B. TECH. AUTOMOBILE ENGG. SYLLABUS 2016 BATCH ONWARDS
(UPDATED ON 24.05.2019)

Semester –VII [Final Year]

Subject Code	Course Title	Hours per week			Maximum Marks		Total Marks	Credits
		L	T	P	Int.	Ext.		
BMEE3-736	Hydraulic & Pneumatics System for Automobile	4	0	0	40	60	100	4
BMEE3-737	Vehicle Maintenance & Diagnostics	4	0	0	40	60	100	4
BMEE3-738	Automotive Electronics Systems	4	0	0	40	60	100	4
BMEE3-739	Automotive Electronics Systems Lab	0	0	2	60	40	100	1
BMEE3-740	Vehicle Maintenance Lab & Diagnostics Lab	0	0	2	60	40	100	1
BMEE3-741	Maintenance of hydraulics and pneumatics systems Lab	0	0	2	60	40	100	1
BMEE3-742	Major Project*	0	0	6	100	50	150	3
Department Elective –II (Select Any One)		4	0	0	40	60	100	4
BMEE3-761	Modern Vehicle Technology							
BMEE3-762	Alternate Fuels and Energy Systems							
BMEE3-763	Microprocessor Application in Automobiles							
xxxxx	Open Elective	3	0	0	40	60	100	3
	Total	19	0	12	480	470	950	25

* The problem formulated in the minor project during 6th semester is to be extended and executed in the major project by the same group of students. The design/construction/fabrication/computer modeling/experimentation etc. is to be carried out. The results and analysis followed by discussion regarding suitability / non suitability of the project or any positive gain in the project made with conclusions and recommendations for future extension of the project must be covered.

LIST OF ELECTIVE-II (Select any one)

1. Modern Vehicle Technology
2. Alternate Fuels and Energy Systems
3. Microprocessor Application in Automobiles

Open Elective (Select any one)
1. Industrial Engineering **BMEE0-F94**
2. Total Quality Management**BMEE0-F95**

Semester –VIII [Final Year]

Subject Code	Course Title	Hours per week			Maximum Marks		Total Marks	Credits
		L	T	P	Int.	Ext.		
BMEE3-743	Software Training	0	0	0	150	100	250	8
BMEE3-744	Industrial Oriented Project Training	0	0	0	300	200	500	10
Total		0	0	0	450	300	750	18

Total Contact Hours per week = 36 (minimum)

Industrial Training in reputed industries will be arranged for complete one semester.

HYDRAULIC & PNEUMATICS SYSTEM FOR AUTOMOBILE

Subject Code: BMEE3-736   **L T P C**   Duration: 60 Hrs.

4 0 0 4

Unit –I

Introduction to Fluid Power: Application of hydraulics and pneumatics in various fields of engineering, properties of fluids, effect of temperature, Hydraulic symbols- Circuit elements, fluid pumps, motors, valves, types of control, reservoirs, advantages and disadvantages of hydraulic systems.   **14 Hrs**

Unit –II

Elements of Hydraulic System: Pumps- Types of pumps and its selection. Hydraulic cylinders and rams- II Single acting and double acting, telescopic, seals, design considerations for pump, motor, cylinder and ram, fluid power plumbing requirements, type and purpose of strainer, filter, accumulator and its types, design considerations, reservoir, fluid temperature control, types of heat exchangers.

Control of Hydraulic Elements: Types of pressure control, Directional control Valves-Two way, four way two position, four way three position, manual operated, solenoid operated. Flow control valves, pressure switches, check valves, quick exhaust valve.   **16 Hrs**

Unit –III

Hydraulic Circuits: Pressure regulating circuit, speed control circuit, accumulator circuit, booster and intensifier circuit, motion synchronizing circuit, servo circuit.

