Subject Name	L	T	P	Credit
Human Values and Professional Ethics	2	0	0	2

Objectives:

- To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
- To facilitate the development of a holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the human reality and the rest of existence.
- To facilitate students in applying the understanding of harmony in existence in their profession and lead an ethical life.

Unit-1

Human Values

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

Unit-2

Engineering Ethics

Senses of "Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

Unit -3

Engineering as a Social Experimentation

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

Unit -4

Safety, Responsibilities and Rights

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Unit-5

Global Issues

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

Outcomes:

- After completion of this course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
- Distinguish between ethical and unethical practices, start working out the strategy to actualize a harmonious environment wherever they work.

Text books:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition
3. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata Mc Graw Hill, New Delhi, 2003.
4. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Reference books:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
3. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
4. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
5. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
6. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
7. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
8. A. N. Tripathy, 2003, Human Values, New Age International Publishers.

Mandsaur University, Mandsaur(M.P.)

Department of Mechanical Engineering

Syllabus of

Mechanical Vibration and Noise Engineering (MEC711) Elective-III

B. Tech. (VII Semester) (CBCS Scheme)(04YDC)

w.e.f. (session2019-20)

Name of Subject With Code No.	Maximum Marks Allocation				Lectures per week			Credits	Total Marks
	Theory Paper		Practical Examination	Continuous Evaluation	L	T	P		
	Mid Sem. Test (MST) F_1	End Sem. Test (EST) F_2							
Elective-III **Mechanical Vibration and Noise Engineering** **(MEC---)**	**30**	**60**		10	3	1		3	100

Course Objectives: Mechanical Vibration and Noise Engineering is a advance Course for Mechanical Engineers to Understand the concepts of Vibrations. This Course is Essential to Understand the application and prevention of vibration and help in design and maintenance work of Machines.

Unit 1: Fundamental Aspects of Vibrations: Vibration, main causes, advantages and disadvantages; engineering applications of vibration and noise; vector method of representing harmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, work done by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier series analysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped and distributed parameter systems.

Undamped Free Vibrations: Derivation of differential equation of motion: the energy method, the method based on Newtons second law of motion, and Rayleighs method. Solution of differential equation of motion: Natural frequency of vibration. Systems involving angular oscillations: the compound pendulum.

Unit 2: Damped Free Vibrations: Viscous damping: coefficient of damping; damping ratio; under damped, over damped and critically damped systems; logarithmic decrement; frequency of

damped free vibration; Coulomb or dry friction damping; frequency, decay rate and comparison of viscous and Coulomb damping; solid and structural damping; slip or interfacial damping.

Unit 3: Harmonically excited Vibration: One degree of freedom- forced harmonic vibration; vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration Isolation, force and motion transmissibility; absolute and relative motion of mass (Seismic Instruments). Whirling Motion and Critical Speed : Whirling motion and Critical speed : Definitions and significance .Critical -speed of a vertical , light flexible shaft with single rotor : with and without damping .Critical speed of a shaft carrying multiple discs (without damping), Secondary critical speed.

Unit 4: Systems With Two Degrees of Freedom : Un-damped free vibration of 2 d.o.f and Principal modes of vibration; torsion vibrations; Forced, Un-damped vibrations with harmonic excitation ; Coordinate coupling; Dynamic vibration absorber; torsion Vibration Absorber; Pendulum type of dynamic vibration.

Unit 5: Noise Engineering -Subjective response of sound: Frequency and sound dependent human response; the decibel scale; relationship between, sound pressure level (SPL), sound power level and sound intensity scale; relationship between addition, subtraction and averaging, sound spectra and Octave band analysis; loudness; weighting networks; equivalent sound level, auditory effects of noise; hazardous noise, exposure due to machines and equipments; hearing conservation and damage risk criteria, daily noise doze. Noise: Sources, Isolation and Control: Major sources of noise on road and in industries, noise due to construction equipments and domestic appliances, industrial noise control, strategies- noise control at source (with or without sound enclosures), noise control along the path (with or without partitions and acoustic barriers); noise control at the receiver, ear defenders, earplugs, semi-insert protectors.

