Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

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दूरध्वनी - इपीबीएक्स - २०६०९०००, अभ्यासमंडळे विभाग : ०२३१- २६०९०९४. २६०९४८७
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जा.क्र./शि.वि/अं.म./ 608 दिनांक:— ०७/१०/२०२५

प्रति,

१. मा. संचालक / प्राचार्य,
सर्व संलग्नीत अभियांत्रीकी महाविद्यालये,
शिवाजी विद्यापीठ, कोल्हापूर

२.प्र. संचालक,
स्कुल ऑफ इंजिनिअरींग ॲण्ड टेक्नॉलॉजी,
शिवाजी विद्यापीठ, कोल्हापूर

३.प्र. संचालक,
यशवंतराव चव्हाण स्कुल ऑफ रुरल डेव्हलपमेंट,
शिवाजी विद्यापीठ, कोल्हापूर

विषय:— एम. टेक अभ्यासक्रमातील किरकोळ दुरुस्तीबाबत.

संदर्भ:— १.एसयु/बीओएस/सायन्स&टेक/३१७ व ५३४ दि.२३/५/२०२५ व दि.४/९/२०२५
२.एसयु/बीओएस/सायन्स&टेक/५३९ दि.०८/०९/२०२५

महोदय,

उपरोक्त संदर्भिय विषयास अनुसररुन आपणास आदेशान्वये कळविण्यात येते की, शैक्षणिक वर्ष २०२५—२६ पासून लागू करण्यात आलेल्या खालील **एम.टेक** अभ्यासक्रमामध्ये किरकोळ दुरुस्ती करण्यात आलेली आहे.

Sr.	Course/Syllabus	Sr.	Course/Syllabus
1	Enargy Technology (ON)	6	Rural Technology (ON)
2	Computer Science and Technology (ON)	7	Computer Science and Engineering (OFF)
3	Electronics and Telecommunication (ON)	8	Mechanical (CAD/CAM/CAE) (OFF)
4	Environmental Science and Technology (ON)	9	Electronics and Telecommunication Engineering (OFF)
5	Food Technology (ON)		

सोबत सदर अभ्यासक्रमाची प्रत जोडली आहे. तसेच विद्यापीठाच्या https://www.unishivaji.ac.in (NEP-2020@suk/ Online syllabus) या संकेस्थळावर ठेवण्यात आला आहे. सदर दुरुस्ती ही शैक्षणिक वर्ष २०२५—२६ पासून लागू राहील.

सदर अभ्यासक्रम सर्व संबधित विद्यार्थी व शिक्षकांच्या निदर्शनास आणून द्यावेत ही विनंती.

कळावे.

आपला विश्वासू,

डॉ. एस. एम. कुबल
उपकुलसचिव

सोबत — अभ्यासक्रमाची प्रत,

प्रत :— **माहितीसाठी व पुढील योग्यत्या कार्यवाहीसाठी**

मा. संचालक, परीक्षा व मुल्यमापन मंडळ	प्र. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा
अध्यक्ष, संबंधित अभ्यास /अस्थायी मंडळ	इतर परिक्षा ४ विभागास.
परीक्षक नियुक्ती ए व बी विभागास.	संलग्नता टी. १ व टी. २ विभागास
पीजी प्रवेश विभागास	पीजी सेमिनार विभागास
संगणक केंद्र / आयटी सेल	पात्रता विभागास

YASHWANTRAO CHAVAN SCHOOL OF RURAL DEVELOPMENT

SHIVAJI UNIVERSITY, KOLHAPUR

RULES, REGULATIONS AND SYLLABUS

For the course

M. Tech. (RURAL TECHNOLOGY)

Under the Faculty of Science and Technology

Syllabus to be implemented from the Academic year 2025-26

Rules and Regulations

Master of Technology
(**Rural Technology**)

(Semester I, II, III and IV)

(FACULTY OF SCIENCE AND TECHNOLOGY)

Programme Educational Objectives (PEO'S)

1. Apply technical knowledge and skills as a Technocrat to provide solutions in rural people, rural industries and government organizations.
2. Work as an individual or in a team; through demonstration of good analytical, research, design and implementation skills.

