a) What do you mean by "valve" and "valve gear mechanism" ?

(b) Name various types of resistance encountered by a moving vehicle. How can these resistance be minimized ?

(c) What do you mean by "gear ratio" ? What is the significance of low and high gear ratios ?

(d) What is the necessity of gear box in automobile ?

(e) Why maximum power and maximum torque is not produced at the same r.p.m. in an engine ?

(f) What is an Idler gear ? Discuss its working.

2. Answer any **two** from the following : **(10×2=20)**

(a) Describe the construction and working of Torque Converter. Explain its significance in fluid coupling.

(b) Explain the working principle of differential gear and also explain its necessity in automobile.

(c) Explain the terms : camber, castor, king-pin inclination and Toe-in. What are the effects of each on the steering characteristics ?

3. Answer any **two** from the following : **(10×2=20)**

(a) What is the function of master cylinder ? Explain the working of master cylinder and wheel cylinder in automobile.

(b) (i) Explain working of vacuum brake.

(ii) Discuss the load coming on a chasis frame.

(c) What is the need of suspension system ? Explain the working of shock absorbers.

4. Answer any **two** from the following : **(10×2=20)**

(a) Describe the working principle of a multipoint electronic fuel-injection system. What are the advantages of S.I. engine fuel injection system ?

(b) Draw a simplified wiring circuit for lightining system of car and discuss the same.

(c) Explain the working principle of a Magneto-ignition system. How is it differ from Battery ignition system ?

5. Answer any **two** from the following : **(10×2=20)**

(a) Describe the Air-cooled system of an automobile engine. What are its applications, advantages and disadvantages ?

(b) What is the need of lubrication system in an automobile ? Explain the working principle of force-feed lubricating system of a four cylinder engine.

(c) Write the names of various types of maintenance. Explain the preventive maintenance in detail.

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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0402 Roll No.

B.Tech

(SEM VII) ODD SEMESTER THEORY EXAMINATION 2009-10

AUTOMOBILE ENGINEERING

Time : 3 Hours] [Total Marks : 100

Note : (1) Attempt **all** questions.

(2) All questions carry **equal** marks.

1 Attempt any two parts : 10×2

(a) How will you classify the different types of Automobile ? Explain the working of four wheel drive vehicle used in practice.

(b) What is necessity of synchromesh gear box in an automobile ? Explain the working of synchronizer used in a gear box with neat sketch.

(c) How will you find the tractive effort required for moving a vehicle ?

For a passenger car travelling at a speed of 64.5 km/h is accelerated up a gradient of 1 : 20. The gross vehicle weight is 1125 kg. It has frontal area A = 1.85 m^2, Air resistance coefficient is 0.0017 and rolling resistance is 22.6 kg/ton at above engine speed. The vehicle

engine develops 80 BHP at 4400 rpm. Rear axle ratio is 5 : 1 and efficiency in top gear is 95%, effective wheel dia 72 cm. Calculate :

(i) Total tractive resistance

(ii) Tractive effort available at the wheels.

2 Attempt any **four** parts : 4×5

(a) What is the need of a clutch in an automobile ? Explain the working of centrifugal clutch.

(b) Explain the working of a fluid coupling. How is it different than a torque converter ?

(c) How an over drive works in an Automobile gear system ? Explain.

(d) Explain the working principle of differential gear with neat sketches.

(e) What do you know about the wheel alignment in an automobile system ? Explain.

(f) What are the various types of steering gears ? Explain the construction of one form of steering gear commonly used.

3 Attempt any **two** parts : 10×2

(a) What are the advantages of power brakes ? Explain the working of pneumatic brake system.

(b) What is the need of self energizing brake system ? Explain the working of a self energizing brake with neat sketch.

(c) Differentiate between the leaf spring suspension and coil spring suspension system of front wheels used for an Automobile vehicle. Describe an independent suspension system.

4 Attempt any **two** parts : 10×2

(a) Draw the layout of diesel engine fuel supply system of an automobile. Explain the function of different components.

(b) Write short notes on any **two** :

(i) Head light system

(ii) Cut out

(iii) Spark plugs

(iv) Types of battries used

(c) Draw the diagram of simple two pole shunt wound generator. Why a generator is equiped with a cutout, explain with neat sketch.

5 Attempt any **two** parts : 10×2

(a) What is the need of lubrication system in an automobile ? Draw the line diagram for lubrication of a petrol engine used in vehicle.

(b) What do you mean by service of an engine ? Explain the method of service for the piston of an I.C. engine, when the engine gives blue smoke.

(c) What is need of over-hauling of an automobile engine ? Explain the nature of work done during over-hauling of an I.C. engine cured in a vehicle.

In Pursuit of Excellence	QUESTION BANK	SESSION-2019-2020 SEM-7th

UNIT-1

Part - A (Short Answer Questions)

S No	QUESTION	Blooms Taxonomy level
1	What are the four basic components of the automobile structure?	Understand
2	How gear box is important in an automobile?	Understand
3	What is the reason for distortion of frame to parallelogram shape?	Understand
4	How the carbon from the cylinder head is removed?	Remember
5	When should the overhauling of the engine is to be done?	Remember
6	What is the friction that occurs between the layers of oil in an oil film?	Understand
7	What is the primary function of the lubrication?	Understand
8	What is the important characteristic of lubricating oil?	Understand
9	What is the most commonly used lubrication system in an automobile?	Understand
10	What is the most widely used fuel supply system for car engines?	Understand
11	What is the source of the drive for a mechanical fuel pump in an engine?	Remember
12	Write the function of venturi in the carburetor?	Remember
13	When will the engine choke is closed?	Remember
14	Which is the most accurate petrol injection system?	Remember
15	Why the compression ratio is high in an automotive diesel engine?	Remember
16	Where is the fuel feed pump in a diesel engine is mounted?	Understand
17	What is the approximate value of the cranking compression pressure in diesel engine?	Understand
18	What is the approximate value of the temperature after compression in a diesel engine?	Understand
19	What is the ignition temperature of diesel fuel?	Understand
20	How the fuel injection timing in a distributor type pump is controlled?	Understand

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Part - B (Long Answer Questions)

