

**COURSE SCHEME**  
**EXAMINATION SCHEME &**  
**COURSE CONTENTS**  
**OF**  
**III-IV SEMESTER CBCS OF**  
**MASTER OF TECHNOLOGY (M.TECH.)**  
**IN**  
**MECHANICAL ENGINEERING DESIGN**  
**(MED)**  
**OF**  
**GONDWANA UNIVERSITY,**  
**GADCHIROLI**

**GONDWANA UNIVERSITY , GADCHIROLI**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**

Course and Examination Scheme for

Master of Technology in -Mechanical Engineering Design (MED)

**SEMESTER-III**

Course Code	Name of Course	Teaching scheme				Examination Scheme								
		Hours per week			No. of Credits	Theory				Practical				
		L	T (Tutorial / Assignment / Field work)	P		Durati on of Paper (Hrs.)	Max. Marks	Max. Marks	Total Marks	Min. passing marks	Max. Marks	Max. Marks	Total Marks	Min. passing marks
								Sessio nal						
				ESE	MSE									
MED 31	Research Methodology	3	1	---	4	03	70	30	100	50	---	---	---	---
MED 32	Open Elective	3	1	---	4	03	70	30	100	50	---	---	---	---
MED 33	Dissertation phase-I	---	10	---	10	---	---	---	---	---	200	---	200	100
	<b>Total</b>	<b>06</b>	<b>12</b>	<b>---</b>	<b>18</b>	<b>---</b>	<b>---</b>	<b>---</b>	<b>200</b>	<b>---</b>	<b>---</b>	<b>---</b>	<b>200</b>	<b>---</b>
	<b>III-Semester Total</b>	<b>18</b>			<b>18</b>	<b>400</b>								

**Open Elective (MED 32) :-** (A) Environmental studies (B) Professional Ethics & Cyber Law (C) Renewable Energy Technology

**GONDWANA UNIVERSITY , GADCHIROLI**

**FACULTY OF ENGINEERING AND TECHNOLOGY**

**Course and Examination Scheme for**

**Master of Technology in -Mechanical Engineering Design (MED)**

**SEMESTER-IV**

Course Code	Name of Course	Teaching scheme				Examination Scheme								
		Hours per week			No. of Credits	Theory					Practical			
		L	T (Tutorial / Assignment / Field work)	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks	Total Marks	Min. passing marks	Max. Marks	Max. Marks	Total Marks	Min. passing marks
								Sessio nal						
ESE	MSE	TW	PEE											
MED 41	Dissertation phase-II	---	24	---	18	---	---	---	---	---	200	200	400	200
	<b>Total</b>	---	24	---	18	---	---	---	---	---	---	---	400	---
	<b>IV-Semester Total</b>	<b>24</b>			<b>18</b>	<b>400</b>								

## **THIRD SEMESTER**

### **M.TECH. – MECHANICAL ENGINEERING DESIGN (MED)**

#### **M.Tech. – Mechanical Engineering Design (MED)**

##### **COURSE: MED 31: RESEARCH METHODOLOGY**

**CREDITS: 04**

**Teaching Scheme:**

Lectures: 03 Hrs./Week

Tutorials: 01 Hr./Week

**Examination Scheme**

Duration of paper : 03 Hrs.

University Assessment : 70 Marks

College Assessment: 30 Marks

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**CONTENTS:**

**Foundation of Research:** What is Research? Objectives of Research , Scientific Research , Research and Theory , Conceptual and theoretical Models , Importance of research methodology in scientific research

**Types and Methods of Research:** Classification of Research, Pure and Applied Research, Exploring or Formulative Research, Descriptive Research, Diagnostic Research/Study, Evaluation research/Studies, Action Research, Experimental Research, Analytical Study of Statistical Method, Historical Research, Surveys, Case Study, Field Studies,

**Review of Literature: Need** for Reviewing Literature, What to Review and for what purpose, Literature Search Procedure, Sources of Literature, Planning of Review work, Note Taking, Library and documentation

**Planning of Research: The** planning process, Selection of a Problem for Research, Formulation of the Selected Problems, Hypothesis formation, Measurement

**Research Design/Plan:** Sampling, Sampling Techniques or Methods, Choice of sampling Techniques, Sample size, Sampling and Non-Sampling errors, Estimation of Population Proportion and Population Mean, Estimation of Standard Error and Confidence Interval

