



Course Title: Automotive Electronics	Course Code: 15AT62T
Credits (L:T:P) : 4:0:0	Core/ Elective: Core
Type of course: Lectures	Total Contact Hours: 52
CIE:25marks	SEE:100 marks

Prerequisites: Basic knowledge of Science & Automobile Electrical and Electronics systems.

Course Objectives:

Appreciate the application, construction and working of sensors, actuators and different electronic control systems used in Automobile.

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

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Describe the components of electronic control system in Automobile.	U/A	2,9	09
CO2	Describe the need, construction and working of vehicle computer systems and networking.	U/A	2,9	08
CO3	Describe the construction and working of different sensors and actuators used in electronic control system	U/A	2,9	12
CO4	Explain the need, construction and working of different SI and C. I engine electronic fuel feed systems.	U/A	2,9	08
CO5	Describe the need and working of different electronically controlled vehicle safety systems of Auto mobile.	U/A	2,9	08
CO6	Explain the need and working of electronically controlled suspension, steering and instrumentation systems of Auto mobile.	U/A	2,9	07
		Total sessions		52

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Automotive electronics	-	3	-	-	-	-	-	-	3	-

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

Method is to relate the level of PO with the number of hours devoted to the CO's which address the given PO.

If > 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at level 3.

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2.

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed Level 1.

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

COURSE CONTENT AND BLUE PRINT OF MARKS FOR SEE

Unit No	Unit Name	Hour	Questions to be set For End Exam			Marks weightage (%)
			R	U	A	
I	Introduction to Automotive electronics.	09	---	10	15	17.2
II	Vehicle computer systems and networking	08	---	15	05	13.7
III	Sensors and actuators	12	----	10	30	27.5
IV	SI and CI engine electronic fuel feed systems	08	----	05	15	13.7
V	Electronic vehicle safety systems	08	----	05	15	13.7
VI	Electronic vehicle motion control and instrumentation.	07	05	05	10	13.7
Total		52	145			100

Legend: R; Remember, U: Understand A: Application

Course Delivery: The course will be delivered through lectures, presentations and classroom discussions.

Course Content:

UNIT-I

Introduction to Autotronics: 09 hrs

Introduction:

Autotronics- Definition- need, Field effect transistor-construction and working-applications, Silicon controlled rectifiers-construction and working-applications, logic gates-concept-AND-OR-NOT gates-working with truth tables, Flif flops-concept-applications, registers-concept, Integrated circuits-concept-types, Binary number system- need- conversion process, analog and digital signals-signal conditioning-need-steps, analog to digital conversion-steps.

UNIT-II

Vehicle computer systems and networking. 08hrs

Computer(ECU) operation-Block diagram of computer(ECU) with its microprocessor-functions-working principle, Microprocessors-design-program-information storage-information retrieval, typical multi point fuel injection system input/output pin configuration, open loop and closed

loop control systems-comparison, multiplexing-concept-need. Computer networking-concept-need-Controlled Area Network (CAN)-concept-merits-types.

UNIT-III

Sensors and actuators

12hrs

Sensors- Definition, construction and working- throttle position sensor-crankshaft position sensor-electromagnetic-Hall effect sensor-Optical Sensor-piezoelectric combustion knock sensor-temperature sensor-Strain gauge type Manifold Absolute Sensor-Exhaust gas oxygen sensor, Mass air flow Sensor-types-construction and working of hot film and hot wire type sensors, Potentiometer type and LVDT type ride height sensors, Rain sensor-need-working principle.

Actuator -Definition, pulse width modulation of input voltage-duty cycle-need, on/off solenoid-proportionate solenoid-stepper motor-servo motor-relays-construction and working -applications.

UNIT-IV

S I and C I engine electronic fuel injection systems

08hrs

SI Engine Electronic Fuel injection-types, construction and working-single point-multipoint-direct injection system-operating modes of direct injection-advantages and disadvantages of each system, construction and working-petrol injectors.

CI Engine Electronic Fuel injection-types-construction and working-Electronic Diesel Control-In line- Distributor pumps, Construction and working-Unit injector-Common rail injection system-electro hydraulic injector of CRDI system.

UNIT-V

Electronic vehicle safety systems

08hrs

Anti lock brakes-Need and types, construction and working- anti lock brake modulator, four chamber anti lock braking system, Traction control system and Electronic stability control-need and working principle.