1	Describe the working of crescent type gear pump and Rotor pump with neat sketches?	Understand
2	What are the requirements of lubricants?	Understand
3	Sketch and explain clearly Splash Lubrication system?	Understand
4	Explain piston rings function, materials, number of rings clearly.	Understand
5	Describe Four wheel drive.	Understand
6	Explain A.C mechanical fuel pump.	Remember
7	How Petrol can be injected according to location?	Understand
8	Discus functions of a carburetor?	Understand
9	Explain common rail fuel injection system.	Remember
10	Draw and explain the schematic diagram of electronic petrol injection system.	Remember
11	Sketch the layout of four wheels automobile and indicate major components.	Remember
12	Distinguish between gear pump and vane pump.	Understand
13	Discus the importance of lubrication.	Understand
14	Draw and Explain pressure lubrication system.	Understand
15	Explain the working principle of simple carburetor with a neat sketch.	Understand
16	Explain the working of nozzle and classify nozzles.	Remember
17	Explain fuel injection pump in CI engines.	Remember
18	How valves are serviced?	Remember
19	Explain the defects in simple carburetor?	Remember
20	How air is cleaned in engines?	Understand

Part - C (Problem Solving and Critical Thinking Questions)

1	Distinguish between front engine and rear engine.	Understand
2	Explain rear engine vehicles.	Understand
3	Distinguish between two wheel drive and four wheel drive vehicles.	Understand
4	Compare petrol and diesel engines for automobile applications	Remember
5	Compare single cylinder and 3-cylinder engine of same power for automobiles.	Understand
6	Distinguish between electrical vehicles with petrol vehicle.	Remember
7	Compare series and parallel hybrid systems.	Understand
8	Describe clearly the requirements of air-fuel ratio mixtures for starting a petrol engine from cold.	Understand
9	Analyze the merits of pre lubrication system	Remember
10	Compare carburetor system with direct petrol injection.	Remember

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UNIT-2

Part – A (Short Answer Questions)

S No	QUESTION	Blooms Taxonomy level
1	What is the approximate percentage of utilization of the heat in the engine for the useful work?	Understand
2	What is the approximate percentage of loss of fuel energy to the cylinder walls?	Understand
3	Write the sequence of the coolant circulation	Understand
4	How wax thermostat is better than Bellows type thermostat?	Understand
5	Sketch coolant pump.	Remember
6	How the cooling fans are driven?	Understand
7	What are the three components of primary ignition circuit?	Understand
8	What are the components of the secondary ignition circuit?	Remember
9	What is the material generally used for the contact breaker points?	Understand
10	What is 'dwell'?	Understand
11	What is the result of excessive contact breaker gap?	Remember
12	How the contact breaker points are opened?	Understand
13	How the contact breaker points are closed?	Remember
14	Which device is used to set the accurate contact breaker gap?	Remember
15	When will the vacuum advance mechanism is operated?	Understand
16	How the life of a spark plug of two stroke engine and four stroke engines is related with each other?	Understand
17	What is the significance of spark plug having white insulator?	Remember
18	What is the significance of spark plug with a black centre?	Understand
19	What are the three units contained in a regulator for automobile D.C. generator?	Remember
20	What is the use of thermistor in an alternator regulator?	Understand

Part - B (Long Answer Questions)

1	Draw the charging Circuit and explain the principle of a D.C Generator.	Understand
2	Draw and explain standard Bendix drive (or) Folo-thru drive.	Understand
3	What are the requirements of Ignition System?	Understand
4	Explain current and voltage regulator with a neat sketch.	Remember
5	Explain pulse generator with a neat sketch.	Remember
6	Compare different contact breakers.	Understand
7	Explain spark advance and its advantages.	Understand
8	What are the main requirements of a charging system?	Understand

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9	Describe the working of a fuel gauge.	Remember
10	Explain the construction of D.C Generator.	Remember
11	Explain the principle of electrically operated oil pressure gauge.	Understand
12	Explain the working of a Horn.	Understand
13	Sketch and explain the different types of thermostats used in automobile.	Remember
14	Explain in detail the type of cooling pump used in water cooling system.	Understand
15	Compare battery ignition system with magneto ignition system.	Understand
16	Draw and explain wind screen wiper.	Remember
17	How overrunning clutch is used as starting device?	Remember
18	Describe magneto ignition system with a neat sketch.	Understand
19	How we can control generator output by the third brush.	Understand
20	Explain centrifugal advance method in automatic ignition advance method?	Understand

Part – C (Problem Solving and Critical Thinking)

1	Compare intelligent cooling with conventional cooling. How intelligent cooling systems improve engine performance?	Understand
2	How electronic ignition systems improve the performance of engine?	Understand
3	How automatic ignition advance result in higher efficiency?	Understand
4	Compare battery and magneto ignition systems	Remember
5	Analyze the performance of D-C generator and alternator for automobile application	Remember
6	Why alternator does not require cut-out relay and current regulator?	Understand
7	Compare Folo-thru and Bendix drive starting mechanism	Understand
8	Compare centrifugal and vacuum spark advance and retard mechanisms.	Remember
9	Explain the advantage of a solenoid switch compared to the manual type.	Understand
10	What are the considerations on which the size of starting motor depends?	Understand

UNIT-3

Part - A (Short Answer Questions)

S No	QUESTION	Blooms Taxonomy level
1	What is the purpose of transmission in an automobile?	Understand
2	How to increase the torque in a vehicle?	Understand
3	Classify the different types of clutches.	Remember

4	What is the use of synchronizing device?	Remember
5	What is the function of flywheel?	Understand
6	In simple epicyclic gear set what is the output member and why it is used?	Understand
7	Explain the principles of different cluches.	Understand
8	Which component in the torque converter allows multiplication of the torque?	Understand
9	Which component in the torque converter drives the oil?	Remember
10	When will the maximum torque multiplication occurs in a torque converter?	Remember
11	What is taper lite leaf spring?	Remember
12	With respect to suspension system when will the vehicle ride will be comfortable?	Understand
13	What is the function of a stabilizer in an automobile?	Understand
14	What is the use of Panhard rod?	Remember
15	What is the function of a shackle with a leaf spring?	Understand
16	What is used for lining of spring eyes in case of cars?	Remember
17	What is the use of zinc liners between the leaves of spring?	Remember
18	What is the other name of torsion bar?	Remember
19	What is the use of shock absorber in an automobile?	Remember
20	Where the coil spring is placed in the wishbone suspension?	Understand

Part – B (Long Answer Questions)

1	What are the requirements of a clutch?	Understand
2	How clutch can be operated electromagnetically?	Understand
3	Explain with a neat sketch how Multi plate clutch can be constructed?	Understand
4	Explain with a neat sketch the principle of differential?	Remember
5	What are the Desirable properties of tyres?	Remember
6	Explain the construction of fluid fly wheel and write the advantages and disadvantages.	Understand
7	How stabilizer bar works? Explain with a neat sketch.	Understand
8	Explain single plate clutch with neat sketch.	Understand

