



Visvesvaraya Technological University

"Jnana Sangama" Belagavi-590018, Karnataka State, India

Dr. A. S. Deshpande B.E., M.Tech., Ph.D.
Registrar

Phone: (0831) 2498100
Fax: (0831) 2405467

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CIRCULAR

Subject: Correction in the syllabus of subject **Automotive Electronics (17ME751)** regarding...

Reference: Hon'ble Vice-Chancellor Approval Dated 17.11.2020

Concerning the subject cited above, the syllabus of subject AUTOMOTIVE ELECTRONICS (17ME751) of Mechanical Engineering programme has been corrected for the errors and the same is enclosed with this circular for information.

You are hereby informed to bring this to the notice of the concerned. The updated 2017-18 scheme and syllabus of Mechanical Engineering is made available for students and staffs concerned on the web portal of VTU with the following link-

<https://vtu.ac.in/wp-content/uploads/2020/10/mec.pdf>

Encl: As mentioned above

Yours Sincerely


17.11.2020
REGISTRAR

To,
The Principal of Constituent and Affiliated Engineering Colleges of VTU Belagavi

CC to

1. Hon'ble Vice-Chancellor through the secretary to VC for information
2. The Registrar(Evaluation) VTU Belagavi for information and needful
3. The Chairperson BOS in Mechanical Engineering for information
4. Special Officer, Academic Section for information
5. The special officer CNC to upload the circular on VTU web portal

AUTOMOTIVE ELECTRONICS

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 - 2018)

SEMESTER – VII

| | | | |
|-------------------------------|----------------------|------------|----|
| Subject Code | 17ME751 | IA Marks | 40 |
| Number of Lecture Hours/Week | 04 | Exam Marks | 60 |
| Total Number of Lecture Hours | 40(8 hrs per Module) | Exam Hours | 03 |
| CREDITS – 03 | | | |

Course Objective Students will learn-

1. Basics of electronic control of internal combustion engines and the drives
2. Understand principle of working of sensors and actuators used in automobiles for control
3. Diagnostics and safety systems in automobiles

Module – 1**Automotive Fundamentals Overview** –Evolution of Automotive Electronics,

Automobile Physical Configuration, Survey of Major Automotive Systems, The Engine – Engine Block, Cylinder Head, Four Stroke Cycle, Engine Control, Ignition System - Spark plug, High voltage circuit and distribution, Spark pulse generation, Ignition Timing, Diesel Engine, Drive Train - Transmission, Drive Shaft, Differential, Suspension, Brakes, Steering System\, Starter Battery – Operating principle:

The Basics of Electronic Engine Control – Motivation for Electronic EngineControl – Exhaust Emissions, Fuel Economy, Concept of an Electronic Engine control system, Definition of General terms, Definition of Engine performance terms, Engine mapping, Effect of Air/Fuel ratio, spark timing and EGR on performance, Control Strategy, Electronic Fuel control system, Analysis of intake manifold pressure, Electronic Ignition.

Module – 2

Control Systems - Automotive Control System applications of Sensors and Actuators – Typical Electronic Engine Control System, Variables to be measured

Automotive Sensors –Airflow rate sensor, Strain Gauge MAP sensor, Engine

Crankshaft Angular Position Sensor, Magnetic Reluctance Position Sensor, Hall effect Position Sensor, Shielded Field Sensor, Optical Crankshaft Position Sensor, Throttle Angle Sensor (TAS), Engine Coolant Temperature (ECT) Sensor, Exhaust Gas Oxygen (O₂/EGO) Lambda Sensors, Piezoelectric Knock Sensor

Automotive Actuators – Solenoid, Fuel Injector, EGR Actuator, Ignition System

Module – 3

Digital Engine Control Systems – Digital Engine control features, Controlmodes for fuel Control (Seven Modes), EGR Control, Electronic Ignition Control - Closed loop Ignition timing, Spark Advance Correction Scheme, Integrated Engine Control System - Secondary Air Management, Evaporative EmissionsCanister Purge, Automatic System Adjustment, System Diagnostics.

Control Units – Operating conditions, Design, Data processing,Programming, Digital modules in the Control unit, Control unit software.

Module – 4

Automotive Networking –Bus Systems–Classification, Applications in thevehicle, Coupling of networks, Examples of networked vehicles (Text 2: Pg. 85-91), Buses - CAN Bus, LIN Bus, MOST

Bus, Bluetooth, Flex Ray, Diagnostic Interfaces

Vehicle Motion Control –Typical Cruise Control System, Digital Cruise Control System, Digital Speed Sensor, Throttle Actuator, Digital Cruise, Control configuration, Cruise Control Electronics (Digital only), Antilock Brake System (ABS)

Module – 5

Automotive Diagnostics–Timing Light, Engine Analyzer, On-boarddiagnostics, Off-board diagnostics, Expert Systems, Occupant Protection Systems – Accelerometer based Air Bag systems

Future Automotive Electronic Systems –Alternative Fuel Engines, Electric and Hybrid vehicles, Fuel cell powered cars, Collision Avoidance Radar warning Systems, Low tire pressure warning system, Heads Up display, Speech Synthesis, Navigation – Navigation Sensors - Radio Navigation, Signpost navigation, dead reckoning navigation, Voice Recognition Cell Phone dialing, Advanced Cruise Control, Stability Augmentation, Automatic driving Control

Course Outcomes: After studying this course, students will be able to

1. Explain the electronics systems used for control of automobiles
2. Select sensors, actuators and control systems used in automobiles
3. Diagnose the faults in the sub systems and systems used automobile

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. William B.Ribbens, “Understanding Automotive Electronics”, 6th Edition, Elsevier Publishing.
2. Robert Bosch Gmbh (Ed.) Bosch Automotive Electrics and Automotive Electronics Systems and Components, Networking and Hybrid Drive, 5th edition, John Wiley& Sons Inc., 2007.