



### SCHEME OF STUDIES & EXAMINATIONS

#### Department: Automobile Engineering – 8<sup>th</sup> Semester

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	AE 402B	EMERGING AUTOMOTIVE TECHNOLOGIES	4	0		25	75	-	100	4	3
2	AE 404B	AUTOMOTIVE WORKSHOPS TOOLS AND EQUIPMENTS	4	0		25	75	-	100	4	3
3		ELECTIVE I	4	-		25	75	-	100	4	3
4		ELECTIVE II	4	-		25	75	-	100	4	3
5	AE 406B	AUTOMOTIVE WORKSHOPS TOOLS AND EQUIPMENTS LAB	-	-	2	20		30	50	1	3
6	AE 408B	SEMINAR	-	-	2	50			50	2	3
7	AE 413B	PROJECT	-	-	8	75	-	125	200	8	3
8	GFAE 402B	GENERAL FITNESS FOR THE PROFESSION	1	-	-	-	-	100	100	4	3
<b>Total</b>			<b>17</b>	<b>0</b>	<b>12</b>	<b>245</b>	<b>300</b>	<b>255</b>	<b>800</b>	<b>31</b>	

ELECTIVE I		ELECTIVE II	
AE 432B	AUTOMOTIVE AERODYNAMICS	AE 442B	TRANSPORT MANAGEMENT AND AUTOMOTIVE INDUSTRY
AE 434B	SPECIAL TYPE OF VEHICLE	AE 444B	ERGONOMICS ENGINEERING
AE 436B	AUTOMOTIVE AIR CONDITIONING	AE 446B	VIBRATION AND NOISE CONTROL
AE 438B	MECHATRONICS	AE 448B	DESIGN OF JIGS, FIXTURE AND PRESS TOOLS
AE 440B	NON DESTRUCTIVE TESTING METHODS	AE 450B	QUALITY CONTROL AND RELIABILITY ENGINEERING

#### Note:

- 1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weight age of Sports is given in General Fitness For The Profession Syllabus.
- 2 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- 3 Electronics gadgets including Cellular phones are not allowed in the examination
- 4 The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be twenty to run an elective course.
- 5 The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher). Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her. The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.



**SYLLABUS: B Tech (Automobile Engineering)**

Department: Automobile – 8<sup>th</sup> Semester

**Subject: Emerging Automotive Technologies (Theory)**

**Subject Code: AE 402 B**

**Detailed Content**

**UNIT NO.1 The Future Of The Automotive Industry, Fuel Cell Technology For Vehicles**

- Topic No.1: Challenges and Concepts for the 21<sup>st</sup> century
- Topic No.2: Crucial issues facing the industry and approaches to meet these challenges
- Topic No.3: What is fuel cell, Type of fuel cell, Advantages of fuel cell
- Topic No.4: Current state of the technology, Potential and challenges
- Topic No.5: Advantages and disadvantages of hydrogen fuel

**UNIT NO.2 Latest Engine Technology Features, 42 Volt System**

- Topic No.6: Advances in diesel engine technology, Direct fuel injection Gasoline engine
- Topic No.7: Diesel particulate emission control, Throttling by wire. Variable Valve Timing
- Topic No.8: Method used to affect variable Valve Timing
- Topic No.9: Electromagnetic Valves, Cam less engine actuation, Need, benefits, potentials and challenges
- Topic No.10: Technology Implications for the Automotive Industry
- Topic No.11: Technological revolution that will occur as a result of the adoption of 42 volt systems.

**UNIT NO.3 Electrical And Hybrid Vehicles, Integrated Starter Alternator**

- Topic No.12: Types of hybrid systems, Objective and Advantages of hybrid systems
- Topic No.13: Current status, Future developments
- Topic No.14: Prospects of Hybrid Vehicles, Starts stop operation
- Topic No.15: Power Assist, Regenerative Braking, Advanced lead acid batteries
- Topic No.16: Alkaline batteries, and Lithium batteries
- Topic No.17: Development of new energy storage systems
- Topic No.18: Deep discharge and rapid charging ultra capacitors

**UNIT NO.4 Integrated Starter Alternator, Vehicles Systems**

- Topic No.19: What is X-By Wire, Advantage over hydraulic systems
- Topic No.20: Use of Automotive micro controllers
- Topic No.21: Types of sensors, Use of actuators in an automobile environment
- Topic No.22: Constantly Variable Transmission, Benefits, Brake by wire
- Topic No.23: Advantages over power Braking System, Electrical assist steering
- Topic No.24: Steering by wire, Advantages of Steering by wire
- Topic No.25: Semi-active and fully-active suspension system
- Topic No.26: Advantages of fully active suspension system

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		P	Credits	Internal Assessment	External Assessment (Examination)		
L	T			Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

**TEXT & REFERENCE BOOKS:**

1. Advanced Vehicle Technologies by Heinz Heisler-SAE International Publication.
2. Electric and Hybrid Electric vehicles by Ronald K. Jurgen.- SAE International Publi.
3. Electronic Braking, Traction and Stability control-SAE Hardbound papers.