References:
1- Ambekar A.G.,' Mechanical Vibrations and Noise Engineering; PHI
2- Meirovitch Leonard; Element of Vibration Analysis; TMH
3- Dukikipati RV Srinivas J Text book of Mechanical Vibrations; PHI
4- Kelly SG and kudari SK; Mechanical Vibrations; Schaum Series;TMH
5- Thomson , W.T., Theory of Vibration with Applications , C.B.S Pub & distributor
6- Singiresu Rao, "Mechanical Vibrations , Pearson Education . 7- G.K. Grover, " Mechanical Vibration , Nem chand and Bross , Roorkee
7- Mechanical Vibrations, V.P. Singh, Dhanpatrai & Co.

Course Outcome: In this course students have learned the concepts of Mechanical Vibration and Noise Engineering. They have learned application and prevention of vibration and use in design and maintenance work of Machines.

Mandsaur University, Mandsaur(M.P.)

Department of Mechanical Engineering

Syllabus of

Elements of Power Plant Engineering (MEC712)

B.Tech (VII Semester) (04YDC)

Name of Subject With Code No.	Maximum Marks Allocation				Lectures per week			Credits	Total Marks
	Theory Paper		Practical Examination	Continuous Evaluation	L	T	P		
	End Sem. Test (EST)	Mid Sem. Test (MST)							
Automobile Engineering	**60**	**30**	**-**	**10**	3	-	-	3	**100**

Course objective:

1. To introduce students to different aspects of power plant engineering
2. To familiarize the students to the working of power plants based on different fuels.
3. To expose the students to the principles of safety and environmental issues.

Unit-1

Thermal power stations. Main components and working of power stations, thermodynamics cycles, fuel handling, combustion and combustion equipment, problem of ash disposal, circulating water schemes and supply of make up water. Choice of pressure of steam generation and steam temperature, selection of appropriate vacuum economiser, air preheater, feedwater heaters and dust collection. Characteristics of turbo alternators, steam power plant, heat balance and efficiency.

Unit-2

Boilers and steam generation, general classification, fire tube and water tube boilers, natural circulation and forced circulation boilers, high pressure, high temperature boilers, supercritical pressure boilers, boiler mounting and accessories, feed pumps, economisers, superheaters, air preheaters; boiler furnaces, heat generation rates, water walls.

Unit-3

Gas fired and fuel fired oil furnaces, pulverised fuel fired furnaces, burners for gas fired, fuel oil-fired and pulverised fuel fired furnaces, grate fired furnaces for solid fuels, feedwater pumps and pipings, boiler settings, estimation of air quantity requirement and draught systems, ID and FD fans.

Unit-4

Diesel power plants: Diesel engine performance and operation, plant layout, log sheets, selections of engine size.

Unit-5

Gas turbine plants: Plant layout, methods of improving output and performance fuel and fuel systems, methods of testing, open and closed cycle plants, operating characteristics.

Text books

1-Nag PK; Power plant Engg; TMH
2-Al-Wakil MM; Power plant Technology; TMH
3-Sharma PC; Power plant Engg; Kataria and sons, Delhi
4- Domkundwar; Power Plant Engg; Dhanpatrai & sons.
5- Rajput RK; A text book of Power plant Engg.; Laxmi Publications.