**Methods of data collection:** Meaning and Importance of Data , Sources of Data , Use of Secondary Data , Methods of Collecting Primary Data , Observation Method , Experimentation, Design of Experiments , Simulation ,

**Tools for data collection:** Types of Data, Construction of Schedules and Questionnaires, Measurement of Scales and Indices, Pilot Studies and Pre-tests, Experimental Data Sets, Check Sheet,

**Field work:** The Nature of Field Work, Selection and Training of Investigators, Sampling Frame and Sample Selection, Field Operation, Field Administration

**Processing of Data:** Editing, Classification and Coding, Transcription, Tabulation, Introduction to Statistical Software: MINITAB, Graphical Representation, Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation

**Statistical Analysis of Data:** Statistical Analysis, Measures of Central Tendency, Measures of Dispersion, Measures of Association/Relationship, Probability distributions: Binomial, Poisson, Uniform, Normal and Exponential, Hypothesis Testing, Confidence Interval, Test of Significance, Comparison of Two Proportions, Comparison of Means ( z test, t test, two sample t test, paired-t test), ANOVA, Non -parametric Methods

**Report writing:** Types of Reports, Planning of Report Writing, Research Report Format, Principles of Writing, Documentation, Data and Data Analysis Reporting in a Thesis, Writing of Report, Typing of Report, Briefing

## **REFERENCES:**

1. Research Methodology: Methods and Techniques by C. R. Kothari, New Age International Publishers, ISBN:81-224-1522-9
2. Statistical Methods for Research Workers by Fisher R. A., Cosmo Publications, New Delhi ISBN:81-307-0128-6
3. Design and Analysis of Experiments by Montgomery D.C. (2001), John Wiley, ISBN: 0471260088

**Open Elective**

**M.Tech. – Mechanical Engineering Design (MED)**

**COURSE: Open Elective- MED 32(A) : ENVIRONMENTAL STUDIES**

**CREDITS: 04**

**Teaching Scheme:**

Lectures: 03 Hrs. /week

Tutorials: 01 Hr. /week

**Examination Scheme**

Duration of paper: 03 Hrs.

University Assessment: 70 Marks

College Assessment: 30 Marks

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**CONTENTS:**

Concept of Green building- Energy efficiency, Energy budget & water budget, waste recycling, indoor air quality

Sources of water, quantity & quality of sources, demand of water, factors affecting demand, fluctuations in demand, rate of water consumption, design period & population forecast. Water quality parameters, characteristics & significance in water treatment, drinking water quality standards- BIS, WHO Standards. Intake Works - concept & design of Intake well, Jack well, Pumps & Rising mains, Concept of water treatment: Aeration- Types of aerators, design of cascade aerator Coagulation & Flocculation- factors affecting, destabilization of colloidal particles, types of dosing of coagulants, selection of coagulants, jar tests, design of rapid mixer & flocculator.

Sedimentation- Theory, types of settling, types of sedimentation tanks, design principles & design, concept of tube & plate settler. Filtration- Mechanism, head loss development, negative head loss, Types of filters Slow sand filter, Rapid sand filter, Multimedia & Pressure filter, operation & design of slow sand rapid sand filter, rate control patterns. Disinfection- Mechanism, factors affecting disinfection, methods of disinfection, chemistry of chlorination, chlorination practices, points of chlorination, application of chlorine. Water softening processes - lime-soda process, ion exchange Demineralization - Reverse osmosis, ion exchange, electro dialysis. Salient features of rural water supply scheme, Sequencing of treatment for various qualities of surface & ground water.

Water supply appurtenances- sluice valve, air relief valve, gate valve, non-return valve, scour valve, fire hydrants water meter, service connections, maintenance & leak detection of water distribution system.