**NOTE:**

1. In the semester examination, the examiner will set eight questions in all; two question from each unit & students will be required to attempt only five questions, at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.



### **SYLLABUS: B Tech (Automobile Engineering)**

**Department: Automobile – 8<sup>th</sup> Semester**

**Subject: Automotive Workshops Tools And Equipments (Theory)**

**Subject Code: AE 404 B**

#### **Detailed Content**

#### **UNIT NO.1 (A) Introduction To Workshop, Automotive Service Tools, Work Shop Tools And Equipment**

- Topic No.27: Measuring Observation, Disassembly, Machining, Installing New Part
- Topic No.28: Reassembly, Adjustment, Measuring Tools, Hand Tools
- Topic No.29: Special Service Tools, and Shop Cutting Tools
- Topic No.30: Various Power Tools, Hydraulic Jack, Axle Stand
- Topic No.31: Hydraulic Lift, Creeper, Hydraulics Press
- Topic No.32: Lubricating Equipment, Cleaning Equipment
- Topic No.33: Electrical Equipment and Tools, Pneumatic Equipment and Tools

#### **UNIT NO.1 (B) Machines Used In Automotive Machinig Workshop, Lifting Equipment**

- Topic No.34: Lathe, Drilling Machine, Boring Machine, Grinding Machine
- Topic No.35: Valve Seat Cutter or Grinder, Lapping Machine
- Topic No.36: Honing Machine, Electromechanical Auto Lift, Four Post Hoist, Hydraulic Hoist
- Topic No.37: Work Shop Crane, Mechanical Hoist

#### **UNIT NO.2 Engine Care Equipment, Wheel Care Equipment**

- Topic No.38: Cylinder Leakage Tracer, Ridge Reamer, Cylinder Hones
- Topic No.39: Piston Ring Tools, Piston Ring Expander
- Topic No.40: Engine Compression Gauge, Radiator Pressure Gauge
- Topic No.41: Tachometer, Engine Analyzer, Monitor Scan Tool Systems
- Topic No.42: Perception 2 Channel Scope and Graphics Multi meter
- Topic No.43: Infra Red Thermometer, Digital Oscilloscope
- Topic No.44: Spark Plug Cleaner And Tester, Wheel Balancing Machine
- Topic No.45: Wheel Alignment Equipment, Turning Radius Gauge
- Topic No.46: Camber Caster King Pin Gauge, Toe in Gauge, Tyre Changer & Tyre Inflator

#### **UNIT NO.3 Body And Frame Repair Tools And Equipment, Weld Shop Equipment, Paint Shop Equipment**

- Topic No.47: Overview, Body and Frame Repair Equipment,
- Topic No.48: Bench Type, Floor Type, Platform Type, Intermediate Type
- Topic No.49: Measuring Equipment, Cutting Equipment, Sanding Equipment
- Topic No.50: Tools for Panel Repairs, Tools for Removal and Mounting
- Topic No.51: Tools for Clamping, Safety Devices, Consumable Materials & Others
- Topic No.52: Welding Equipment, Spot Welding Machine
- Topic No.53: Plasma Cutting Machine, MIG Welding Machine
- Topic No.54: TIG Welding Machine, Spray Paint Booth, Sun Scanners

#### **UNIT NO.4 (A) CLEANING EQUIPMENT, CLEANING EQUIPMENT, CLEANING EQUIPMENT**

- Topic No.55: Pressure Automatic Touch Free Car Wash System
- Topic No.56: High Pressure Steam Jet Cleaning, Vehicle Washes, Hose Reels
- Topic No.57: Auto Service Unit, Two/ Three Wheeler Washers
- Topic No.58: Nozzle Tester, Nozzle Cleaning Tool Set, Vacuum Fuel Pump Pressure Gauge
- Topic No.59: Fuel Injector Cleaning, Injector Cleaner, A/C Recovery Units
- Topic No.60: UV Leak Detection Kit, Refrigerant Identifier