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9	Sketch and explain different types of clutches.	Understand
10	Explain the principle of centrifugal clutch with a neat sketch.	Remember
11	What are the types of Rubber springs? Explain with a neat sketch.	Understand
12	Explain working of a synchro mesh gear box with a neat sketch.	Remember
13	What are the various problems encountered on wheels and tyres? How they can be eliminated?	Understand
14	Differentiate between the torque tube and Hotch kiss drive.	Remember
15	Explain vertical guide suspension with sketch?	Remember
16	Explain the construction and working of a telescopic type of shock absorber.	Remember
17	Explain the purpose of shackle in leaf spring mounting with a neat sketch?	Understand
18	What are the objectives of employing suspension on an automobile?	Understand
19	Sketch and explain the construction and working of wishbone type independent front suspension.	Understand
20	Explain Air suspension with a neat sketch.	Understand

Part – C (Problem Solving and Critical Thinking)

1	Compare friction clutch and fluid flywheel.	Understand
2	Compare friction clutch and fluid flywheel.	Understand
3	Explain magnetic and centrifugal clutches.	Remember
4	Compare tubeless tyre with conventional tyre.	Remember
5	Compare torque tube and conventional propeller shaft.	Understand
6	Compare rigid axle and independent suspension.	Understand
7	Compare air suspension with spring suspension.	Understand
8	What are advantages and disadvantages of auto transmission?	Understand
9	Compare sliding mesh and syncro mesh gear boxes.	Remember

UNIT-4

Part – A (Short Answer Questions)

S No	QUESTION	Blooms Taxonomy level
1	What is the general break efficiency of a new vehicle?	Understand
2	Define the brake fade?	Remember
3	Why fading of brakes occur?	Understand
4	What is the ratio of braking effect at the front and at the rear wheels due to weight transfer?	Understand
5	How usually the brakes employed in cars are operated?	Understand
6	Which component of the wheel cylinder seals the brake fluid?	Remember
7	What is the use of push rod during braking?	Remember

8	In drum type brakes why the fluid on releasing, returns to the master cylinder?	Understand
9	What is the use of intake port in the master cylinder?	Understand
10	When will the proportioning valve does not work?	Understand
11	Where are the most anti-skid devices employed?	Understand
12	In disc brakes, why pad-to-disc adjustment is provided?	Understand
13	What is the function of brake bleeding process?	Remember
14	What are the types of brakes generally used on front and on rear of Maruti car?	Understand
15	Where generally the electric brakes are used?	Remember
16	On suspended vacuum brakes, when will the vacuum present on both sides of the piston?	Remember
17	In which vehicles generally air brakes are used?	Understand
18	Hand brake is used on which wheels?	Remember
19	What is the main component of the material of the brake lining?	Remember
20	What is the maximum disc runout allowed on the vehicle?	Remember

Part – B (Long Answer Questions)

1	What is meant by bleeding of brakes?	Understand
2	What is brake adjustment? When is it required?	Understand
3	Define camber, castor. Explain with a neat sketch.	Understand
4	Define king pin inclination. Explain with a neat sketch.	Understand
5	What is meant by Toe-in or Toe-out? Explain with a neat sketch.	Remember
6	Explain Rack and pinion steering gear with neat sketch.	Remember
7	Draw and explain worm and nut type steering gear.	Understand
8	Derive an equation for the condition for correct steering mechanism?	Understand
9	Explain different types of steering gears.	Understand
10	How worm and wheel steering gear mechanism works?	Understand
11	What are the advantages of power steering?	Understand
12	Sketch and explain the construction and working of Ackermann steering mechanism.	Remember
13	Explain self-righting torque.	Remember
14	Explain special steering columns.	Understand
15	Describe the working of a power steering unit with a neat sketch.	Remember
16	How hydraulic brake works? Explain with a neat sketch.	Understand
17	Describe the steering linkage for vehicle with rigid axle front suspension.	Understand
18	Explain the construction and working of Davis steering gear mechanism.	Understand
19	How recirculating ball type steering gear is working. Explain with sketch.	Understand
20	Describe steering linkage for vehicle with independent front	Understand

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	suspension.	

Part – C (Problem Solving and Critical Thinking)

1	Explain why the master cylinder is not filled completely with the braking fluid.	Understand
2	Why drum type hydraulic brakes are so designed that there should be residual pressure in the brake lines even when the brakes are in the released position?	Understand
3	Out of the disc and the drum brakes, which have better anti-fade characteristics and explain them.	Understand
4	What are the advantages of using synthetic resin adhesives for attaching brake linings as compared to the conventional riveting?	Remember
5	If only the brake on one of the four brake drums is incorrectly adjusted, how does it affect braking performance?	Remember
6	Out of the camber and the castor, which is measured first and out of their angle which is adjusted first why?	Understand
7	What should be the approximate amount of the following in a car: camber, kingpin inclination, included angle, castor and toe-in?	Understand
8	What is the meaning of the terms wander and shimmy in steering and how are they caused?	Understand
9	If the kingpin and the wheel centre lines meet below the ground, will the wheels try to toe-in?	Remember
10	Explain why the master cylinder is not filled completely with the braking fluid.	Understand

UNIT-5

S No	QUESTION	Blooms Taxonomy level
1	What are the main pollutants in the engine exhaust?	Understand
2	What are the approximate maximum allowable hydrocarbons in the car emission?	Remember
3	Define ppm.	Remember
4	What is the limit of the percentage of the CO in the exhaust of a car engine?	Remember
5	Where is the PCV valve located?	Understand
6	Define a PCV valve.	Understand
7	List out the functions of PCV valve.	Understand
8	What is the position of the PCV valve plunger at idle speed?	Understand
9	List out the functions of the charcoal granules.	Remember
10	Where is the liquid-vapour separator located?	Remember
11	Why EGR system is employed?	Understand

