

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

Semester –VII [Final year]

Sr. No	Subject Code	Course Title	Hours per week			Maximum Marks		Total Marks	Credits
			L	T	P	Int.	Ext.		
1	BMEE4-738	Mechanical Vibrations	3	0	0	40	60	100	3
2	BMEE4-739	Refrigeration and Air Conditioning	3	1	0	40	60	100	4
3	BMEE4-740	Project	0	0	12	100	50	150	6
4	BMEE4-741	Design of Machines-II	3	1	0	40	60	100	4
5	BMEE4-742	Refrigeration and Air Conditioning lab	0	0	2	60	40	100	1
6	Department Elective (select any one)								
	BMEE4-756	Marine Control and automation	3	1	0	40	60	100	4
	BMEE4-757	Environment science and Engineering							
Total						320	330	650	22

LIST OF ELECTIVES (Select any one)

1. Marine Control and automation
2. Environment science and Engineering

B. TECH. MARINE ENGG. SYLLABUS 2016 BATCH ONWARDS
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Semester –VIII [Final year]

Sr. No	Subject Code	Course Title	Hours per week			Maximum Marks		Total Marks	Credits
			L	T	P	Int.	Ext.		
1	BMEE4-843	Marine Training	0	0	0	150	100	250	8
2	BMEE-844	Industrial Training	0	0	0	300	200	500	10
Total						450	300	750	18

Total Contact Hours per week = 36 (minimum)

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

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

MECHANICAL VIBRATIONS

Subject Code: BMEE4-738

L T P C

Duration: 45 Hrs.

3 0 0 3

Unit –I

Introduction; Basic concepts, Methods of vibration analysis, Types of vibration, Periodic & Harmonic vibrations **08 Hrs.**

Unit –II

undamped free vibrations, damped free vibrations and damped force vibrations of single degree of freedom system, vibration isolation transmissibility. vibration measuring instruments. **12 Hrs**

Unit –III

Two degrees of Freedom systems: a) principal modes of vibrations, natural frequencies, amplitude ratio, forced harmonic vibration. combined rectilinear & angular modes. b) Application; Vibration absorber - principle, centrifugal pendulum vibration absorber, torsional vibration damper, untuned viscous damper, dry friction dampers, torsional vibration of two rotor systems. **10 Hrs.**

Unit –IV

a) Multi-degree of freedom systems: undamped free vibrations, influence coefficients, generalized coordinates, orthogonality principal, matrix alteration methods, Rayleigh and Dunkerley, Holzer's , stodola method, Eigen values & eigen vector.

b) continuous systems: Vibration of a string, longitudinal vibrations of bars, Euler's equation of motion for beam vibration, natural frequencies for various end conditions, torsional vibration of circular shafts **15 Hrs**

Recommended Books:

1. Mechanical Vibrations by GK Grover, Hem chand and Bros, Roorkee
2. Mechancial Vibrations by KK Purjara, DhanpatRai and Sons, Delhi
3. Mechanical Vibrations by V.P.Singh,

B. TECH. MARINE ENGG. SYLLABUS 2016 BATCH ONWARDS
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REFRIGERATION AND AIR CONDITIONING

Subject Code: BMEE4-739

L T P C

Duration: 60 Hrs.

3 1 0 4

Unit –I

Basic Concept Natural and Mechanical refrigeration; Application of Refrigeration; Units of refrigeration and Coefficient of performance; Refrigeration effect, cooling capacity and COP of a refrigerator; heating effect, heating capacity and COP as heat pump; Reversed Carnot cycle and its limitations, Bell Coleman Cycle and Aircraft Refrigeration Bell Coleman Cycle and its analysis; optimum COP and pressure ratio, necessity of air craft refrigeration - air cycle refrigeration systems and their comparison.

Vapour Compression Refrigeration Cycle Vapour compression cycle on P-V, P-H and T-S diagrams; Deviation of actual cycle from theoretical cycle; Compressor capacity and volumetric efficiency, Analysis of theoretical and actual vapour compression cycles; Effect of suction pressure, discharge pressure, subcooling, super heating and pressure drop in valves on performance and cooling capacity.

15 Hrs.

Unit –II

Vapour Compression Refrigeration with Multiple Evaporators and Compressors Compoundcompression with single and multiple expansion valves, water intercooling and flash intercooling; multiple load systems with single and multiple expansion valves

Vapour Absorption Refrigeration Cycle (No Mathematical Analysis) Principle of absorption system; components of the system; Desirable properties of absorption system refrigerant and absorbent; Aqua - ammonia absorption refrigeration system; Lithium Bromide - water absorption system; Theory of mixtures; temperature concentration and enthalpy concentration diagrams; comparison between absorption and compression systems; Electrolux refrigeration system.