Elements of Pneumatic System: Air compressor - Types, selection criteria, capacity control, piping layout, fittings and connectors, pneumatic control, Direction control valves, two way, three way, four way check valves, flow control valves, pressure control valves, speed regulators. Quick exhaust valves, solenoid, pilot operators, Cylinders- Types and their mountings, hoses and connections, Air motors- Types, comparison with hydraulic and electric motor. Filters- Types of filters, regulators, lubricators, mufflers, dryers. Pneumatics Circuits and Applications: Basic pneumatic circuit, impulse operation, speed control, pneumatic motor circuit, sequencing of motion time delay circuit & their applications.   **17 Hrs**

Unit –IV

Automatic Control: Need of control: Manual v/s automatic control, advantages of automatic control, open loop v/s closed loop control, generalized control system, merits, demerits and Applications, Mathematical conversion of control components: Helical spring, viscousdamper and their combinations, resister, inductors, capacitor, series and parallel electrical circuits and mech. Systems, thermal and fluid systems, direct and inverse analog, grounded chair representation for material system. Block diagram algebra: Rules of block diagram algebra, reduction of block diagram, block diagram transfer function representation of speed, temperature and fluid systems, AC & DC Motors. Modes of control: On off control, proportional (P) control, integral (I) control, derivative control, P+I, P+D, P+I+D (including an analytical treatment).

13 Hrs

Recommended Books

1. Majumdar S.R., "Pneumatics Systems-Principles and Maintenance", Tata Mc Graw Hill Book Co., New Delhi;

2. Majumdar S.R., "Oil Hydraulic Systems-Principles and Maintenance", Tata Mc Graw Hill Book Co., New Delhi;51B.Tech. Automobile Engineering (AE) Batch 2011

3. Pippenger J.J, "Industrial Hydraulic", Mc-Graw Hill Book Co. Ltd., New Delhi;

4. Pease D.A., "Basic fluid power" Prentice Hall of India, New Delhi;

5. Stewart H.L., "Pneumatics and Hydraulics", Taraporevala, Mumbai;

6. Esposito A., "Fluid power with application", Prentice Hall of India, New Delhi;

7. Yeaple, "Fluid power design handbook", Marcel DekkarInc, New York;

8. Pneumatic handbook: R.S.Warrring;

VEHICLE MAINTENANCE & DIAGNOSTICS

Subject Code:BMEE3-737   **L T P C**   Duration: 60 Hrs.

4 0 0 4

Unit –I

Introduction: Maintenance Objectives, classification, preventive, running and breakdownmaintenance, maintenance schedules, workshop manuals, owner's manual, Warranty Procedures, pre-delivery inspection (PDI): front manager, service advisor: functions and duties. Condition Based Maintenance (Cbm): Benefits, Objectives, Principles, what and when to monitor, Techniques, manual inspections, performances monitoring, vibration monitoring, oildebris spectroscopy, thermography and corrosion monitoring, Reliability centered maintenance (RCM), logic, benefits evaluations. **15 Hrs**

Unit –II

Vehicle Maintenance Tools and Equipments: Specifications of standard tools, non-Standard tools, denting tools, painting equipments, testing equipments, Service station equipments, Hydraulic lift, Tyre changer, Tyre inflation gauge, Car Washer, Air Compressor, Spark Plug Cleaner and Tester, brake and transmission bleeding equipment, Grease Guns, Hydraulic Hoist, Analyzers: CO, HC, NOx, smoke meter, Engine analyzer- Petrol and Diesel, Ignition timing light, Wheel Balancer, Wheel aligner, Headlight aligner, Cylinder boring and honing, crankshaft grinder, Brake lathe m/c, ridge cutter and boring m/c, Trolley Jacks, Engine lifting cranes.