12	Define EGR system.	Understand
13	Name the type of the pump for the air injection system.	Understand
14	What is the main purpose of the diverter valve in the air injection system?	Understand
15	Name the catalyst used in the reduction converter?	Understand
16	Name the catalyst used in the converter for oxidising HC and CO?	Understand
17	What is controlled by the first converter in a three way converter?	Remember
18	What is the air fuel ratio required for the efficient operation of a three way converter?	Remember
19	What does the amount of oxygen in the exhaust indicate?	Understand
20	Define 'catalyst operating window'.	Understand
	Part - B (Long Answer Questions)	
1	How emissions reduced by positive crank case ventilation?	Understand
2	What is a multi-point fuel injection system for S.I engines?	Understand
3	Explain vacuum advance method in automatic ignition advanced method?	Understand
4	List out the advantages of C.N.G?	Understand
5	List out the advantages of L.P.G?	Understand
6	Explain the operation of exhaust gas analyser.	Remember
7	Explain the working of positive crank case ventilation (PCV) with PCV valve.	Remember
8	How hydrogen fuel is utilized as alternative fuel?	Understand
9	What is exhaust gas recirculation (EGR)? How EGR valve works?	Understand
10	How air injection systems reduce pollution?	Remember
11	How fuel tank carburetor ventilation reduces the pollutants?	Remember
12	Explain the working of catalytic converter?	Understand
13	Explain the two types of techniques for treating the exhaust gases to reduce the pollutants?	Understand
14	Explain the methods for reducing emissions from automobile.	Understand
15	How common rail fuel injection system in Diesel engines works.	Understand
16	What are the advantages and disadvantages of Bio-diesel?	Understand
17	Explain clearly how the proper design of combustion chamber help in reducing exhaust emission	Remember
18	What are the main pollutants from the engine exhaust and mention its effects on the living organisms.	Remember
19	How diesel catalytic converter-cum-particulate trap reduce pollutants?	Understand
20	Explain unheated lambda probe with neat sketch.	Understand

Part – C (Problem Solving and Critical Thinking)

1	Why does the three – way converter not work in case of diesel engines?	Understand

2	At what air-fuel ratio does the three – way converter operate at maximum efficiency? How is this ratio achieved precisely?	Understand
3	Why should unleaded gasoline be used for engines employing catalytic converters?	Understand
4	Compare the catalytic converter method with blowing of air only into the exhaust manifold	Understand
5	How does PCV valve protect crankcase from engine backfiring?	Understand
6	If the opening temperature for the thermostat valve in the engine cooling system is raised, how does it affect the pollution?	Remember
7	How does an electric – assist type of choke help decrease the emission of pollutants?	Remember
8	How does the fuel-air ratio affect the exhaust emission idle?	Remember
9	How does the fuel injection help to reduce automobile pollution?	Remember
10	What happens when at higher speeds the crankcase emissions exceed the flow rating of the PCV valve?	Understand

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In Pursuit of Excellence	**Final Internal Marks**	SESSION-2019-2020
		SEM-7TH

S/N	Roll No.	Name of Students	TOTAL	TOTAL		MAKEUP	CT(best two)	CT	TA		total
			20	20	20		40	20	10		30
1	16082 40069	Raman Kaushik	17	A	15		32	16	9	10	25
2	16082 40070	Ritesh Singh	12	A	9		21	11	9	10	19
3	16082 40071	Sachin Kumar S/O S S	9	A	17		26	13	10	10	23
4	16082 40072	Sachin Bhandari	14	A	17		31	16	9	10	25
5	16082 40073	Sagar Kumar	13	A	16		29	15	9	10	23
6	16082 40074	Salman	11	A	11		22	11	8	10	19
7	16082 40075	Santosh Verma	9	12	9		21	11	10	10	20
8	16082 40076	Sarabhjeet Singh	D	11	11		22	11	8	10	19
9	16082 40077	Sarthak Vyas	13	A	15		28	14	9	10	23
10	16082 40078	Satyam Thakur	14	A	18		32	16	10	10	26
11	16082 40080	Shashwat Yadav	13	A	11		24	12	9	10	21
12	16082 40082	Shubham Kumar	8	A	13		21	11	9	10	20
13	16082 40084	Sumit Kumar	6	15	A		21	11	9	10	20
14	16082 40085	Ubaid Ur Rehman	0	14	A		14	7	9	10	16
15	16082 40086	Utkarsh Tyagi	9	15	14		29	15	9	10	24
16	16082 40087	Vaibhav Singh	D	17	A		17	9	9	10	18
17	16082 40088	Varun Rastogi	D	19	14		33	17	8	10	25
18	16082 40089	Vikas Kumar	6	16	A		22	11	9	10	20

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19	16082 40091	Vishal Chaudhary	7	13	A		20	10	9	10	19
20	16082 40092	Vishesh Kumar	17	19	17		36	18	9	10	27
21	16082 40093	Vishnu Kumar Gautam	10	17	A		27	14	9	10	23
22	16082 40094	Yash Rastogi	9	18	A		27	14	9	10	22
23	16082 40095	Yasharth Gautam	D	12	A		12	6	8	10	14
24	16082 40096	Ziaul Mustafa	D	11	17		28	14	9	10	23
25	15082 40064	Kamal Prakash Singh Lodhi	A	12	12		24	12	8	10	20
26	15082 40083	Mohd. Anas	D	11	16		27	14	9	10	22
27	15082 40117	Priyanshu Kumar	D	8	4		12	6	8	10	14
28	15082 10153	Shrikant Siddharth	D	D	15		15	8	8	10	15
29	16082 10065	Himanshu Chaudhary	13	11	A		24	12	9	10	21
30	16082 10083	Mohd. Javed	D	15	11		26	13	9	10	22
31	16082 10132	Rohan Dhariwal	D	D	16		16	8	8	10	16
32	17082 40901	Ankur Saini	11	12	13		25	13	9	10	22
33	17082 40902	Anuj Pal S/o Rajkumar	D	18	17		35	18	9	10	27
34	17082 40903	Devraj Singh	D	13	9		22	11	9	10	20
35	17082 40904	Mohammad Junaid	D	12	12		24	12	9	10	21
36	17082 40905	Mohammad Shariq	D	A	10	13	23	11	9	10	20
37	17082 40906	Ravi Arya	12	A	11		23	12	8	10	20
38	17082 40907	Rishabh Dhyani	D	18	18		36	18	9	10	27
39	17082 40908	Shubham Raj	D	16	18		34	17	9	10	26
40	17082 40909	Varun Chhatrawal	D	12	17		29	15	9	10	23

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In Pursuit of Excellence	**Course outcome Attainment**	SESSION-2019-2020
		SEM- 7th

Course Name	Automobile Engineering
Course Code	RME702
Batch	2015 2019
Semester	7
Session	2018 2019
L:T:P	3.0.0

CO Attainment

Course Code	CO	CO Attainment
RME702	CO1	54.63
	CO2	51.03
	CO3	54.63
	CO4	53.14
	CO5	55.23

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CO Attainment Gap

Course Code	CO	CO Targets	CO Attainment	CO Attainment Gap (Target - Attainment)
RME702	CO1	60	54.63	5.37
	CO2	60	51.03	8.97
	CO3	60	54.63	5.37
	CO4	60	53.14	6.86
	CO5	60	55.23	4.77