Solid waste management-Solid wastes Definition, Types, Sources, Characteristics, Functional outlines-storage, Collection, Processing techniques, Methods of treatment of solid waste-

Composting, Incineration, Pyrolysis and Sanitary land filling. Concept of Hazardous waste management

Air Pollution-Definition, Sources and classification of pollutants, Effects on man material and vegetation, Introduction to Meteorological aspects such as atmospheric stability, mixing heights, and plume behavior. Control of industrial air pollution, Settling Chamber, Bag Filters, Cyclone separators, Scrubbers, Electrostatic precipitators, Introduction to global issues – Global warming, Acid rain, Ozone depletion, Photochemical Smog, Carbon credits Control of vehicular pollution. Air quality standards .Noise Pollution-Decibel scales, Noise characteristics and measurements, Levels of noise and standards, control measures of community and industrial noise.

### References:

1. Manual of water supply and treatment by Government of India publication.
2. Water and Waste water Technology by Mark J. Hammer / John Wiely and Sons.
3. Introduction to Environmental Engineering by M. L. Davis and Davis A. Cornwell, Mc Graw Hill.
4. Water supply and sewerage by T. H. McGhee.
5. Introduction to Environmental Engineering & Sciences G. M. Master, Prentice – Hall.
6. Environmental Engineering by Peavy
7. Water Supply Engineering by S. K. Garg, Khanna Publishers, New Delhi
8. Water Supply Engineering by Dr. B. C. Punmia, Laxmi Publishers, New Delhi
9. Water Supply Engineering by Dr. P. N. Modi, Standar d Book House, New Delhi.
10. Rao. M. N. and Rao H.V. Air pollution, McGraw Hill, 1990. 9. Canter, Environmental Impact Assessment, TMH Publication
11. Manual on Municipal Solid Waste Management, Ministry of Urban Development Govt. of India.
12. Water Supply & Sanitary Engineering, G. S. Birdie, Dhanpat Rai & Sons, New Delhi.
13. Viessman W. and Hammer M.J. Water supply and pollution Control, Harper Collins College publishers
14. Environmental Engineering by Peavy.
15. Introduction to Environmental Engineering & Sciences G. M. Master, Prentice – Hall.

## **M.Tech. – Mechanical Engineering Design (MED)**

### **Open Elective**

**COURSE: MED 32B – PROFESSIONAL ETHICS AND CYBER LAW**

**CREDITS: 04**

#### **Teaching Scheme:**

Lectures: 03 Hrs. /week

Tutorials: 01 Hr. /week

#### **Examination Scheme**

Duration of paper: 03 Hrs.

University Assessment: 70 Marks

College Assessment: 30 Marks

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#### **CONTENTS:**

- Computer & Philosophical Ethics - Computer Ethics, Philosophical Ethics, Professional Ethics, Ethical relativism, utilitarianism, deontological theories, virtue ethics, Code of Ethics and professional conduct, steps in ethical decision making
- Ethics and Internet : Hacking and Hacker Ethics, Intellectual property issues in cyberspace – protections via trade secrets, trademarks, patents etc., copyright on web content, copyright on software, digital contracts, digital signature.
- Data and Evidence Recovery – Data recovery tools, data recovery procedure and ethics, complete time line analysis of computer files based on file creation, file modification and file access, recover internet usage data and files, Use computer forensics software tools to cross validate findings in computer evidence-related cases.  
Cyber Forensics Investigation – investigation tools, ediscovery, digital evidence collection, evidence preservation, e-mail investigation, e-mail tracking, IP tracking, e-mail recovery, password cracking.
- Cyber security – Introduction, hardware based security, software based firewalls, security standards, assessing threat levels, types of incidents, threats in cyberspace, incident prevention and detection, reporting cyber crime, reverse engineering & cracking techniques and financial frauds.  
Information Technology Act 2000.

#### **REFERENCES:**

1. Computers, Ethics and social Values, Johnson & Nissenbaum, 1994, Prentice Hall.
2. Cyber Security operations Handbook, John Rittinghouse, William Hancock.
3. Computer Ethics, D.G.Johnson, third edition, Pearson Education.



## Open Elective

### M.Tech. – Mechanical Engineering Design (MED)

#### **COURSE: MED 32(C): RENEWABLE ENERGY TECHNOLOGY**

**CREDITS: 04**

**Teaching Scheme:**

Lectures: 03 Hrs. /week

Tutorials: 01 Hr. /week

**Examination Scheme**

Duration of paper: 03 Hrs.

University Assessment: 70 Marks

College Assessment: 30 Marks

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#### **CONTENTS:**

**Energy Scenario:-**Introduction, World's production and reserves of commercial energy sources, India's production and reserves, Energy alternatives.