Maintenance Schedule: Difference between chassis and ball bearing grease, use of lubricants: SAE 20 -30, SAE 40-50, SAE 90-120, Machine oil, Brake fluid, Lubrication and maintenance schedules for clutch system, Gear Box, Propeller shaft, universal joints, differential, axles, wheel bearings, tires, Cooling and lubrication system, Specification of petro / diesel Engine, Engine Troubles and Diagnosis. **16 Hrs**

Unit –III

Engine Tuning: S.I Engine tuning; use of compression gauge, vacuum gauge, engineanalyzer, exhaust analyzer, battery tester S.G tester, Cam-dwell angle, valve tappet clearance, replacement of engine oil and filter, ignition timing setting, Tyre inflation pressure, checking fuel consumption, MPFI and CRDI, Engines: assembly line diagnostic link (ALDL) connector, ALDL read out scan tool, test light, ohmmeter, digital volt meter, jumper wires, vacuum gauge, Tachometer,

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computerized automotive maintenance system. Knowledge of diagnostic codes, service engine soon (SES) light, ECM, CALPAK, TPS, IAC valve, ECM, MAP sensor, engine coolant temp sensor, IAT sensor, VSS, camshaft and Crankshaft – position sensor, start signal, PSP switch, Oxygen sensor, Fuel VapourCannister, Catalytic Converter, Particulate filter, Troubles and diagnosis MPFI engines.

12 Hrs

Unit –IV

Clutch, Drive Line, Suspension, Steering and Brakes: Disassembly, cleaning, visualinspection; inspection by measurement and assembly of clutch; gearbox; universal joints; propeller shaft; differential; axles; steering and suspension system (leaf spring and McPhearsonstrut); Drum and disc Brakes; bleeding of brakes; Gaps and Clearances. Tyremaintenance and wheel balancing; service limits and wheel alignment

Engine Overhauling: Procedure for engine removal from vehicle; disassembly; cleaningprocedures; agents; Decarburizing; Top overhauling; Visual inspection; inspection by measurement; Engine inspection sheets: Service limits; machining of component parts:boring and honing of Engine components; camshaft grinding and lapping of engine valves; Fitting valve seat inserts and guides; Idea of oversize pistons and undersize split bearings; testing of cylinder heads and valve springs; Cooling system : maintenance and Service; troubles and diagnosis**.   17Hrs**

Recommended Books

1. Shrivastava, Sushil Kumar., "Industrial Maintenance Management", S Chand & Company Ltd.

2. Kohli, P.L., "Automotive Chassis and Body", McGraw Hill;

3. Maruti Suzuki Manual;

AUTOMOTIVE ELECTRONICS SYSTEM

Subject Code:BMEE3-738   **L T P C**   **Duration: 60 Hrs.**

4 0 0 4

Unit –I

Fundamental of Automotive Electronics: Current trend in Automobiles - Open loop and closed loop systems - Components for electronic engine management. Electronic management of chassis system.   **14 Hrs**

Unit –II

Sensors and Actuators: Introduction, basic sensor arrangement, types of sensors such as –oxygen sensors, Crank angle position sensors - Fuel metering, vehicle speed sensor and detonation Sensor- Altitude sensor, flow sensor. Throttle position sensors, solenoids, stepper motors, relays.

Electronic Fuel Injection and Ignition Systems: Introduction, Feed-back carburetorsystems (FBC), Throttle body injection and multi point fuel injection, Fuel injection systems, injection system controls, Advantages of electronic ignition system, Types of solid-state ignition systems and their principle of operation, Contact less electronic ignition system, Electronic spark timing control.

15 Hrs

Unit –III

Digital Engine Control System: Open loop and closed loop control systems –Enginecranking and warm up control -Acceleration enrichment - Deceleration leaning and idle speed control. Distributor less ignition -Integrated engine control system, Exhaust emission control engineering.