If Gap > 0 : Target not attained

If Gap ≤ 0 : Target attained

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Closure of Quality Loop

Course Code	CO	CO Targets	CO Attainment Gap	Action proposed to bridge the gap where targets are not achieved	Modification of targets where Achieved
RME702	CO1	60	5.37	More practice question will be added for tractive effort and gear ratio determination.	Target is increased to 62%
	CO2	60	8.97	More practice question and video will be added for automatic transmission and determination of Castor and camber angle.	Target is increased to 62%
	CO3	60	5.37	More practice question will be added for weight transferand Braking ratio.	Target is increased to 62%
	CO4	60	6.86	Some videos and examples Fuel Pump, Carburettoretc and MPFI will be added in lectures and assignment in next offering of course.	Target is increased to 62%
	CO5	60	4.77	Contact hours will be increases for covering new Alternative energy sources.	Target is increased to 62%

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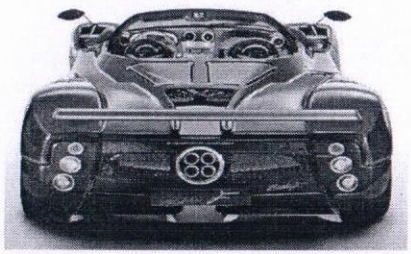
:- Sample Teaching learning resource

Moradabad Institute of Technology
Department of Mechanical Engineering
Automobile Engineering (RME-702)
Session: 2019-20



Automobile/ Automotive Engineering:

Definition: Modern **automotive engineering**, along with aerospace engineering and marine engineering, is a branch of vehicle engineering, incorporating elements of mechanical, electrical, electronics, software and safety engineering as applied to the design, manufacture and operation of motorcycles, automobiles, buses and trucks and their respective engineering subsystems.

Syllabus Contents:

- Unit1: Power Unit and Gear Box.
- Unit 2: Transmition System.
- Unit 3: Braking System,
  Chasis and Suspension system.
- Unit 4: Electrical System,
  Fuel Supply System.
- Unit 5: Automobile Air Conditioning,
  Cooling & Lubrication System,
  Maintenance system.

Classification of Autovehicles:

- On the basis of:

1. Number of wheels
2. Type of power plants (prime mover) used
3. Load carrying capacity and their weights
4. Purpose served
5. Fuel used
6. Drive system used (Front wheel or Rear wheel D.S.)
7. Capacity of the engine (c.c.)
8. Sports, luxury and high altitude vehicles
9. Placement of steering wheel
10. Special purpose

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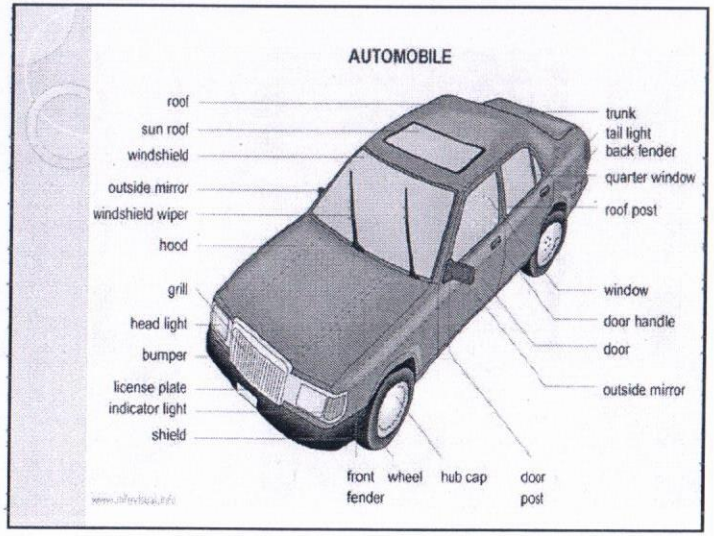
3.On the basis of weight of the vehicle:

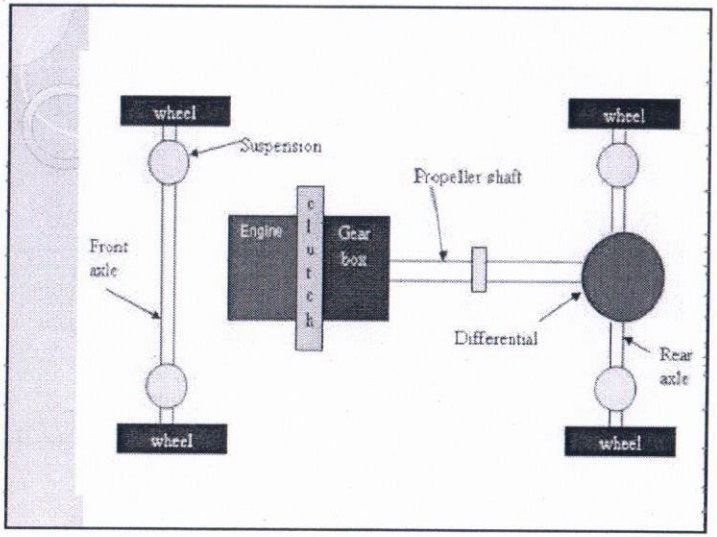
- Gross vehicle weight = Kerb wt. + Payload.

1. Light wt. vehicle, GVW=1 tonne
2. Medium wt. vehicle, 3.5> GVW < 1 tonne
3. Heavy wt. vehicle, 7.5> GVW < 3.5 tonne
4. Extra heavy duty vehicle, 15> GVW <7.5 tonne
5. Special purpose (load) vehicles GVW >15 tonne

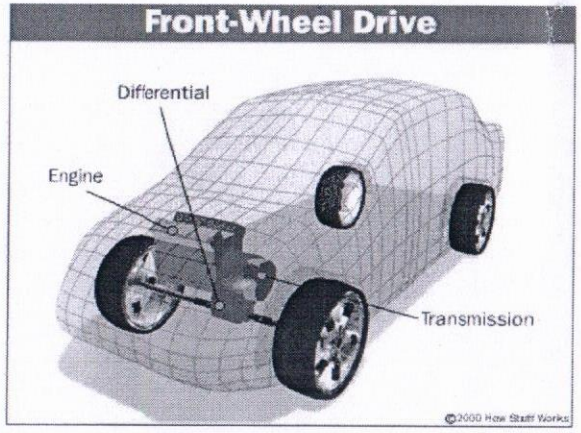
4. On the basis of purpose served

1. **On-the-road vehicles** such as scooters, cars, trucks etc.
2. **Off-the-road vehicles** such as tractors, construction equipments etc.
3. **On-the-road and off-the-road vehicles** such as military tanks, bulldozers etc.