15Hrs

Unit –III

Refrigerants Classification and nomenclature of refrigerants; Desirable thermodynamic, chemical and physical properties of refrigerants; comparative study of commonly used refrigerants and their

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

fields of application; Azeotropes; Effect of moisture and oil miscibility; Refrigerants dying agents and antifreeze solution; leak detection and charging of refrigerants; environmental aspects of conventional refrigerants; Eco friendly refrigerants and action plan to reduce ecological hazards. Non-Conventional Refrigeration Systems (No Mathematical Analysis) Steam Jet Refrigeration; Cascade Refrigeration System; Mixed Refrigeration Systems; Vortex Tube Refrigeration, Thermoelectric cooling; Linde and Claude cycles, cryogenics and its engineering applications.

15Hrs

Unit –IV

Air Conditioning Concept and Applications; Psychrometric properties of air; Dry bulb, wet bulb and dew point temperatures; Relative and specific humidity; degree of saturation adiabatic saturation temperature, enthalpy of air and water vapours; psychrometric chart. Human requirement of comforts; effective temperature and comfort charts; Industrial and comfort air conditioning.

Psychrometric Processes Sensible heating and cooling, cooling with dehumidification; Heating with dehumidification; by-pass factor; chemical dehumidification; adiabatic mixing, air washer.

Calculations for Air –conditioning Load and for Rate and state of Supply Air Sources of heat load; sensible and latent heat load; sensible heat factor; apparatus dew point temperature; Rate and state of supply - air for air- conditioning of different types of premises. Refrigeration and Air Conditioning Equipment Brief description of compressors, condensers, evaporators and expansion devices; Cooling towers; Ducts; dampers; grills; air filters; fans; room air conditioners; split units; Package and central air conditioning plants.

15 Hrs

Recommended Books

1. Refrigeration and Conditioning by CP Arora, Tata McGraw Hill
2. Refrigeration and Conditioning by Manohar Prasad, Wiley Eastern Limited
3. Refrigeration and Conditioning by Jordan and Priester, Prentice Hall of India
4. Refrigeration and Conditioning by WF Stoecker, McGraw

**B. TECH. MARINE ENGG. SYLLABUS 2016 BATCH ONWARDS
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DESIGN OF MACHINES-II

Subject Code: BMEE4-741

L T P C

Duration: 60 Hrs

3 1 0 4

Unit –I

1. Understand the selection/ Design of each of the transmission components

- a. Flat, V-Belt and rope drive
- b. Chain drives
- c. Gear drives of different types
- d. Selection of sliding and rolling bearings and their housing
- e. Flywheel and pulley
- f. Closed coiled, helical and leaf springs
- g. Various types of clutches and brakes
- h. Lubrication in the transmission systems

15 Hrs

Unit –II

2. To learn the design or design modification for manufacturing and assembly

3. To understand the basic concept of computer aided design i.e.

- a. The basic Theory of CAD Techniques
- b. Design strategies of different CAD/Softwares
- c. Functioning/ Structure of CAD Softwares

15 Hrs

Unit –III

4. To handle live projects of transmission systems efficiently Detailed Contents
- 1. Design of Flat belt, V-belt and rope (steel wire), Design of the pulley for the same
 - 2. Selection of Chain Drive
 - 3. Design of spur, helical, straight bevel gears, worm and worm wheel
 - 4. Bearing Selection, Design of sliding and rolling type of bearings, Detailed of bearing housing.

15 Hrs.

Unit –IV

- 5. Design of Flywheel for different operation
- 6. Design of Close-coil, Helical and Leaf springs
- 7. Design of Contact clutches i.e. Plate and cone types, Band, Block, Band and block brakes
- 8. Design of Lubrication in transmission system

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

9. Computers in Design: Basic Theory of CAD Software, structure of CAD software, Design Philosophy, Structure of CAD Softwares, Designing a CAD Software **15 Hrs**

Recommended Books

1. Machine Design by Shigley Tata McGraw hill
2. Machine Design by Juvinal, John-Wiley Publishers
3. Machine Design by Spots, Prentice hall
4. Machine Design by Norton, Prentice Hall
5. Machine Design by Sharma, Aggarwal, Kataria Publishers
6. Machine Design by Goyal and Bahl, Standard Publishers

REFRIGRATION AND AIR CONDITIONING LAB

Subject Code: BMEE4-742

L T P C

0 0 2 1

1. Study of various elements of a mechanical refrigerator system through cut sections models /actual apparatus
2. Study and performance of domestic refrigerator,
3. Study the performance of and Eectrolux refrigerator
4. Study of an Ice plant and visit to a cold storage for study
5. Calculation/ Estimation of cooling load for large building
6. Visit to a central Air conditioning plant for study of processes for winter and summer air conditioning
7. Study and performance of window type room air conditioner

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

MARINE CONTROL & AUTOMATION

Subject Code: BMEE4-756

L T P C

Duration: 60 Hrs

3 1 0 4

Unit –I

Control System: Introduction to control terms, Block diagrams for control systems, open loop and closed loop feedback control, comparison of closed loop and open loop, Feed forward control. Feed forward modification. Regulators and Servomechanism. Proportional plus integral plus derivative controls, use of various control modes.