Course Outcomes: At the end of the course, a student will be able to:

1. Describe and analyze different types of sources and mathematical expressions related to thermodynamics and various terms and factors involved with power plant operation.
2. Analyze the working and layout of steam power plants and the different systems comprising the plant and discuss about its economic and safety impacts
3. Combine concepts of previously learnt courses to define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types
4. Describe the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it.
5. Discuss the working principle and basic components of the hydro electric plants and the economic principles and safety precautions involved with it.
6. Discuss and analyze the mathematical and working principles of different electrical equipments involved in the generation of power

Mandsaur University, Mandsaur
Mechanical Engineering
Operations Research (MEC713) Elective-IV
B.Tech SEMESTER VII w.e.f. 2019-20

Subject Name &Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Operation Research (MEC713)	60	30	10	-	-	-	2	1	2	4	100

Course Objective: The objective of operations research is optimization. What is the best plan of action given the set of circumstances? The specific objective depends entirely on the problem.

Unit : 1 Introduction to Operations Research: Introduction, Historical Background, Scope of Operations Research , Features of Operations Research, Phases of Operations Research, Types of Operations Research Models, Operations Research Methodology, Operations Research Techniques and Tools ,forecasting models:moving average,exponential smoothing .regression model etc., sequencing of jobs on machines ,line balancing, Structure of the Mathematical Model, Limitations of Operations Research.

Unit : 2 Linear Programming: Introduction, Linear Programming Problem, Requirements of LPP, Assumptions of LPP, Mathematical Formulation of LPP, Graphical Methods to Solve Linear Programming Problems, Applications, Advantages, Limitations

Simplex Method: Introduction, Standard Form of LPP, Fundamental theorem of LPP, Solution of LPP – Simplex Method, The Simplex Algorithm, Penalty Cost Method or Big M-method

Unit : 3 Transportation Problem: Introduction, Formulation of Transportation Problem (TP), Transportation Algorithm (MODI Method), the Initial Basic Feasible Solution, Moving Towards Optimality.

Assignment Problem: Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Routing Problem, Traveling Salesman Problem

Unit : 4 Game Theory : Introduction, Competitive Situations, Characteristics of Competitive Games, Maximin – Minimax Principle,Saddle point, Dominance, Mix strategy.

Queuing Theory: Introduction, Properties of Queuing System, Notations, Service System, Single Channel Models, Multiple Service Channels, Applications of Queuing Theory, Limitations of Queuing Theory

Unit : 5 Project Scheduling and PERT-CPM: Introduction, Basic Difference between PERT and CPM, PERT/CPM Network componens and Precedence Relationship, Activity, Event,Network, Types of network- AOA and AON, Network analysis : float and slack time of an activity and event ,event float,activity float ,total float ,free float ,numerical problems on "probability of meeting the schedule time " Project Management and crashing of activity and its effect on total cost.

Course outcome :

- Identify and develop operational research models from the verbal description of the real system
- Understand the mathematical tools that are needed to solve optimization problems.
- Use mathematical software to solve the proposed models.
- Develop a report that describes the model and the solving technique, analyses the results.

References :

- Hillier FS and Liberman GJ; Introduction to Operations Research concept and cases; TMH
- Srinivasan G; Quantitative Models In Operations PHI Learning
- Taha H; Operations research; PHI
- Sen RP; Operations Research-Algorithms and Applications; PHI Learning
- Sharma JK; Operations Research; Macmillan
- Ravindran , Philips and Solberg; Operations research; Wiley India
- Burt DN, Dobler DW, StarlingSL; World Class SCM; TMH
- Bronson R ;Theory and problems of OR; Schaum Series; TM
- Heera and Gupta ; operations research

Mandsaur University, Mandsaur(M.P.)

Department of Mechanical Engineering

Syllabus of

Refrigeration and Air Conditioning (MEC-720)

B.Tech.(VII - Semester) (CBCS Scheme)(04YDC)

W.e.f. (**session 2019- 20**)

Subject Name & Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Refrigeration and Air Conditioning	**40**	**20**	**10**	**30**	**----**	**----**	**2**	**1**	**2**	**4**	**100**

Course Objectives:

(i) Learning the fundamental principles of refrigeration and air conditioning.

(ii) Study of various refrigeration cycles and evaluate performance using refrigerant property tables.

(iii)Comparative study of properties and applications of different refrigerants .