Programme Outcome (PO'S) & Programme Specific Outcome (PSO'S) :

PO1 - Acquire knowledge of basic sciences and technical concepts of various fields in engineering.
PO2 - Acquire an ability to identify, formulate and solve technical problems.
PO3 - Acquire an ability to design and conduct experiments and analyze and interpret data related to rural technology.
PO4 - Acquire skills to use engineering tools, software and equipment to analyze problems.
PO5 - Acquire knowledge of professional and ethical responsibilities and develop an understanding of impact of appropriate engineering solutions on the society.
PO6 - Acquire awareness of contemporary issues related to rural area.
PSO1 - Apply technical knowledge and skills as Technocrat to provide the solutions in rural area and rural industries and government organizations.
PSO2 - Utilize effective communication, team, and project management skills to work productively within their professions and communities.
PSO3 - Formulate and implement appropriate technologies according to the problems identified in rural area.
PSO4 - Conduct themselves in a responsible, professional and ethical manner.

1. Title: Master of Technology (Rural Technology)

2. Year of Implementation:

A new syllabus of **Master of Technology (Rural Technology),** Yashwantrao Chavan School of Rural Development, Shivaji University, Kolhapur is to be implemented from the academic year 2025-26 onwards.

3. Introduction:

This program is offered at Yashwantrao Chavan School of Rural Development, Shivaji University, Kolhapur. The objective of the M.Tech.(RT) programme is to create new trained professionals for rural development with the appropriate values,identities and principles.

4. Duration

Full Time 2 Years i.e. 4 semesters

5. Medium of Instruction:

The medium of Instruction will be English only.

6. Admission Process:

Admission process of the course is through DTE and/or through the entrance test conducted by the University in case of admission process not mechanized through D.T.E. Candidates with a Valid GATE score are eligible for direct admission(without entrance test) if seats are vacant.

Syllabus for the Entrance Test:

There shall be a separate entrance test for M. Tech. course/programme of the YCSRD if the admission process is not through D.T.E., which will be conducted by the University in the Month of May/June of the academic year. The syllabus for the course programme shall consist of the following areas.

A) General Knowledge and Aptitude, for 25 marks. (Multiple Choice Questions)
B) General Communication in English and Soft Skills, for 25 marks. (MCQs)
C) Course Specific Subject Knowledge/Aptitude, for 50 marks. (MCQs)

7. Pattern:

The pattern of examination will be Semester with Credit System and Continuous Internal Evaluation [CIE].

8. Course Structure:

Lectures, Practical, Research/Industrial Projects, Field Project, Minor Project, Seminar, On-Job Training, Internship, NPTEL, SWAYAM, MOOCs courses.

9. Teaching and Practical Scheme

- Each contact session for teaching or practical should be of 60 minutes.
- Minimum 48 contact sessions should be conducted for each subject of 100 Marks.

10. Examination Pattern and Assessment:

For 4-credit course- University Assessment: 60 marks

There will be seven (7) questions of 12 Marks each.
Attempt any five(5) questions.

Internal evaluation for 4 credit courses: Internal evaluation: 40 marks

a) A teacher in communication with students and in relevance with the subject assign Seminar/ Case Studies/ Book Review/ Problem Solving/ Poster Presentation/ Research Paper Review/ Group Discussion/ Open Book Examination considered for Internal examination of 30 marks and Mid Test of 10 Marks will be conducted on each unit and total marks will be converted to 10 marks. Total internal evaluation: 40 marks.

b) The internal marks will be communicated to the University at the end of each semester, but before the semester-end examinations, for declaration of result.

On Job Training / Field Project:

For 4 credits: In Semester I and II students should perform OJT/FP/Internship.

11. Standard of Passing:

Internal as well as external examination will be held at the end of the semester. The candidate must score 40% marks in each head of internal as well as external Examination.