Front wheel Drive system:



Advantages of front wheel Drive system:

1. Interior space: Since the power train is a single unit contained in the engine compartment of the vehicle, there is no need to devote interior space for a driveshaft tunnel or rear differential, increasing the volume available for passengers.
2. Weight: Fewer components usually means lower weight.
3. Improved fuel efficiency due to less weight.

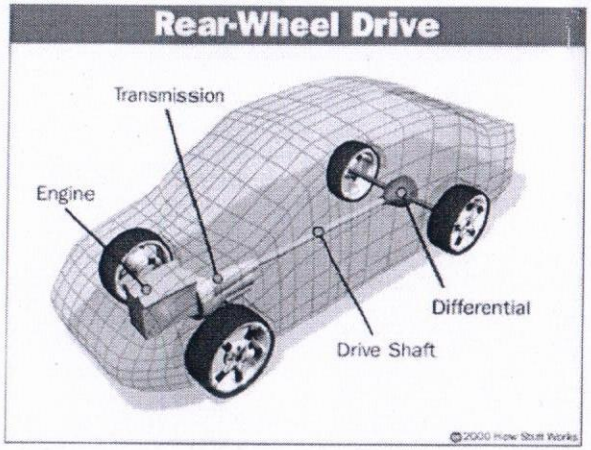
Advantages of front wheel Drive system:

4. Cost: Fewer material components and less installation complexity overall.
5. They are easier to assemble, since the entire drive package is in the front half of the car.

Disadvantages of front wheel Drive system:

1. Torque steer is the tendency for some front-wheel drive cars to pull to the left or right under hard acceleration.
2. Poor drive-off capacity on wet, icy and inclined roads.
3. Due to high front axle load, power steering is necessary.
4. It is difficult to design the power plant and suspension system due to lack of space.
5. There is higher tyre wear in front.

Rear wheel Drive system:



Advantages of Rear wheel Drive system:

1. Even weight distribution — The layout of a rear-wheel drive car is much closer to an "even front and rear weight distribution" than a front-wheel-drive car.
2. Better handling — the more even weight distribution and weight transfer improve the handling of the car.
3. No torque steer.

Advantages of Rear wheel Drive system:

4. Serviceability — Drivetrain components on a rear-wheel drive vehicle are not critical and do not involve packing as many parts into a small space as does front wheel drive.
5. Can accommodate more powerful engines as a result of the longitudinal orientation of the drive train.

Disadvantages of Rear wheel Drive system:

1. Increased weight — The components of a rear wheel drive vehicle's power train are less complex, but they are larger. The driveshaft adds weight.
2. Higher initial purchase price — Modern rear wheel drive vehicles are typically more expensive to purchase than comparable front wheel drive vehicles.
3. Decreased interior space.

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Disadvantages of Rear wheel Drive system:

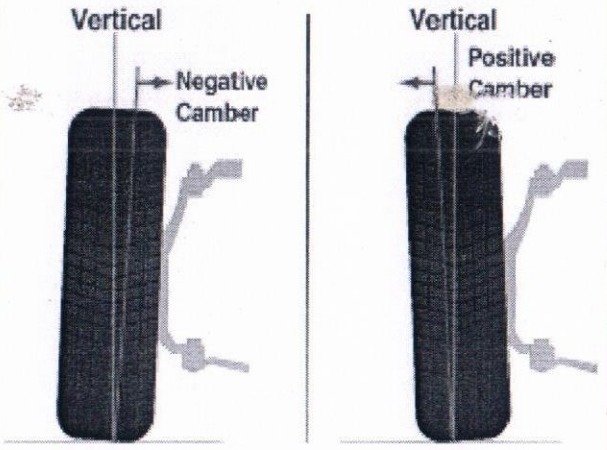
4. The possibility of a slight loss in the mechanical efficiency of the drivetrain.
5. Improper weight distribution when loaded — A rear wheel drive car's center of gravity is shifted rearward when heavily loaded with passengers, which may cause unpredictable handling behavior.

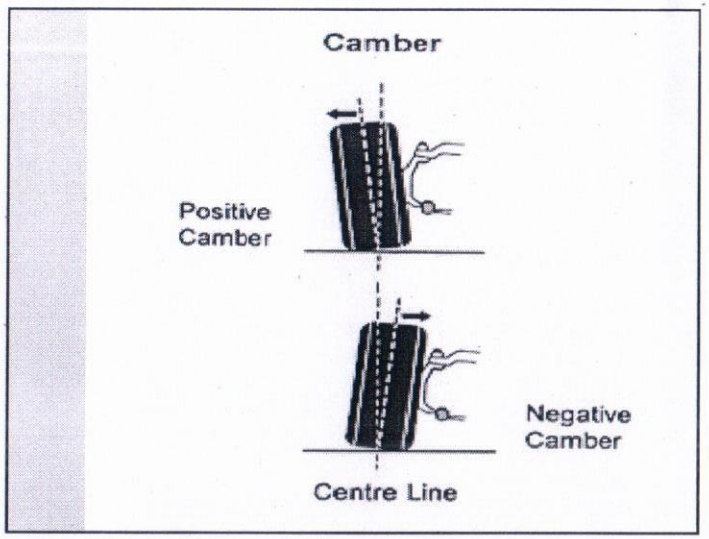
Steering Geometry:

1. **Camber**
2. **King Pin Inclination (KPI) or Steering axis Inclination (SAI)**
3. **Combined Angle and Scrub Radius**
4. **Castor**
5. **Toe-in or Toe-out**

1. Camber:

- **Definition:** Camber is the tilt of the car [illegible] perpendicular to the ground. Camber is positive if the tilt is outward at the top. Camber is also called 'wheel rake'.
- **Amount:** Camber should not generally exceed 2°.