(iv) Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.

(iv) Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems

Unit-I Introduction :

conceptual meaning of refrigeration, applications of refrigeration and air conditioning domestic and commercial Refrigeration, basic difference between Refrigeration and Air Conditioning, unit of refrigeration and significance of C.O. P (coefficient of performance),concept of Heat pump,Engine and a Refrigerator, Principles and various methods of refrigeration, freezing ; mixture cooling by gas, reversible expansion, throttling, evaporation, Joule Thomson effect,reverse Carnot cycle; vortex tube & thermoelectric refrigeration, adiabatic demagnetization; air refrigeration cycles-Joule's cycle Boot-strap cycle, reduced ambient and regenerative cooling cycles.

Unit-II Vapour Refrigeration systems :

(a) Vapour compression system: Vapor compression cycle, p-h and t-s diagrams, deviations from theoretical cycle, sub-cooling and super heating, effects of condenser and evaporator pressure on cop; multi-pressure system: removal of flash gas, multiple expansion & compression with flash inter cooling; low temperature refrigeration: production of low temperatures, cascade system, dry ice, production of dry ice, air liquefaction system.

(b) **Vapour absorption system**: Theoretical and practical systems such as aqua- ammonia, Electrolux & other systems.

(c)Vapour adsorption cooling systems – Steam jet refrigeration

Unit-III : properties of common refrigerants and other Refrigeration Systems: Refrigerants, their general classification, primary and secondary refrigerants, nomenclature of refrigerants, desirable properties of refrigerants, comparative study , azeotropes , leak detection methods, environment friendly refrigerants and refrigerant mixtures, brine and its properties.

Other Refrigeration Systems : Ejector refrigeration systems- Thermoelectric refrigeration, Magnetic – Vortex and Pulse tube refrigeration systems.

Unit-IV : Psychrometry and Air conditioning :

significance of Psychrometry , Calculation of psychrometric properties of air; psychrometric chart , psychrometric processes: sensible heating and cooling, evaporative cooling, cooling and dehumidification, heating and humidification, mixing of air stream, sensible heat factor; principle of air conditioning, comfort air conditioning, industrial air conditioning ,ventilation standards, infiltrated air and fresh air load, human comfort, effective temperature chart.

Unit- V : Air conditioning loads:

calculation of summer & winter air conditioning load, bypass factor of coil, calculation of supply air rate & its condition, room sensible heat factor(RSHF), grand sensible heat factor(GSHF), effective sensible heat factor, dehumidified air quantity. cooling load calculation. Air distribution and ventilation systems

Books:

Text:

1. Arora C. P., Refrigeration and Air Conditioning, Tata McGraw-Hill
2. Manohar Prasad, Refrigeration and Air Conditioning, Willey Eastern Ltd,
3. Arora and Domkundwar, Refrigeration & Air Conditioning, Dhanpatrai & Company, New Delhi
4 Khurmi R.S. and Gupta J.K., Refrigeration and Air conditioning, Eurasia Publishing House Pvt. Ltd, New Delhi, .
5. Ballaney P.L., Refrigeration and Air conditioning, Khanna Publishers, New Delhi,

References:

1. Dossat Ray J, Principles of refrigeration, S.I. version, Willey Eastern Ltd,
2. Stockers W.F and Jones J.W., Refrigeration and Air conditioning, McGraw Hill
3. Threlkeld J.L, Thermal Environmental Engineering, Prentice Hall Inc., New Delhi.
4 Aanatnarayan, Basics of refrigeration and Air Conditioning, Tata McGraw Hill Publications
5. Roger Legg, Air Conditioning System Design, Commissioning and Maintenance
6. ASHRAE & ISHRAE handbook

List of Experiments:

1. General Study of vapor compression refrigeration system.
2. General Study of Ice Plant
3. General Study and working of cold storage
4. General Study Trane Air Condition (Package Type).
5. General Study of Electrolux Refrigeration
6. General Study of Water cooler
7 General Study and working of Gas charging Rig.
8. General Study of window Air Conditioner.
9. General Study and working of Vapor compression Air conditioning Test rig.
10. Experimentation on Vapor compression Air Conditioning test rig.