12. ATKT rules for Postgraduate Programmes:

(Ref. जा.क्र./शिवाजी वि./अ. मं./३२८ दि. १२/०६/२०२४ Regulation in accordance with NEP 2020)

i. If a candidate fails in any number of courses (subject heads) of Semester I, shall be allowed to proceed to Semester II.
ii. A candidate shall be allowed to proceed to Semester III, even if he/she fails in any number of courses at Level 6.0.
iii. A candidate shall be allowed to proceed to Semester IV even if a candidate fails in any number of courses (subject heads) of any previous Semesters.

13. Course Center and Intake:

i) Centre: Yashwantrao Chavan School of Rural Development, Shivaji University, Kolhapur.

ii) Intake: **18**.

14. Admission Committee:

The composition of the Admission Committee is as mentioned below:

1. Director, Yashwantrao Chavan School of Rural Development, Chairman.
2. Coordinator of Rural Technology Course.
3. One Associate Professor from YCSRD department.
4. One Assistant Professor from YCSRD department.
5. One member for reserved category representative.

15. Eligibility:

B.E. / B. Tech. (all branches)

M.Sc.(all branches) AMIE / IETE or any equivalent degree, MCA, (with minimum 50%aggregate marks for open category and 45% of marks for reservation category.

16. Credit System:

As per the University norms and NEP-2020 Theory Paper / Practical / Research/Industry Project / Internship / OJT Grade Points: Conversion

The marks obtained by a candidate in each Theory Paper / Practical / Research/Industry Project / Internship / OJT and Internal Assessment (out of 100) in any fractions like 60: 40 shall be converted into grades on the basis of the following table.

Marks Range (%)	Grade Point (GP)
96 – 100	10
91 – 95	9.5
86 – 90	9
81 – 85	8.5
76 – 80	8
71 – 75	7.5
66 – 70	7
61 – 65	6.5
56 – 60	6
51 – 55	5.5
46 – 50	5
41 – 45	4.5
40	4
Below 40	0

Grading: Shivaji University has introduced a Seven-point grading system as follows:

Grades	CGPA Credit Points
O	8.60 To 10
A+	7.00 To 8.59
A	6.00 To 6.99
B+	5.50 To 5.99
B	4.50 To 5.49
C	4.00 To 4.49
D	0.00 To 3.99

Overall Final Grades	Class		Grade
8.60 To 10	Higher Distinction Level	Extraordinary	O
7.00 To 8.59	Distinction Level	Excellent	A+
6.00 To 6.99	First Class	Very Good	A
5.50 To 5.99	Higher Second Class	Good	B+
4.50 To 5.49	Second Class	Satisfactory	B
4.00 To 4.49	Pass	Fair	C
0.00 To 3.99	Fail	Unsatisfactory	D

17. Board of Paper Setters /Examiners:

For each Semester end examination there will be a board of Paper setters and examiners for every course. While appointing paper setter/examiners, care should be taken to see that there is at least one person specialized in each unit of the course.

18. Clarification of Syllabus:

The syllabus Committee should meet at least once in a year to study and clarify any difficulties from the Institute. The Workshop on syllabi should be organized at the beginning of every semester on request from the Institutes.

19. Revision of Syllabus:

Revision of the syllabus should be considered after every three years.

20. Equivalence (ForRevised Syllabus): As Per University Rules.

COURSE CURRICULUM

	Name of the Course
Semester – I	
MT-101	Rural Energy Sources
MT-102	Generative AI for Rural Innovation
MT-103	Environmental Pollution, Monitoring and Control
SEM-104	Seminar-I
FP-105	Field Work
ET-106	Watershed Management
ET-107	Remote Sensing and GIS for Rural Planning
Semester – II	
MT-201	Rural Waste Management
MT-202	Recent Trends in Engineering and Technology
MT-203	Power Plant Engineering
SEM-204	Seminar-II
FP-205	Minor Project
ET-206	Greenhouse Technology
ET-207	Irrigation Techniques
Semester – III	
DP-301	Dissertation Phase-I
OJT-302	Industrial Training
CV-303	Comprehensive Viva-I
Semester – IV	
	Course
DP-401	Dissertation Phase– II
CV-402	Comprehensive Viva-II