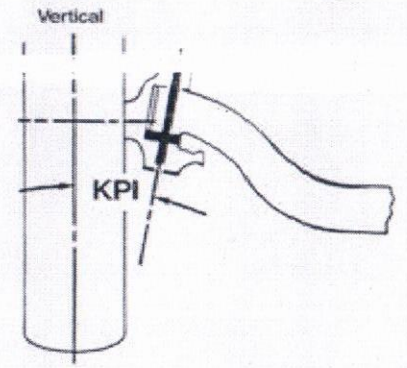


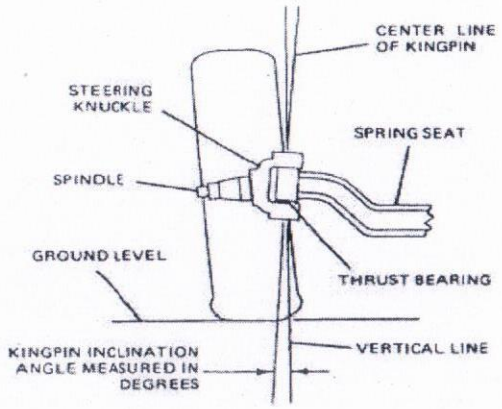
Effect of Camber:

- It is always desirable that tyres should roll on the ground vertically so that the wear on tyre surface is uniform.
- If while running, the tyres are inclined from the vertical either inward or outward, they will wear more on one side than the other.
- Always initial positive camber is provided to the wheels so that when the vehicle is loaded, they automatically come to a vertical position.

2. King Pin Inclination (KPI) or Steering axis Inclination (SAI):

- Inclination of king pin from vertical is called the King Pin Inclination(KPI).
- In modern cars where the king pin has been replaced by the ball joints, this term has been renamed as Steering Axis Inclination(SAI).
- It is defined as the inclination of the ball joint-axis from the vertical.
- **Amount:** About 7 to 8 degrees.





Effect of KPI or SAI:

- When the vehicle takes a turn, the steering linkages rotate about the king pin as it acts as pivot.
- This causes a rise in C.G. of the vehicle and vehicle body moves up.
- As soon as the steering wheel is left after the turn is completed, the weight of the vehicle tends to return the wheels to the straight ahead position.

3. Combined Angle and Scrub Radius:

- **Combined Angle= Camber + KPI**
- **Scrub Radius:** In rear wheel driven vehicle, the tractive force of the vehicle pushes the vehicle body in forward direction, thus the forward tractive force acts at the point on the road where the king pin axis meets when projected.

The road resistance acts at the wheel contact point on the road, so the distance between these two points is known as **scrub radius.**

4. Castor:

- **Definition:** The angle between the king pin [illegible] the plane of the wheel is called the castor angle.
- If the king pin center line meets the ground at a point ahead of the vertical wheel center line then it is called **positive castor** while if it is behind the vertical wheel center line, it is called **negative castor.**

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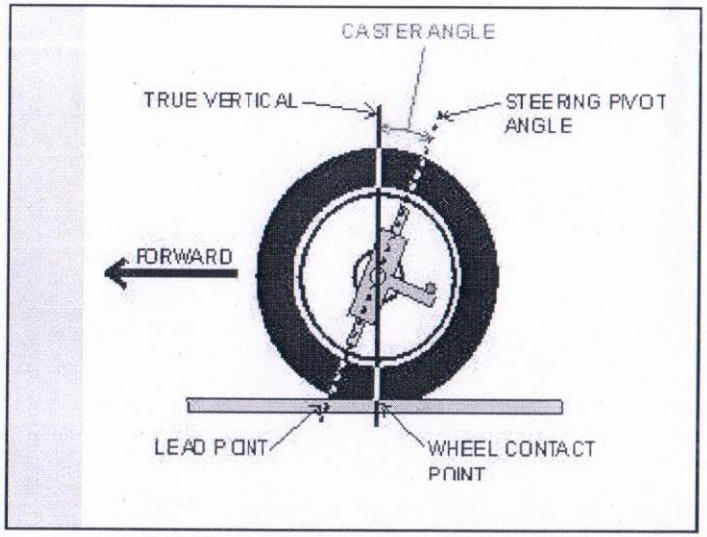
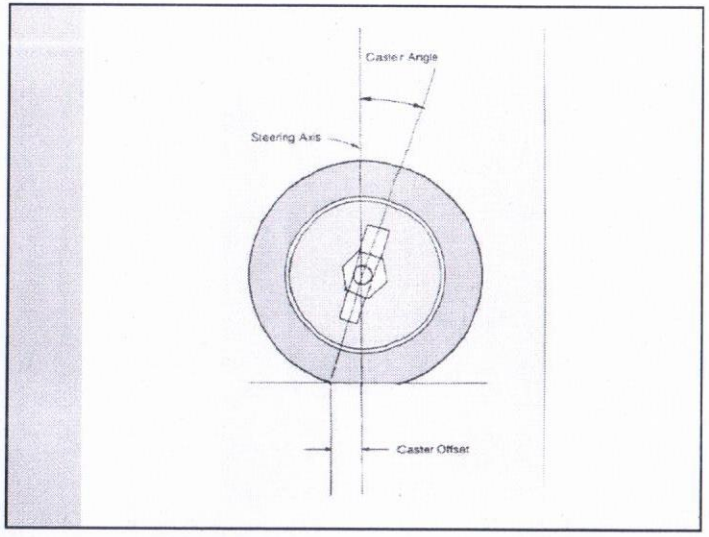




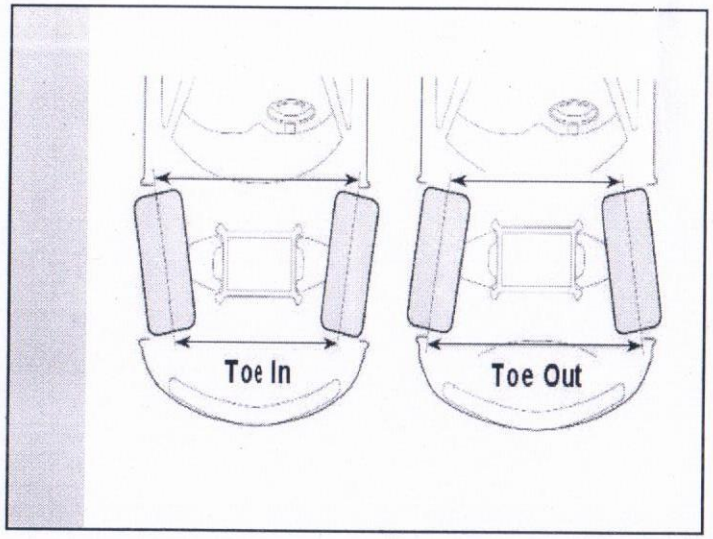
Effect of Castor:

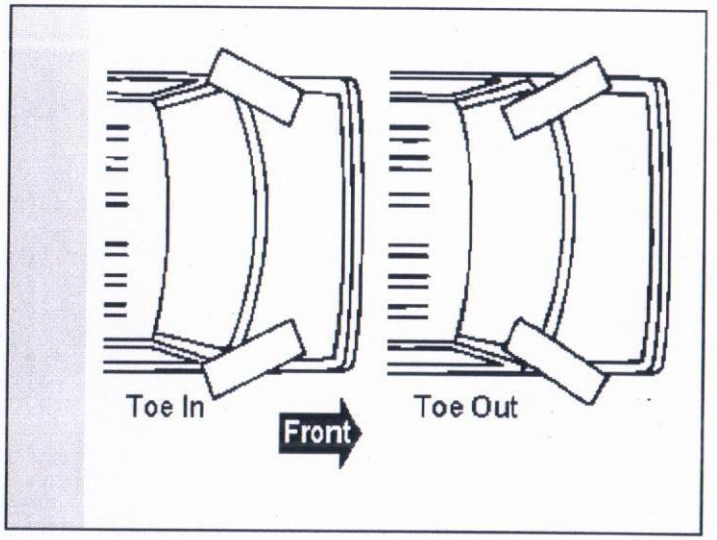
- Since in positive castor steering axis would meet the ground ahead of the center of the tyre print therefore wheel will always follow the steering axis in this way positive castor provides directional stability to the car wheels.
- **Amount:** About 3° of castor gives good results.

5. Toe-in or Toe-out:

- **Definition:** Toe-in is the amount by which the front wheels are set closer together at the front than at the rear, when vehicle is stationary.

Toe-out is the amount by which the front wheels are set closer together at the rear than at the front, when vehicle is stationary.





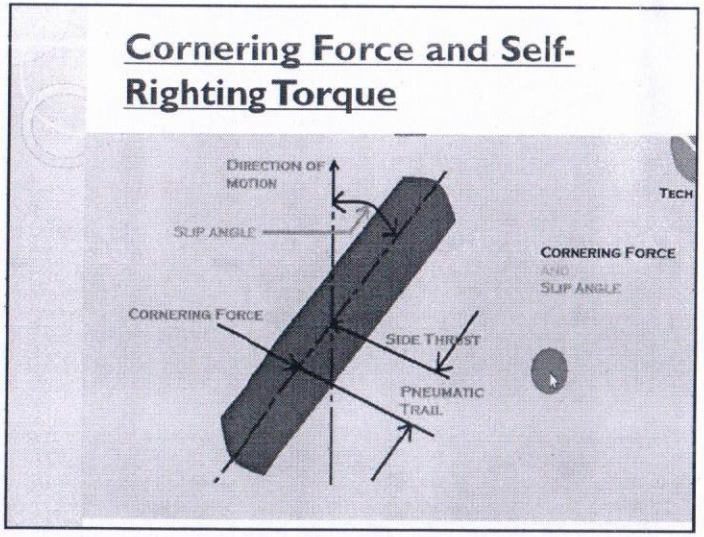
Effect of Toe-in or Toe-out:

- There is always an inherent tendency of the front wheels in case of a rear wheel drive system to toe-out and in front wheel drive system to toe-in because of purposeful deviation from center point steering and also due to errors in steering angles.
- To avoid this initial toe-in is provided in rear wheel driven cars and initial toe-out in front wheel driven cars.
- **Amount:** Its value generally does not exceed 3mm.

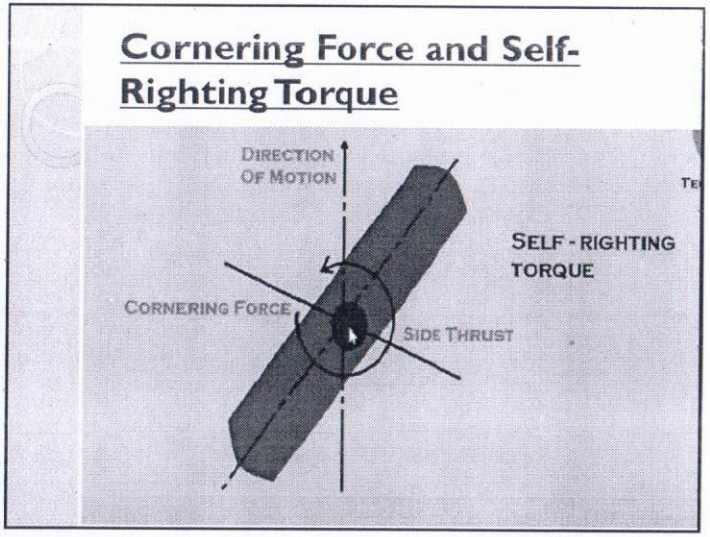
Wheel Alignment:

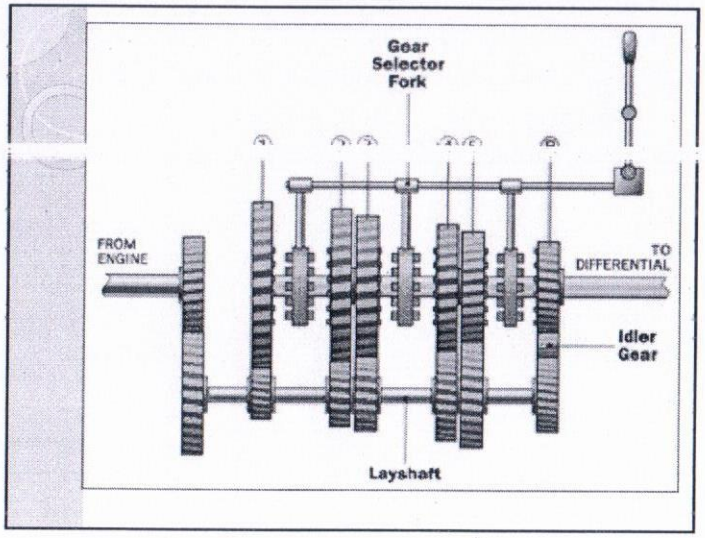
- The term 'wheel alignment' refers to such an arrangement of front wheels and the steering mechanism that provides an easier directional control to the vehicle, minimum tyre wear, stability to the vehicle while negotiating a curve and parallel rolling of front wheels while moving straight.

Cornering Force and Self-Righting Torque

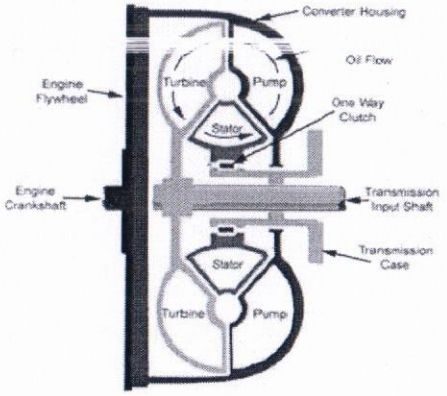


Cornering Force and Self-Righting Torque





Torque-Converter:



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