Need and working- air bags-magnetic bias sensor- rolamite sensor, working-inertia switch based air bag system-accelerometer based air bag system, collision avoidance warning system-tyre pressure warning system- needs-working.

UNIT-VI

Electronic vehicle motion control and instrumentation:

07 hrs

Construction, working and advantages-electronic rack and pinion power steering-electronic four wheel steering.

Need and working principle-electronically controlled shock absorber-types, electronic suspension system.

Computer based instrumentation-working principle-advantages, trip information computer-working principle, working principle-vehicle speed measurement-engine coolant temperature measurement-fuel quantity measurement systems, navigation- types- GPS navigation system.

Resources

Reference books:

Sl NO	Title of the book	Author	Publisher
1	Understanding Automotive electronics	William Ribben	Butterworth-Heinemann
2	A Systems Approach to Automotive technology	Jack Erjavec	Cengage Learning
3	Electronic Engine Controls	Steve.V.Hatch	Cengage Learning
4	Truck engines Fuel& computerized management systems	Sean Bennett	Cengage Learning
5	Automobile Engineering vol 2	Kripal Singh	Standard Publishers
6	Automobile engineering Vol I	Anil chikara	Satyaprakashan
7	Automotive mechanics 10 th Edi	W H Crouse and Anglin	Tata Mc Grill
8	Automobile electrical and electronic systems	Tom Denton.	Butterworth-Heinemann
9	Automobile Technolgy	R B Gupta	Satya Prakashan
10	Automobile Technolgy	Dr N K Giri	Kanna Publications
11	Mechatronics	Prof C R Venkataramana	
12	Automotive Computer Controlled Systems (Diagnostic tools and techniques)	Allan. W. M Bonnick	Butterworth-Heinemann

13	Automotive Engineering (Engine performance)	Ken Pickerill	Cengage Learning
14	Mechatronics	W Bolten	Longman Pearson publications .. 2nd Ed , 2007, Third Edition

Websites:

Analog vs digital signals:

http://www.diffen.com/difference/Analog_vs_Digital

<https://www.youtube.com/watch?v=AiQpYO5E-go>

Signal conditioning:

https://en.wikipedia.org/wiki/Signal_conditioning

Analog to Digital conversion:

https://en.wikibooks.org/wiki/Electronics/Digital_to_Analog_%26_Analog_to_Digital_Converters

<https://www.britannica.com/technology/telecommunication/images-videos/Basic-steps-in-analog-to-digital-conversion-An-analog-signal/3692>

<http://www.allaboutcircuits.com/textbook/digital/chpt-13/delta-sigma-adc/>

<http://www.nutag.com/blog/analog-digital-%E2%80%93-part-2-conversion-process>

FET:

<http://whatis.techtarget.com/definition/field-effect-transistor-FET>

Thyristers or Silicon controlled rectifiers:

<http://www.explainthatstuff.com/how-thyristors-work.html>

flip flops:

<http://www.electrical4u.com/latches-and-flip-flops/>

Applications of flip flops:

<http://www.electrical4u.com/application-of-flip-flops/>

Multiplexing:

<http://searchnetworking.techtarget.com/definition/multiplexing>

Sensors:

- <https://www.youtube.com/watch?v=jyQuRgQHGCk>

Exhaust Gas Oxygen Sensor:

- <https://www.youtube.com/watch?v=Fl3aD1qJrEg>

Throttle position sensor:

- <https://www.youtube.com/watch?v=vyxNLRcmk3I>

MAP Sensor:

- <https://www.youtube.com/watch?v=dLIFSIPmQxY>

MAF Sensor:

- <https://www.youtube.com/watch?v=RFnfi25p3po>
- <https://www.youtube.com/watch?v=xhbSuIZus-o>

- <http://www.electroschematics.com/11900/measuring-air-flow/>

Crank shaft position sensor:

- <https://www.youtube.com/watch?v=RUlislTGOwA>
- <https://www.youtube.com/watch?v=YeXlmdlXp2s>

Hall effect Sensor:

- <https://www.youtube.com/watch?v=wpAA3qeOYiI>

Knock Sensor:

- <https://www.youtube.com/watch?v=6xHJYQreZnM>

Ride height sensor:

- <https://www.youtube.com/watch?v=srgBDFVTZ6M>

LVDT Sensor:

- <https://www.youtube.com/watch?v=CRH6PYcAk7s>
- <https://www.youtube.com/watch?v=anCnrtjNLQM>

Rain sensor:

- http://www.agcoauto.com/content/news/p2_articleid/272

Solenoid valve:

- <https://www.youtube.com/watch?v=AmXWkVMfC5I>

PWM and DUTY CYCLE:

- <https://www.youtube.com/watch?v=kwb4pAUxR4E&spfreload=5>
- <https://www.youtube.com/watch?v=YmPziPfaByw>

Proportionate solenoid:

- <http://www.tlxtech.com/understanding-solenoids/theory-operation/pwm-solenoid-theory>

Stepper motor and servo motors:

- <https://www.youtube.com/watch?v=oOvRf7xa5r4>
- <https://www.youtube.com/watch?v=TWMai3oirnM>
- <https://www.youtube.com/watch?v=CrEW89RrtB4&list=PLuiZCNAMmjnNDaL9hFRbQaJRv-SCvpUj9&index=2>
- <http://www.electrical4u.com/servo-motor-servo-mechanism-theory-and-working-principle/>
- <http://www.electricaleasy.com/2015/01/how-does-servo-motor-work.html>
- <http://electricalstudy.sarutech.com/servo-motor-servo-mechanism-theory-and-working-principle/index.html>

Electronic fuel injection:

- <https://www.youtube.com/watch?v=umdoG7qdWWs>
- <https://www.youtube.com/watch?v=xG1w3l41lmQ>

Direct injection system

- <https://www.youtube.com/watch?v=LjJSbHxIvnM>

Common rail injector: <https://www.youtube.com/watch?v=NUvWnOd5IFw>

Student Activities to be performed to award five marks in continuous internal evaluation:

1. Visit nearby electronic/electrical repair shops collect different transistors and ICs and make a report on them containing photos, pin configuration and applications.
2. Visit nearby computer repair shop/ automobile service stations/websites and collect information on different ICs, components used in general computer or ECU and make a report with photographs/block diagrams/circuits, working and applications.
3. Visit nearby two wheel/four wheeler service stations/garages/websites and make report of different automotive sensors and actuators and components seen with specification, materials used and manufacturing processes used along with photographs.
4. Visit nearby two wheel/four wheeler service stations/garages and collect different electrical/electronic control circuits of vehicles.
5. Visit nearby four wheeler service stations/ websites and collect information on checking and troubleshooting procedures of different automobile sensors and actuators.
6. Visit nearby four wheeler service stations/ websites and collect information on different OBDII standard trouble codes.

Note:

1. Student should prepare a report on any one of the above/similar activity, which helps in achieving above course outcomes.
2. The report prepared should be approved by the concerned staff and HOD.
3. The activity group should consist of maximum of three students.

MODEL OF RUBRICS FOR ASSESSING STUDENT ACTIVITY

RUBRICS MODEL

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

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

Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	IA	Students	Three IA Tests; (Average of three Tests)	20	Blue books	1,2,3,4,5,6
				Activity	05	Activity Reports	1,2,3,4,5,6
	SEE (Semester End Examination)	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2&3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3,4,5&6 Effectiveness of Delivery of instructions & Assessment Methods

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

1. Blue books (20 marks)
2. Student suggested activities report for 5 marks evaluated through appropriate rubrics.
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

MODEL QUESTION PAPER (CIE)

Note: The course coordinator has to follow the question paper blue print given in above table

Test date and Time	Semester/year	Course/Course Code	Max Marks		
	VI semester	Automotive electronics	20		
	Year: 2016-17	Course code:15AT62T			
Name of Course coordinator:		Units:1,2	Co: 1,2		
Note: Answer all questions					
Q No	Question	Mark	CL	CO	PO
1	a. Explain the construction and working of silicon controlled rectifier.	5	U	1	2,9,
	b. Compare analog signals to digital signal	5	A	1	2,9,
	OR				
	a. Convert the numbers 20, 42 into equivalent binary numbers.	5	U	1	2,9,
2	b. Explain the need of signal conditioning.	5	A	1	2,9,
	Sketch the block diagram of computer and its CPU and explain its working in Automobile environment.	10	U	2	2,9,
	Or Explain types of CAN and their applications.	10	U	2	

MODEL QUESTION BANK

Legend: R; Remember, U: Understand A: Application

CO1: Describe the components of electronic control system in Automobile.