Vehicle Motion Control and Stabilization Systems: Vehicle motion control – Adaptivecruise control, Electronic transmission control, Vehicle stabilization system – Antilock braking system, Traction control system, Electronic stability program, onboard diagnosis system.   **16 Hrs**

Unit –IV

Future Automotive Electronic Systems: Knock control, Linear solenoid idle speedControl,Sequential fuel injection, Distributor-less ignition, Self-diagnosis for fail-safe operation, Back-up MPU, Crankshaft angular position measurement for ignition timing, Direct mass air flow sensor, Continuously Variable Transmission, Collision Avoidance Radar Warning System, Low Tire Pressure Warning System, Speech Synthesis, Radio/signpost Navigation, intelligent transportation system.   **15 Hrs**

Recommended Books

1. William B. Ribbens, "Understanding Automotive Electronics", Butterworth, Heinemann Woburn;1998.

2. Tom Weather Jr and ClandC.Hunter, "Automotive Computers and Control system", Prentice Hall Inc. New Jersey.

3. BOSCH, Automotive Handbook, 6th Edition, Bentley publishers.

4. Young. A.P. and Griffths.L, "Automobile Electrical Equipment", English Language Book Society and New Press;

5. Crouse. W. H., "Automobile Electrical equipment", McGraw Hill Book Co Inc.,

6. Robert N Brady., "Automotive Computers and Digital Instrumentation", A Reston Book, Prentice Halls

7. Bechtold., "Understanding Automotive Electronics

AUTOMOTIVE ELECTRONICS SYSTEM LAB

Subject Code: BMEE3-739   **L T P C**

                               0 0 2 1

LIST OF EXPERIMENTS

1. OPAMP as integrator

2. 555 timers as a stable multivibrator

3. Implementing study of gates and Logic Operations like, NOT, AND, OR,

4. Realization of basic gates using universal gates

5. Light dimmer circuit using Diac-Triac

6. Simple programs using microcontroller

7. Simple programs for microcontroller based applications

8. Study of electronic fuel injection & ignition system

9. Study of Digital Engine Control System

10. Vehicle motion control & stabilization systems

VEHICLE MAINTENANCE LABORATORY & DIAGNOSTICS LAB

Subject Code:BMEE3-740	**L T P C**	**Duration: 31 Hrs**
	0 0 2 1	

LIST OF EXPERIMENTS

Section A

(Power unit including electrcal)

1. Engine Reboring

2. Crank shaft grinding

3. Valve Seat grinding and Valve Lapping.

4. Silencer Decarbonising

5. Fuel Nozzle reconditioning

6. Fuel Injection Pump Calibration.

7. Engine Ignition System of a SI system

8. Engine Starting system of a CI system

Section B

(Transmission unit &power train)

9. Demonstration of garage, garage equipments& tools, preparation of different garage layouts

10. Demonstration of washing & greasing of vehicle

11. Engine oil change & periodic maintenance of vehicle

12. Clutch overhaul of light / heavy duty vehicle

13. Clutch overhaul of two or three wheeler vehicle

14. Dismantling & assembly of sliding mesh gearbox

15. Dismantling & assembly of synchromesh gearbox

16. Automobile Electrical & lighting circuit.

MAINTENANCE HYDRAULICS AND PNEUMATICS SYSTEMS LAB

Subject Code:BMEE3-741   **L T P C**

                                                0 0 2 1

LIST OF EXPERIMENTS

1. ISO/JIC symbols for hydraulic and pneumatic system.

2. Study of Accumulators, actuators, intensifiers, hydraulic and pneumatic power brakes.

3. Demonstration & study of sequence valve in hydraulic and pneumatic circuit.

4. Demonstration on meter-in & meter-out control circuit for hydraulic system.

5. Demonstration on meter-in & meter-out control circuit for pneumatic system.

6. Experiment on On Off temperature controller.

7. Experiment on DC/AC Motor speed control

8. Design of hydraulic system and related components for hydraulic system for agricultural tractor

9. Design of hydraulic system and related components for hydraulic system for tipper/hydraulic clamps, pneumatic clamp.

10. Design of hydraulic system and related components for shaping machine/broaching machine/slotting machine.

MODERN VEHICLE TECHNOLOGY

Subject Code: BMEE3-761   **L T P C**   **Duration: 60 Hrs**

4 0 0 4

Unit –I

Trends in Automotive Power Plants: Hybrid Vehicles – Stratified charged / lean burn engines – Hydrogen Engines-battery vehicles – Electric propulsion with cables – Magnetic track vehicles.