**Thermal applications: -** Introduction, devices for thermal collection and storage.

**Solar Radiation:-** Introduction, Solar radiation outside the earth's atmosphere, solar radiation at the earth's surface. Instruments for measuring solar radiation and sunshine, solar radiation geometry, predicting the availability of solar radiation, solar radiation on tilted surface (Problems)

**Methods of solar collection and conversion: -** Radiative properties and characteristics of materials, flat plate collectors, Solar air heaters, concentrating collectors.

**Photovoltaic conversion:-**Introduction description, working principle, performance characteristics, types, applications, PV thermal collectors.

**Other renewable energy sources:-** Introduction, wind energy, energy from biomass, hydropower, ocean energy, nuclear energy, MHD power generation.

**Economic analysis of solar process (Renewable Energy) systems: -** Overview of solar economics, cost of the solar process system, design variables, cost benefit analysis and its optimization, clean development mechanism. (Problems)

#### **REFERENCES:**

1. Solar Energy Principles of Thermal collection and storage by Sukatme & J. K. Nayak - Tata Mcgraw Hill.
2. Solar Energy Thermal Processes- by John A. Duffie & W. A. Beckmen - John Willey & sons.
3. Principles of Solar Engineering – by D. Yogi Goswami, Frank Krieth and J.F. Kreider - Tata Mcgraw Hill.
4. Energy Science-Principles, Technologies and Impact:- John Andrews, Nick Jelley & Nicholas Alfred Jelley- Oxford University Press.
5. Introduction to Nuclear Power:-by G. F. Hewitt, John G. Collier- Taylor and Francis New York
6. Renewable Energy Resources-John Twidell and Tony Weir –Taylor and Francis
7. Wind and solar power systems : Design, Analysis and operation – by Mukund Patel- Taylor and Francis New York

## **M.Tech. – Mechanical Engineering Design (MED)**

### **COURSE: MED 33: DISSERTATION PHASE -I**

**CREDITS: 10**

**Teaching Scheme:**

Tutorials: 10 Hrs.

**Examination Scheme**

University Assessment: -----

College Assessment: 200 Marks

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### **CONTENTS:**

Student is expected to choose the topic of his/her dissertation. The scope of proposed study must be in the relevant discipline/area. Student is expected to carry out the following –

1. Identification of proposed Topic/Area of Study for the Dissertation
2. Literature Review related to proposed topic
3. Formulation of Scope & Methodology for the proposed study.
4. Formulation of Hypothesis for the selected study.
5. Preliminary Dissertation.

Student should prepare & submit a Pre-Dissertation report minimum 50 pages in the given format, covering the above mentioned tasks. Evaluation will be on the basis of brief report on dissertation study undertaken on specified date at the end of semester through seminar & viva-voce.

## **FOURTH SEMESTER**

### **M.TECH. – MECHANICAL ENGINEERING DESIGN (MED)**

#### **M.Tech. – Mechanical Engineering Design (MED)**

##### **COURSE: MED 41 - DISSERTATION PHASE -II**

**CREDITS: 18**

**Teaching Scheme:**

Tutorials: 24 Hrs.

**Examination Scheme**

University Assessment: 200 Marks

College Assessment: 200 Marks

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**CONTENTS:**

The dissertation phase – II will be in continuation of dissertation phase – I and shall consist of a report on the research work done by the candidate or a comprehensive and critical review of any recent development in the subject or detailed report of the project work consisting of a design and / or development work, system modeling, design and analysis etc., that the candidate has executed. The examinee shall submit the dissertation in triplicate to the head of the institution duly certified by the guide and the concerned head of department and the principal that the work has been satisfactorily completed. The student is also expected to write and register at least two research papers on his/her study undertaken in UGC approved refereed journals and/or international conferences.

Evaluation for this component will be on the basis of submitted Report, Seminar & Viva-Voce.

- **College Assessment -Term work**

The dissertation will be assessed by two internal examiners, one of whom will be the guide and other will be a senior faculty member from the department nominated by Head of the Department.

- **University Assessment -Viva voce**

It shall consists of a defense presented by the examinee on his work in the presence of examiners appointed by the University, one of whom will be the guide and other will be an external examiner.