Structure of M-Tech (Rural Technology) and Scheme of Examination

Part-I Semester – I, II

Course Name	Course Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectures /Tutorial/ (Hours/ week)	Practical (Hours/ week)	Credits	Maximum Marks	Minimum Marks	Exam Duration (Hours)	Maximum Marks	Minimum Marks	Exam. Duration (Hours)
Semester-I										
Rural Energy Sources	MT-101	4	--	4	60	24	2	40	16	1 ½
Generative AI for Rural Innovation	MT-102	4	--	4	60	24	2	40	16	1 ½
Environmental Pollution, Monitoring, and Control	MT-103	4	--	4	60	24	2	40	16	1 ½
Seminar-I	SEM-104	2	--	2	--	--	--	50	20	2
Field Work (OJT/FP)	FP-105	--	8	4	60	24	2	40	16	1 ½
Watershed Management (Elective-I)	ET-106	4	--	4	60	24	2	40	16	1 ½
Remote Sensing and GIS for Rural Planning (Elective-I)	ET-107									
Total				22	300			250		
Semester-II										
Rural Waste Management	MT-201	4	--	4	60	24	2	40	16	1 ½
Recent Trends in Engineering and Technology	MT-202	4	--	4	60	24	2	40	16	1 ½
Power Plant Engineering	MT-203	4	--	4	60	24	2	40	16	1 ½
Seminar-II	SEM-204	2	--	2	--	--	--	50	20	2
Minor Project (OJT/FP)	FP-205	--	8	4	60	24	2	40	16	1 ½
Greenhouse Technology (Elective-II)	ET-206	4	--	4	60	24	2	40	16	1 ½
Irrigation Techniques (Elective-II)	ET-207									
Total				22	300			250		
Total (Sem I + Sem II)				44	600			500		

Structure of M-Tech (Rural Technology) and Scheme of Examination

Part- II Semester – III and IV

Course Name	Course Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectures /Tutorial/ (Hours/week)	Practical (Hours/ week)	Credits	Maximum Marks	Minimum Marks	Exam. Duration (Hours)	Maximum Marks	Minimum Marks	Exam. Duration (Hours)
Semester-III										
Dissertation Phase-I	DP-301	--	08	14	60	24	--	40	16	--
Industrial Training	OJT-302	--	--	04	--	--	--	100	40	--
Comprehensive Viva-I	CV-303	04	--	04	--	--	--	100	40	--
							--	--	--	
Total				22	60			240	--	--
Semester-IV										
Dissertation Phase– II	DP-401		10	18	200	120		100	40	
Comprehensive Viva-II	CV-402	04		4				100	40	
Total				22	200			200		
Total (Sem III + Sem IV)				44	260			440		

Note: Teaching Scheme: P: 5 Hrs../week/ student

- MT–Mandatory Theory
- SEM–Seminar
- ET–Elective Theory
- OJT/FP- On-Job Training/ Field Project/Internship
- DP- Dissertation Phase
- CV- Seminar and Comprehensive Viva

- Total Marks for M.Tech (RT)-I (Semester I & II): **1100**
- Total Marks for M.Tech (RT)-II (Semester III & IV): **700**
- Total Credits for M.Tech (RT)-I (Semester I & II) : 44
- Total Credits for M.Tech (RT)-II (Semester III & IV) : 44
- ***Separate passing is mandatory for University and Internal Examinations***

*Evaluation scheme for OJT/FP shall be decided by concerned BOS

M.Tech (RT) (Part I) (Semester I) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Rural Energy Sources