FIVE MARK QUESTIONS

1. List the advantages of electronic control systems in Automobile.(R)
2. Compare analog signals with digital signals.(A)
3. List the advantages and disadvantages of analog signals.(R)
4. list the advantage and disadvantages of digital signals(R)
5. Explain the need of signal conditioning.(A)
6. Explain the construction and working of field effect transistor with a sketch (U/A)
7. Explain the construction and working of silicon controlled rectifier with a sketch.(U/A)
8. List applications of FET,SCR and IC's (A)
9. Write a short note on logic gates and Integrated circuits.(A)
10. Write a short note on binary number system.(A)
11. Convert the numbers 20, 42 into equivalent binary numbers. (U)
12. Convert the binary numbers 0110 and 1101 into equivalent decimal number.(U)
13. Explain flip flops with their applications.(U)
14. Write a short note on flip flops.(A)
15. Write a short note on registers.(A)

TEN MARK QUESTIONS

1. Explain the working of AND and OR gates with block diagrams and truth tables.(U/A)
2. Explain the working of OR and NOT gates block diagrams and truth tables.(U/A)
3. Explain the steps involved in signal conditioning.(U)
4. Explain the steps involved in analog to digital conversion(U)

CO2: Describe the need, construction and working of vehicle computer systems and networking.

FIVE MARK QUESTIONS

1. Explain the meaning of microprocessor and program.(U)
2. Explain the process of data retrieval and storage.(U)
3. Explain the functions of RAM and ROM (U)
4. List the difference between RAM, ROM and PROM (R)
5. Explain the functions of input and output interfaces.(U)
6. Sketch the general block diagram of computer (ECU)and name its parts.(A)
7. Explain working of open loop control system with block diagram(U/A)
8. Explain the working of closed loop control system with block diagram(U/A)
9. Compare open and closed loop control systems (A)
10. Explain the meaning of multiplexing and its need(U)
11. List the advantages of multiplexing(R)

12. Explain the meaning of networking and its need.(U)
13. Explain the meaning of CAN and its merits.(U)
14. State different types of CAN with their applications.(R)

TEN MARK QUESTIONS

1. Sketch the block diagram of computer(ECU) with its microprocessor and explain its functions.(U/A)
2. Sketch the block diagram of computer(ECU) with its microprocessor and explain its working in Auto mobile environment.(U/A)
3. Explain the need of program and process of information storage and information retrieval.(U)
4. Sketch the block diagram of typical multi point electronic fuel injection system micro controller pin configuration and label the parts.(U/A)
5. Explain the meaning of CAN its merits and types.(U)
6. Explain types of CAN and their applications.(U)

CO3: Describe the construction and working of different sensors and actuators used in electronic control system

FIVE MARK QUESTIONS

1. State the meaning of sensor and list types of sensors used in engine control system. (R)
2. Draw the sketch of Throttle position sensor and name its parts.(A)
3. Draw the sketch of electromagnetic type crankshaft position sensor and name its parts(A).
4. Draw the sketch of Hall effect type crankshaft position sensor and name its parts(A).
5. Draw the sketch of Optical type crankshaft position sensor and name its parts(A).
6. Compare electromagnetic crank shaft position sensor with Hall effect crank shaft position sensor.(A)
7. Draw the sketch of Combustion Knock sensor and name its parts(A).
8. Draw the sketch of temperature sensor and name its parts(A).
9. Draw the sketch of MAP sensor and name its parts(A).
10. Draw the sketch of hot film MAF sensor and name its parts(A).
11. Draw the sketch of hot wire sensor and name its parts(A).
12. Draw the circuit diagram MAF sensor with air temperature sensor.(A)
13. Compare hot film to hot wire MAF sensor.(A)
14. Compare MAP sensor to MAF sensor (A)
15. Compare potentiometer ride height sensor to LVDT sensor.(A)
16. Draw the sketch of potentiometer type height sensor and name its parts(A).
17. Draw the sketch of LVDT type sensor and name its parts (A).
18. Explain the working principle of infra red rain sensor with a sketch. (U/A)
19. State the meaning of actuator and list types of actuators used in engine control system. (R)
20. Explain the meaning of PWM input voltage and state the need of it.(U)
21. Explain the meaning of duty cycle in PWM input voltage and need of it(U)