#### **UNIT NO.4 (B) BATTERY TESTER EQUIPMENT, GAS & SMOKE ANALYZER EQUIPMENT, BRAKE TOOLS, WORK SAFTY**

- Topic No.61: Flash Timing Light, Battery Starter Tester, Battery Hydrometer Set
- Topic No.62: Battery Charger, Automotive Emission Analyzer
- Topic No.63: Smoke Opacity Meter, Brake Tester
- Topic No.64: High Thermal Brake Tester, Brake Lath
- Topic No.65: Brake Bleeder, Description, Work Cloth, Safe and Tidy Work, Fire Prevention, Electrical Equipment



# PM

## COLLEGE OF ENGINEERING

A Unit of Puran Murti Educational Society  
Approved by AICTE, Ministry of HRD, Govt. of India,  
Affiliated to Deenbandhu Chhotu Ram University of Science & Technology

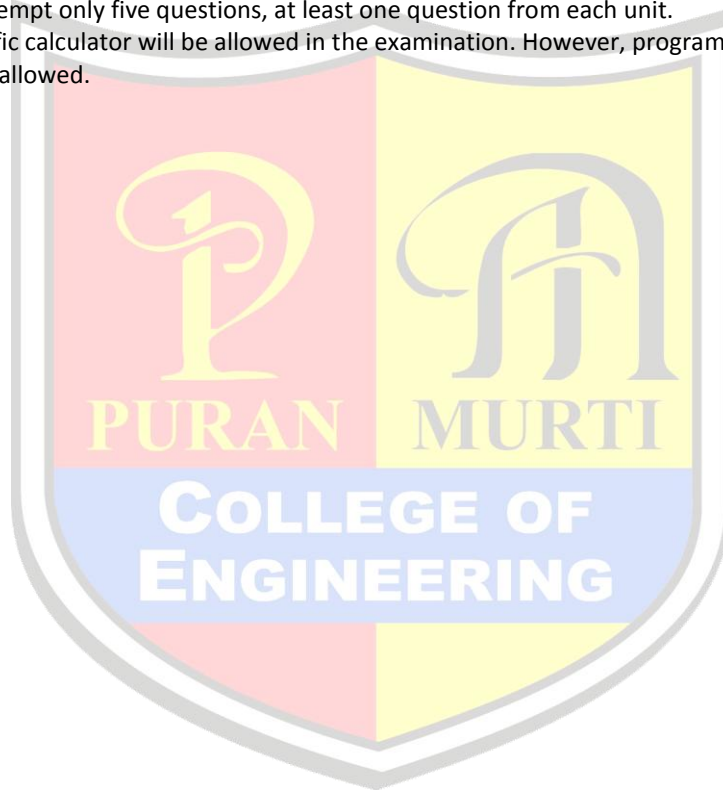
Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	

### TEXT & REFERENCE BOOKS:

1. Automobile Engineering, Vol I- VI, by Anil Chhikara, Satya Prakashan, New Delhi.
2. Symphony in Automotive Care Catalogue by Precision Testing Machines Pvt Limited, Delhi

### NOTE:

1. In the semester examination, the examiner will set eight questions in all; two question from each unit & students will be required to attempt only five questions, at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





### SYLLABUS: B Tech (Automobile Engineering)

Department: Automobile – 8<sup>th</sup> Semester

Subject: Special Types Of Vehicles (Theory)

Subject Code: AE 434 B

#### Detailed Content

#### UNIT NO.1 Tractors And Farm Equipments

- Topic No.1: Classification and power required
- Topic No.2: Design consideration
- Topic No.3: Ride and stability characteristics power plants
- Topic No.4: Transmission
- Topic No.5: Farm equipments.

#### UNIT NO.2 Tractors And Farm Equipments

- Topic No.6: Construction and operation aspects of Bull dozers
- Topic No.7: Scrapers
- Topic No.8: Dumpers
- Topic No.9: Loaders
- Topic No.10: Mobile cranes
- Topic No.11: Road rollers
- Topic No.12: Elevators
- Topic No.13: Elevating graders

#### UNIT NO.3 Military And Combat Vehicles

- Topic No.14: Special requirements like power
- Topic No.15: Fuel strength
- Topic No.16: Impact resistance tanker
- Topic No.17: Gun carrier
- Topic No.18: Transport vehicle

#### UNIT NO.4 Classification And Requirements Of Heavy Vehicles

- Topic No.19: Power plants
- Topic No.20: Chassis
- Topic No.21: Transmission

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		Internal Assessment		External Assessment (Examination)			
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

#### TEXT BOOK:

1. Construction planning, Equipment and Methods – Robert L. Peurifoy, William B. Ledbrtter, Clifford J. Schexnayder - McGrawHill, Fifth

#### REFERENCES:

2. A. Gurevich and E.Soreking, Tractors Mir Publishers, Moscow
3. V. Rodichev & G. Rodicheva, Tractors and automobiles, MIR Publishers, Moscow.