Course Code: MT-101

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Create awareness among students about non-conventional sources of energy technologies.
2. Enable students to understand various renewable energy technologies and systems.
3. To impart the knowledge of Storage technologies, from the autonomous renewable energy sources.
4. Equip the students with knowledge and understanding of various possible mechanisms about renewable energy projects.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Thermodynamics Review and Waste Heat Fundamentals** Waste heat: sources, classification, and importance, First Law and Second Law of Thermodynamics, First and Second Law efficiencies, Energy cascading in thermal systems, Rankine cycle and its modifications, Gas turbine cycle, Combined cycle systems, Heat Recovery Steam Generators (HRSG)	15 Hrs.
2	**UNIT 2: Heat Exchangers and Low-Temperature Energy Systems** Thermodynamic cycles for low-temperature applications, Cogeneration systems, Introduction to heat exchangers, LMTD and effectiveness–NTU methods, Special heat exchangers for waste heat recovery, Synthesis of heat exchanger networks, Problem solving based on industrial scenario	15 Hrs.
3	**UNIT 3: Direct Energy Conversion and Recovery Technologies Solar** Heat pipes and vapor chambers, Thermoelectric generators (TEG): principles and applications, Thermionic conversion systems Thermophotovoltaic (Thermo-PV) systems, Magneto-hydro-dynamic (MHD) generators ,Heat recovery from incinerators, Heat pumps: working principle and applications	15 Hrs.
4	**UNIT 4: Energy Storage Technologies and Economics** Introduction to energy storage: need and classification, Mechanical storage: pumped hydro, compressed air, flywheel, SMES, Thermal storage: sensible and latent heat systems, Chemical storage: batteries, hydrogen, fuel cells, Energy economics: cost-benefit analysis, return on investment (ROI), life cycle costing	15 Hrs.

Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.

References: -

Textbooks

1. **S. C. Laroiya**, Energy Conservation and Management, Katson Publishing House, India (Simple explanation of energy conservation techniques, energy audits, and efficiency in Indian industries)
2. **G.D. Rai**, Non-Conventional Energy Sources, Khanna Publishers, New Delhi (Chapters on waste heat recovery, cogeneration, and renewable integration)
3. **S. P. Sukhatme and J. K. Nayak** Solar Energy: Principles of Thermal Collection and Storage, Tata McGraw-Hill, New Delhi (Thermal energy utilization, thermal storage, and energy conservation principles)
4. **Y. P. Abbi & Shashank Jain** Handbook on Energy Audit and Environment Management TERI Press, New Delhi (Practical guidance on energy conservation audits, case studies in Indian industries)
5. **V. Ganapathy** Industrial Boilers and Heat Recovery Steam Generators: Design, Applications, and Calculations Marcel Dekker (Advanced topics on HRSGs and waste heat recovery in power plants)

Research Papers and Journal Articles

6. **Patil, P. A., & Deshmukh, M. B. (2021).** Analysis of Waste Heat Recovery Potential in Sugar Industries in India International Journal of Mechanical and Production Engineering Research and Development (IJMPERD)
7. **Kumar, R., & Kumar, P. (2020).** Review on Technologies for Waste Heat Recovery in Indian Industries Journal of Energy and Thermal Science
8. **Khandare, H., & Joshi, P. (2019).** Performance Evaluation of Heat Pipe-Based Waste Heat Recovery System International Research Journal of Engineering and Technology (IRJET)

Government and Institutional Reports

1. **Bureau of Energy Efficiency (BEE), Government of India** Energy Efficiency in Thermal Utilities – Book 2 of Energy Manager Exam Study Material https://beeindia.gov.in
2. **MNRE – Ministry of New and Renewable Energy** Annual Report on Energy Efficiency and Waste Heat Recovery https://mnre.gov.in
3. **TERI – The Energy and Resources Institute** Reports on Industrial Energy Conservation Projects and Best Practices in India https://www.teriin.org

M.Tech. (RT) (Part I) (Semester I) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Generative AI for Rural Innovation