Graphical Representation of Signals: Inputs of Step Ramp sinusoid, Pulse and Impulse, Exponential Function etc. Error Detector, Controller output elements. **15 Hrs**

Unit –II

The Dynamics of a simple servo-mechanism for Angular Position Control: The Torque Proportional to Error, Servomechanism, Different response of servomechanism. Technique for improving the general performance of servomechanism. The frequency response test. Series compensation using Nyquist Diagram. Parallel compensation using the Inverse Nyquist Diagram. **15 Hrs**

Unit –III

Process Control Systems: Automatic Closed loop process. Control system Dynamic characteristic of Processes. Dynamic characteristic of controllers. Practical pneumatic controllers. Electronic Instrumentation for Measurement and control.

Analog Computing and Simulation: Introduction, Basic concepts. Analog computers. Simulation. The use of Digital computer in the simulation control system. Hybrid Computers. **15 Hrs**

Unit –IV

Transmission: Pneumatic and electric transmission, suitability for marine use. Pneumatic and types of Controllers hydraulic, electric and electronic controllers for generation of control action. Time Function controllers. Correcting Units: Diaphragm actuators, Valve-positioners, piston actuators, Electro-pneumatic transducers. Electro-hydraulic actuators and Electric actuator control valves.

**B. TECH. MARINE ENGG. SYLLABUS 2016 BATCH ONWARDS
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Application of Controls on ships: Marine Boiler-Automatic combustion control, Air/fuel Ratio control feed water control single two and three element type, steam pressure control, Combustion chamber pressure control, fuel oil temperature control, Control in Main Machinery units for Temperature of lubricating oil, jacket cooling water, fuel valve cooling water, piston Cooling water and scavenage air, fuel oil viscosity control Bridge control of main machinery. Instrument for UMS classification.

15 Hrs

Recommended Books

1. Industrial Automation by R.G. Jamkar, Global Education Limited
2. Marine Automation & Control Systems by Vikram Gokhale, Bhandarkar Publications; Third Edition edition (2014)
3. Marine Control Technology by Elstan A. Fernandez, Shroff Publishers and Distributors Pvt. Ltd.; 1 edition (April 24, 2007)

ENVIRONMENTAL SCIENCE AND ENGINEERING

Subject Code: BMEE4-757

**L T P C
3 1 0 4**

Duration: 60 Hrs

UNIT I

COMPONENTS OF ENVIRONMENT

Components – Water, air and land – Inter-relationship between components –Subcomponents; Ecosystem – Structure and functional components of ecosystem –Development and evolution of ecosystem – Energy flow and material cycling in ecosystem – Natural and manmade impacts on water, air and land; Environment and development – Concept of sustainable development.

15 Hrs.

UNIT II

SCIENCE OF ENVIRONMENT

Chemistry, Physics and biology of water, air and land; Stress on the Chemistry, Physics and Biology of water, air and land owing to the impacts; Environmental quality objective and goals –

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

policies on development projects and their impacts, with emphasis on the branch of engineering of the student. **15 Hrs**

UNIT III

CURRENT ENVIRONMENTAL ISSUES

Current Environmental issues at country level – management of municipal sewage, municipal solid waste, Hazardous waste and Bio-medical waste – Air pollution due to industries and vehicles; Global issues – Biodiversity, Climate change, Ozone layer depletion. **15 Hrs**

UNIT IV

THE ENVIRONMENTAL STRESSES

Minimization of Stress – Principles of Physics, chemistry and biology in engineering interventions such as waste treatment – Flow sheets of engineering interventions relevant to the Engineering discipline of the student – Waste minimization techniques – Clean technology options – Standards of performance of the interventions.

(A) TOOLS FOR ENVIRONMENTAL MANAGEMENT

Environmental impact assessment; Precautionary Principle and Polluter Pays Principle; Constitutional provisions, Legal and economic instruments in Environmental Management; Role of Non-government organizations – Community participation environmental management works; International conventions and protocols; Pollution Control Boards and Pollution Control Acts.

(B) FIELD STUDY

In-depth study of environmental issues at least one environmentally sensitive site relevant to the discipline of the student and preparation of a report thereupon. **15 Hrs**

Recommended Books:

1. G.M. Master, “Introduction to Environmental Engineering & Science”, Prentice Hall, New Delhi, 1997.
2. J.G. Henry and G.W. Heike, “Environmental Science & Engineering”, Prentice Hall International Inc., New Jersey, 1996.

MAJOR PROJECT

Subject Code:

L T P C

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.