#### NOTE:

1. In the semester examination, the examiner will set eight questions in all; two question from each unit & students will be required to attempt only five questions, at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.



**SYLLABUS: B Tech (Automobile Engineering)**

**Department: Automobile – 8<sup>th</sup> Semester**

**Subject: Quality Control & Reliability Engineering (Theory)**

**Subject Code: AE 450 B**

**Detailed Content**

**UNIT NO.1 Introduction And Process Control For Variables**

- Topic No.1: Introduction, definition of quality  
Topic No.2: Basic concept of quality, Definition of SQC  
Topic No.3: Benefits and limitation of SQC, Quality assurance, Quality cost  
Topic No.4: Variation in process, Factors  
Topic No.5: Process capability , Process capability studies and simple problems  
Topic No.6: Theory of control chart- uses of control chart , Control chart for variables  
Topic No.7: X chart, R chart and e chart.

**UNIT NO.2 Process Control For Attributes , Acceptance Sampling**

- Topic No.8: Control chart for attributes  
Topic No.9: Control chart for proportion or fraction defectives  
Topic No.10: P chart and N p chart , Control chart for defects  
Topic No.11: C and U charts, State of control and process out of control identification in charts  
Topic No.12: Lot by lot sampling & types  
Topic No.13: Probability of acceptance in single, double, multiple sampling techniques  
Topic No.14: O.C. curves , Producer’s Risk and consumer’s Risk.  
Topic No.15: AQL, LTPD, AOQL , Concepts standard sampling plans for AQL and LTPD  
Topic No.16: Uses of standard sampling plans.

**UNIT NO.3 Life Testing – Reliability**

- Topic No.17: Life testing & Objective , Failure data analysis  
Topic No.18: Mean failure rate, Mean time to failure, Mean time between failure  
Topic No.19: Hazard rate, System reliability, Series, parallel , mixed configuration & simple problems  
Topic No.20: Maintainability , availability & simple problems  
Topic No.21: Acceptance sampling based on reliability test , O.C Curves

**UNIT NO.4 Quality And Reliability**

- Topic No.22: Reliability improvements , Techniques  
Topic No.23: Use of Pareto analysis , Design for reliability  
Topic No.24: Redundancy unit and standby redundancy , Optimization in reliability  
Topic No.25: Product design , Product analysis , Product development , Product life cycles

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		Internal Assessment		External Assessment (Examination)			
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

**TEXT BOOKS:**

- Grant, Eugene .L “Statistical Quality Control”, McGraw-Hill.
- L.S.Srinath, “Reliability Engineering”, Affiliated East west press

**REFERENCES:**

- Monohar Mahajan, “Statistical Quality Control”, Dhanpat Rai & Sons
- R.C.Gupta, “Statistical Quality control”, Khanna Publishers
- Besterfield D.H., “Quality Control”, Prentice Hall, 1993.

**NOTE:**

- In the semester examination, the examiner will set eight questions in all; two question from each unit & students will be required to attempt only five questions, at least one question from each unit.
- The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.



### SYLLABUS: B Tech (AE)

Department: Automobile Engineering – 8<sup>th</sup> Semester

Subject: Automotive Workshops Tools And Equipments Lab

Subject Code AE 406B

#### LIST OF EXPERIMENTS:

To study the construction, working and operation with or on the following tools and equipments for given task