Course Outcomes:

At the end of this course the students should be able to

(i) Illustrate the fundamental principles and applications of refrigeration and air conditioning system
(ii) Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
(iii) Present the properties, applications and environmental issues of different refrigerants
(iv) Calculate cooling load for air conditioning systems used for various
(v) Operate and analyze the refrigeration and air conditioning systems

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Mandsaur University, Mandsaur (M.P.)

Department of Mechanical Engineering

Syllabus of

Design of Machine Element – II (MEC - 730)

B – Tech (VII – Semester) (CBCS Scheme) (04YDC)

W.e.f. (**session 2019- 20**)

Subject Name & Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Design of Machine Element – I (MEC-500)	40	20	10	30	----	----	2	1	2	4	100

Note: PSG Design data book and/ or R. Mahadevan and Reddy's Mechanical design data book are to be provided/permitted in exam hall (duly verified by authority)

Course Objective:

1. To develop an ability to design a system, component, or process to meet desired needs within realistic constraints.
2. To develop an ability to identify, formulate, and solve engineering problems.

Unit – I

Spur Gears

Tooth forms, System of gear teeth, contact ratio, Standard proportions of gear systems, Interference in involute gears, Backlash, Selection of gear materials, Gear manufacturing methods, Design considerations, Beam strength of gear tooth, Dynamic tooth load, Wear strength of gear tooth, Failure of gear tooth, Design of spur gears.

Unit – II

Helical Gears

Terminology of Helical Gears, Virtual number of teeth, Tooth proportions, Force analysis, Beam strength, Effective Load on gear tooth, design procedure.

Bevel Gears

Terminology of Bevel Gears, Force Analysis, Beam strength, Wear strength of Bevel gears, effective load on gear tooth, design procedure.

Unit – III

Rolling Contact Bearings

Types of ball and roller bearing, Selection of bearing for radial and axial load, Bearing life, design procedure, mounting and lubrication.

Plain or Journal Bearings

Types, Selection of bearing, Plain journal bearing, Hydrodynamic lubrication, Properties and materials, Lubricants and lubrication, Hydrodynamic journal bearing, Heat generation, Design of journal bearing, Thrust bearing - pivot and collar bearing, Hydrodynamic thrust bearing.

Unit – IV

Belt Drive

Belt construction, geometrical relationship, Analysis of belt tension, Condition of maximum power, Characteristic of belt drive, Flat belt, V- Belt.

Chain Drive

Roller chain, Geometrical relationship, Polygonal efficiency, Power rate for rolling chain, Sprocket wheel, Design of chain drive, Chain lubrication, Silent chain.

Unit – V

Brakes

Introduction, Block Brake, design procedure, Internal Expanding Shoe Brake, design procedure, Band brakes, design procedure, Disc brake, design procedure.

Clutches

Introduction, Friction materials, Torque transmitting capacity, Single & Multiple plate clutch, Centrifugal clutches, Cone clutch.

Experiments : Design problems of each of the Machine components should separately be solved in the classroom with the help of design data book and be learnt practically on the components in the laboratory .

Outcome:

1. Demonstrate knowledge on basic machine elements used in machine design; design machine elements to withstand the loads and deformations for a given application, while considering additional specifications.
2. Be able to approach a design problem successfully, taking decisions when there is not a unique answer.

Books and References

1. Design of Machine Elements-V.B. Bhandari, Tata McGraw Hill Co.
2. Machine Design-Sharma and Agrawal, S.K. Kataria & Sons.
3. Machine Design, U C Jindal, Pearson Eductaion.
4. Design of Machine Elements, Sharma and Purohit, PHI.
5. Machine Design-Maleev and Hartman, CBS Publishers.