22. Explain the construction and working of on/off solenoid with a sketch.(U/A)
23. Explain the and working of proportionate solenoid and list its applications.(U/A)
24. Compare on/off solenoid to proportionate solenoid with their applications.(U/A)
25. Draw the sketch of stepper motor and name its parts.(A).
26. Explain the meaning of servo motor and list its applications.(U).
27. Explain the working of servo mechanism of servo motors with a sketch.(A)
28. Explain the need and applications of relay (U/A)
29. Explain the construction and working of relay with a sketch (U/A)

TEN MARK QUESTIONS

1. Explain the construction and working of throttle position sensor with block diagram.(U/A)
2. Explain the construction and working of Electromagnetic Crank shaft position sensor with block diagram.(U/A)
3. Explain the construction and working of Hall effect crank shaft position sensor with block diagram.(U/A)
4. Explain the construction and working of Optical crankshaft position sensor with block diagram.(U/A)
5. Explain the construction and working of Combustion knock sensor with block diagram.(U/A)
6. Explain the construction and working of temperature sensor with block diagram.(U/A)
7. Explain the construction and working of Manifold absolute pressure sensor with block diagram.(U/A)
8. Explain the construction and working of Exhaust gas oxygen sensor with block diagram.(U/A)
9. Explain the construction and working of Mass Air flow sensor with block diagram.(U/A)
10. Explain the working of MAF sensor circuit diagram with air temperature sensor and explain the need of air temperature sensor.(U/A)
11. Explain the construction and working of potentiometer type ride height sensor with block diagram.(U/A)
12. Explain the construction and working of LVDT type position sensor with block diagram.(U/A)
13. Explain the construction and working of rain sensor with a block diagram(U/A)
14. Explain the meaning of pulse width modulation and duty cycle with their application(U/A)
15. Explain the working of on/off solenoid and proportionate solenoid with block diagrams(U/A)
16. Explain the construction and working of stepper motor with block diagram.(U/A)
17. Explain the working principle of servo motor with their applications.(U/A)

CO4: Explain the need, construction and working of different SI and C. I engine electronic fuel feed systems.

FIVE MARK QUESTIONS

1. List different electronic petrol injection systems.(R)
2. List advantages of electronic petrol injection system over carburettor (A).
3. Compare single point petrol injection to multi point injection system (U/A).
4. Compare multi point petrol injection to direct petrol injection system (U/A).
5. Draw the sketch of petrol injector and label the parts (A).

6. Write a short note on lean burn /part load working mode in Direct injection system.(A)
7. List the advantages of Direct injection system over port injection system(A)
8. List any three advantages and any two disadvantages of Direct injection system (A)
9. List different types of diesel injection system(R).
10. Explain the need of electronic diesel control (U/A).
11. Draw the sketch of unit injector and name the parts.(A)
12. Draw the sketch of common rail injector and label the parts.(A)
13. Draw the sketch of electronic common rail injection system and label the parts(A).
14. Explain different sensors and actuators used in electronic diesel control of distributor pump with their functions and location.(A)
15. Explain different sensors and actuators used in electronic diesel control of in line fuel pump with their functions and location (A).

TEN MARK QUESTIONS

1. Explain the construction and working of single point injection system with a block diagram(U/A)
2. Explain the construction and working of multi point injection system with a block diagram(U/A)
3. Explain the construction and working of direct injection system with a block diagram(U/A)
4. List the advantages and disadvantages of direct injection system(A).
5. Explain the working modes of direct injection system.(U)
6. Explain the construction and working of petrol injector with a sketch.(U/A)
7. Explain the construction and working of electronic Diesel Control in inline FIP with a sketch showing position of different sensors and actuators(U/A)
8. Explain the construction and working of electronic Diesel control in distributor pump with a sketch showing position of different sensors and actuators(U/A)
9. Explain the construction and working of electronic Unit injector with a sketch.(U/A)
10. Explain the construction and working of electronic CRDI injector with a sketch.(U/A)
11. Explain the construction and working of electronic CRDI syatem with a block diagram(U/A)

CO5: Describe the need and working of different electronically controlled vehicle safety systems of Auto mobile.