16 Hrs

Unit –II

Suspension Brakes and Safety: Air Suspension-Closed loop suspension-antiskid braking system, Retarders, Regenerative braking safety cageair bags-crash resistance – passenger comfort. Oise & Pollution: Reduction of noise – Internal & external pollution control through alternate fuels/ power Plants-Catalytic converters and filters for particular emission.   **16 Hrs**

Unit –III

Vehicle Operation and Control: Computer Control for pollution and noise control and for fuel Economy-Transducers and operation of the vehicle like optimum speed and direction.   **14 Hrs**

Unit –IV

Vehicle Automated Tracks: Preparation and maintenance of proper road Network-National highway network with automated roads and vehicles-Satellite control of vehicle operation for safe and fast travel.   **14 Hrs.**

Recommended Books

1. Beranek. L.L. Noise Reduction, McGraw-Hill Book Co., Inc, Newyork, 1993
2. Bosch Hand Book, 3rd Edition, SAE,1993

ALTERNATE FUELS AND ENERGY SYSTEMS

Subject Code: BMEE3-762   **L T P C**   **Duration: 60 Hrs**

4 0 0 4

Unit –I

Introduction: Estimation of petroleum Reserve-Need for alternate Fuel-Availability and properties of alternate fuels-general use of alcohols LPG-Hydrogen-Ammonia, CNG, and LNG-Vegetable oils and Biogas-Merits and demerits of various alternate fuels.   **16 Hrs**

Unit –II

Alcohols: Properties as engine fuels, alcohols and gasoline Blends-Combustion characteristics in engines-emission characteristics.

Natural Gas, LPG, Hydrogen and Biogas: Availability of CNG, properties modification required to use in engines-performance and emission characteristics of CNG using LPG in SI &CI engines. Performance and emission for LPG-Hydrogen-Storage and handling, performance and safety aspects.

17 Hrs

Unit –III

Vegetable Oils: Various vegetable oils for Engines-Esterification-Performance in Engines-Performance and emission characteristics.   **13 Hrs**

Unit –IV

Electrical and Solar Powered Vehicles: Layout of an electric Vehicle-Advantage and Limitations-Specifications-System component, Electronic control System-High energy and power density Batteries-Hybrid Vehicle-Solar powered vehicles   **14 Hrs**

Recommended Books

1. MaheswarDayal, Energy today & tomorrow, I & B Horishr India,1982

2. Nagpal, Power Plant Engineering, Khanna Publishers,1991.

3. Alchohols and Motor fuels progress in technology, Series No.19, SAE Publication USA 1980.

4. SAE paper Nos.840367, 841156,841333,841334.

5. The properties and performance of modern alternate fuels SAE paper No 841210.

6. Bechtold.R.L. Alternative Fuels Guide Book, SAE, 1997.

MICROPROCESSOR APPLICATION IN AUTOMOBILES

Subject Code: BMEE3-763   **L T P C**   **Duration: 60 Hrs**

4 0 0 4

Unit –I

Architecture: General 8-bit microprocessor and its architecture 8085, Z-80 and MC 6800 MPU and its pin Functions-Architecture-Functions of different sections.   **14 Hrs**

Unit –II

Instruction Set: Instruction format-addressing modes-instruction set of 8085 MPU-T-STATE-Machine cycle and instruction Cycles-Timing Diagrams-Different Machine Cycles-Fetch and execute operations-estimation of execution times.   **16 Hrs**

Unit –III

Assembly Language Programming: Construct of the language Programming-Assembly format of 8085-Assembly Directive-Multiple precision addition and subtraction-BCD to Binary and Binary to BCD Multiplication, Division, Code conversion using look up tables-stack andsubroutines.