1. AUTOMOTIVE SERVICE TOOLS: Measuring Tools, Hand Tools, Special Service Tools, and Shop Cutting Tools, various Power Tools.
2. WORK SHOP TOOLS AND EQUIPMENT: Hydraulic Jack, Axle Stand, Hydraulic Lift, Creeper, Hydraulics Press, Lubricating Equipment, Cleaning Equipment, Electrical Equipment and Tools, Pneumatic Equipment and Tools.
3. MACHINES USED IN AUTOMOTIVE MACHINIG WORKSHOP: Lathe, Drilling Machine, Boring Machine, Grinding Machine, Valve Seat Cutter or Grinder, Lapping Machine, Honing Machine.
4. LIFTING EQUIPMENT: Electromechanical Auto Lift, Four Post Hoist, Hydraulic Hoist, Work Shop Crane, Mechanical Hoist
5. ENGINE CARE EQUIPMENT: Cylinder Leakage Tracer, Ridge Reamer, Cylinder Hones, Piston Ring Tools, Piston Ring Expander, Engine Compression Gauge, Radiator Pressure Gauge, Tachometer, Engine Analyzer, Monitor Scan Tool Systems, Perception 2 Channel Scope and Graphics Multi meter, Infra Red Thermometer, Digital Oscilloscope, Spark Plug Cleaner And Tester
6. WHEEL CARE EQUIPMENT: Wheel Balancing Machine, Wheel Alignment Equipment, Turning Radius Gauge, Camber Caster King Pin Gauge, Toe in Gauge, Tyre Changer, Tyre Inflator
7. BODY AND FRAME REPAIR TOOLS AND EQUIPMENT: Overview, Body and Frame Repair Equipment, Bench Type, Floor Type, Platform Type, Intermediate Type, Measuring Equipment, Cutting Equipment, Sanding Equipment, Tools for Panel Repairs, Tools for Removal and Mounting, Tools for Clamping, Safety Devices, Consumable Materials, Others.
8. WELD SHOP EQUIPMENT: Welding Equipment, Spot Welding Machine, Plasma Cutting Machine, MIG Welding Machine, TIG Welding Machine.
9. PAINT SHOP EQUIPMENT: Spray Paint Booth, Sun Scanners
10. CLEANING EQUIPMENT: Pressure Automatic Touch Free Car Wash System, High Pressure Steam Jet Cleaning, Vehicle Washers, Hose Reels, Auto Service Unit, Two/ Three Wheeler Washers,
11. INJECTOR SERVICING EQUIPMENT: Nozzle Tester, Nozzle Cleaning Tool Set, Vacuum Fuel Pump Pressure Gauge, Fuel Injector Cleaning, Injector Cleaner
12. AIR CONDITION SERVICE EQUIPMENT: A/C Recovery Units, UV Leak Detection Kit, Refrigerant Identifier
13. BATTERY TESTER EQUIPMENT: Flash Timing Light, Battery Starter Tester, Battery Hydrometer Set, Battery Charger
14. GAS & SMOKE ANALYZER EQUIPMENT: Automotive Emission Analyzer, Smoke Opacity Meter
15. BRAKE TOOLS: Brake Tester, High Thermal Brake Tester, Brake Lath, Brake Bleeder
16. WORK SAFTY: Description, Work Cloth, Safe and Tidy Work, Fire Prevention, Electrical Equipment

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	50

#### NOTE:

1. Ten experiments are to be performed in the Semester.
2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.



### SYLLABUS: B Tech (Auto)

Department: Automobile Engineering– 8<sup>th</sup> Semester

Subject: Seminar

Subject Code: AE 408B

#### Detailed Content

The objectives of the course remains

- To learn how to carry out literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/ She will give a seminar talk on the same before a committee constituted by the chairperson of the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students' seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		Internal Assessment		External Assessment (Examination)			
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	2	2	50	-	-	50





**SYLLABUS: B Tech (Auto)**

**Department: Automobile Engineering– 8<sup>th</sup> Semester**

**Subject: Project**

**Subject Code: AE 413B**

**Detailed Content**

The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department : Chairperson  
Project coordinator : Member  
External expert : To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	8	8	75	125	3Hrs	200



**SYLLABUS: B Tech (Auto)**

**Department: Automobile Engineering– 8<sup>th</sup> Semester**

**Subject: General Fitness For The Profession**

**Subject Code: GFAE – 402B**

**Detailed Content**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality Development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student Efforts will be evaluated on the basis of his/ her perfor. / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

1. Dean, Faculty of Engineering & Technology/ Director /Principal of affiliated college:Chairperson
2. Chairperson of the department : Member
3. External expert : Appointed by the university

**A. The student will present a written report before the committee with following in view:**

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- I. Academic Performance -----
- II. Extra Curricular Activities / Community Service, Hostel Activities **(12 Marks)**
- III. Technical Activities / Industrial, Educational tour **(12 Marks)**
- IV. Sports/games **(16 Marks)**

**Note:** Report submitted by the students should be typed on both sides of the paper.

- B. A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. **(40 Marks)****

**C. Faculty Counselor Assignment **(20 Marks)****

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
4. Moral values & Ethics

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	-	4	100	-	-	100