FIVE MARK QUESTIONS

1. Explain the need and types of anti-lock brakes(U/A)
2. Draw the sketch of anti-lock brake modulator and name the parts(U/A)
3. Draw the four chamber anti lock brake system and name the parts (U)
4. Write a short on traction control system (A)
5. Write a short on electronic stability program (A)
6. Compare ABS, TCS and ESP (A)
7. Explain the working of magnetic bias sensor used in airbags(U/A)
8. Explain the rolamite sensor used in airbags (U/A)
9. Explain the working of inertia switch type air bag system with a block diagram (U/A)
10. Explain the working of accelerometer type air bag system with a block diagram (U/A)
11. Draw the block diagram of collision avoidance system and name the parts (U/A)
12. Explain the construction and working of tyre pressure warning system with a block diagram(U/A)

TEN MARK QUESTIONS

1. Explain the construction and working of anti lock brake modulator with a sketch.(U/A)
2. Explain the working of four chamber anti lock braking system with a block diagram(U/A)
3. Explain the working of collision avoidance warning system with a block diagram(U/A)

CO6: Explain the need and working of electronically controlled suspension, steering and instrumentation systems of Auto mobile.

FIVE MARK QUESTIONS

1. List the advantages of electronic power steering.(A)
2. Draw the sketch of electronic power steering and label the parts.(U/A)
3. List the advantages of electronic suspension system.(U/A)
4. Explain the working of electronic solenoid controlled shock absorber with a sketch.(U/A)
5. Draw the block diagram electronic suspension system and label the parts.(U/A)
6. Write a short note on computer based instrumentation system.(A)
7. List the advantages of Computer based information system (A)
8. Sketch the block diagram computer based instrumentation and label the parts.(A)
9. Sketch the block diagram of trip information computer and label the parts.(A)
10. Sketch the vehicle speed measurement system block diagram and label the parts.(A)
11. Sketch the engine coolant temperature measurement system block diagram and label the parts.
(A)
12. Sketch the fuel quantity measurement system block diagram and label the parts.(A)
13. Write a short note on GPS navigation system.(A)

TEN MARK QUESTIONS

1. Explain the construction and working of electronic rack and pinion power steering with a sketch.(U/A)
2. Explain the construction and working of electronic four wheel steering with a sketch.(U/A)
3. Explain the construction and working of electronic shock absorber with a sketch.(U/A)
4. Explain the construction and working of electronic suspension system with a block diagram.(U/A)
5. Explain the working principle and advantages of computer based instrumentation with a block diagram(U/A)
6. Explain the working of trip information computer with a block diagram(U/A)
7. Explain the working of fuel quantity measurement system with a block diagram(U/A)
8. Explain the working of temperature measurement system with a block diagram(U/A)
9. Explain the working of speed measurement system with a block diagram(U/A)

Board Of Technical Examination

MODEL QUESTION PAPER

Automotive electronics

Max Marks: 100

Time: 3 Hr

- Note:** 1. Answer any **six** questions from **PART-A** and each question carries **five** marks.
2. Answer any **seven** questions from **PART-B** and each question carries **ten** marks.

PART-A

1. Explain flip flops with their applications.(U)
2. Explain the need of signal conditioning.(U)
3. List the advantages of electronic control systems in Auto mobile.(A)
4. Compare open and closed loop control systems (A)
5. Explain the meaning of microprocessor and program.(U)
6. Compare potentiometer ride height sensor to LVDT sensor.(A)
7. Compare hot film to hot wire MAF sensor.(A)
8. Compare single point petrol injection to multi point injection system (U/A).
9. List advantages of electronic petrol injection system over carburettor (A).

PART-B

1. Explain the working of AND and OR gates with block diagrams and truth tables.(U/A)
 2. Explain the need of program and process of information storage and information retrieval.(U)
 3. Explain the construction and working of throttle position sensor with block diagram.(U/A)
 4. Explain the working of on/off solenoid and proportionate solenoid with block diagrams(U/A)
 5. Explain the working principle of servo motor with their applications.(U/A)
 6. Explain the construction and working of electronic Unit injector with a sketch.(U/A)
 7. Explain magnetic bias and rolamite type sensors of airbags with sketch.(U/A)
 8. Explain the working of accelerometer type air bag system with a block diagram (U/A)
 9. Explain the construction and working of electronic rack and pinion power steering with a sketch.(U/A)
 10. Explain the working of trip information computer with a block diagram(U/A).
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