14 Hrs

Unit –IV

Data Transfer Schemes: Interrupt Structure-Programmed I/O, DMA-Serial I/O.Interfacing Devices: Types of interfacing Devices-Input/Output ports 8212, 8255,8251,8279. Octal latches and tristate buffers-A/D and D/A Converters-Switches, LED's ROM and RAM interfacing.

Applications: Data Acquisitions-Temperature Control-Stepper Motor Control-Automotive applications engine control, Suspension system control, Driver information systems, Development of a high speed, high precision learning control system for the engine control.

16 Hrs

Recommended Books

1. Ramesh, Goankar.S., Microprocessor Archietecture Programming and Applications, Wiley Eastern Ltd.,New Delhi,1986.

2. Aditya .P. Mathur, Introduction to Microprocessors, III Edition Tata McGraw Hill Publishuing Co Ltd New Delhi,1989.

3. Ahson. S. I., Microprocessors with Applications in Process Control,Tata McGraw Hill New Delhi,1986.

4. JabezDhinagfar .S., Microprocessor Applications in Automobiles.

INDUSTRIAL ENGINEERING

Subject Code: BMEE0-F94   **L T P C**   **Duration: 45 Hrs**

3 0   0 3

Unit –I

Production Planning and Control; Product: product design, customer requirements, value engineering, quality, reliability, service life, and competitiveness.   **12 Hrs**

Unit –II

Plant: location, layout, material handling, equipment selection, maintenance of equipment and facilities.   **10 Hrs**

Unit –III

Processes: Job, batch and flow production methods, Group Technology Work study and Time and Motion study, Work/job evaluation, quality control (SPC), control charts.   **11 Hrs**

Unit –IV

Resource planning: production/ operation control, forecasting, capacity management, scheduling and loading, line balancing, breakeven analysis, inventory of materials and their control, manufacturing planning, MRP - II, JIT.   **12 Hrs**

Recommended Books

1. Production, Planning and Inventory Control by S.L.Narasimhan, D.W.McLeavey, P.J.Billington, Prentice Hall.

2. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.

3. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan

TOTAL QUALITY MANAGEMENT

Subject Code: BMEE0-F95   **L T P C**   **Duration: 45 Hrs**

3 0 0 3

Unit –I

Basic concepts, definitions and history of quality control. Quality function and concept of quality cycle. Quality policy and objectives.

Economics of quality and measurement of the cost of quality. Quality considerations in design.

10 Hrs

Unit –II

Process control: Machine and process capability analysis. Use of control charts and process engineering techniques for implementing the quality plan.   **10 Hrs**

Unit –III

Acceptance Sampling: single, double and multiple sampling, lot quality protection, features and types of acceptance sampling tables, acceptance sampling of variables and statistical tolerance analysis. Quality education, principles of participation and participative approachesto quality commitment.   **14 Hrs**

Unit –IV

Emerging concepts of quality management: Taguchi's concept of off-line quality control and Ishikawa's cause and effect diagram.   **11 Hrs**

Recommended Books

1. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
2. Quality Control and Applications by Housen&Ghose
3. Industrial Engineering Management by O.P. Khanna

MAJOR PROJECT

Subject Code: BMEE3-742　　　　**L T P C**

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MAJOR PROJECT GUIDELINES

1. The problem formulated in the minor project during 6th semester is to be extended and executed in the major project by the same group of students.

2. The design/construction/fabrication/computer modeling/experimentation etc. is to be carried out.

3. The results and analysis followed by discussion regarding suitability / non suitability of the project or any positive gain in the project made with conclusions and recommendations for future extension of the project must be covered.

4. A Project Report is a documentation of a Graduate student's project work—a record of the original work done by the student. It provides information on the student's research work to the future researchers.

5. The final copy of the report has to contain all the modifications/corrections suggested by the examiners (including the members of the Viva-Voce Board) and is to be submitted after the student successfully defends the project in the viva-voce examination.

6. The report has to contain an appropriate copyright notice.

7. The report has to include a declaration by the student to the effect that he/she has not resorted to any unethical practice while carrying out the research work and preparing the report.