Course Code: MT-102

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Write a prompt to communicate with generative AI tools effectively.
2. Enable students to understand and implement step-wise solutions given by AI tools.
3. Develop Rural Development applications using AI tools.
4. Awareness of using AI tools ethically.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Introduction to Generative AI and Tools** What is Generative AI?, Differences between Discriminative and Generative Models, Use cases in text, image, audio, and video generation, Tools: ChatGPT, DALL·E, Copilot, Bard, Midjourney, Introduction to Prompt Engineering **Assignment:** • Write a prompt that helps generate a rural development project idea using ChatGPT. • Use DALL·E or Midjourney to generate an image for a "Smart Village" concept.	15 Hrs.
2	**UNIT 2: Generative AI for Rural Education & Awareness:** Use of AI chatbots for education in local languages, Creating explainers for farmers/students using AI tools, Video and audio content generation for agriculture, health, and hygiene awareness, Case studies of AI in rural communication **Assignment:** • Create an AI-powered chatbot prototype (using tools like Dialogflow) to answer farmer FAQs. • Generate a short AI-based video explaining organic farming techniques.	15 Hrs.
3	**UNIT 3: Generative AI in Agriculture, Health, and Handicrafts:** AI-generated advisories for crop selection and disease control, Generative design for rural handicrafts and packaging ,AI-generated medical leaflets/posters in local language, Role of AI in small-scale entrepreneurship **Assignment:** • Use ChatGPT to generate an awareness pamphlet for water conservation. • Design packaging using AI image tools for a rural product (e.g., jaggery, millet cookies). • Use Canva + ChatGPT to design a marketing poster for a local rural business.	15 Hrs.

4	**UNIT 4: Project Development and Ethics** Selecting and scoping a rural development problem, Building simple AI tools (no-code/low-code platforms like Pictory, RunwayML, Scratch for AI), Introduction to ethical use of AI in rural areas (bias, misuse, over-dependence), Final project planning and implementation **Assignment:** • Choose a rural problem and design a working solution using any generative AI tool (e.g., AI content generator for government schemes, a storytelling bot for education). Submit a report and give a demo presentation.	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.		

References:-

1. Kavita, S. & Dinesh, R., *AI and Machine Learning in Rural Development* Notion Press, 2022.
   (Focuses specifically on the application of AI in rural settings, with Indian case studies.)

2. Marr, Bernard. Generative AI in Practice: 100+ Amazing Ways It Can Be Used Across Industries. Wiley, 2023.
   (Direct examples of how generative AI can be used in sectors including agriculture, education, and business.)

3. Kelleher, John D. Artificial Intelligence: A Guide for Thinking Humans. MIT Press, 2019.
   (Simplified AI concepts relevant to non-CS students.)

Research Papers and Indian Journals

1. **Sharma, S., & Singh, R. (2022).**
   Generative AI and its Scope in Indian Agriculture: Opportunities and Constraints
   Journal of Rural Technology and Innovation, Vol. 8(2)
   (Discusses ChatGPT, predictive text models, and image-based crop health detection in Indian context.)
2. **Kumar, M., & Raj, A. (2021).**
   Application of Artificial Intelligence in Smart Village Initiatives in India
   International Journal of Engineering Research & Technology (IJERT), Vol. 10 Issue 4.
   www.ijert.org
   *(*Talks about using AI for clean energy, water management, and education in villages.)
3. **Singh, A., & Patel, S. (2023).**
   Generative AI for Agricultural Extension: A Review
   Indian Journal of Agricultural Sciences*, ICAR*
   (Explores AI tools like ChatGPT, voice assistants in local languages, and image-based advisories for farmers.)

Web Platforms & Tools (for Assignments/Projects)

1. **ChatGPT** – https://chat.openai.com
   *(*Text generation, report writing, Q&A chatbots)
2. **Bard/Gemini** – https://bard.google.com
   (Google's generative AI for local applications and language support)

3. **DALL·E / Bing Image Creator** – https://www.bing.com/images/create
   *(*Generative image creation for posters, awareness campaigns)
4. **RunwayML** – https://runwayml.com
   (Video generation and editing using AI)
5. **Canva AI Tools** – https://www.canva.com
   (Poster, pamphlet, marketing material with text and design AI tools)
6. **Dialogflow** – https://dialogflow.cloud.google.com
   (No-code chatbot development, useful for rural information services)
7. **Voiceflow** – https://www.voiceflow.com
   (Voice-based assistant and chatbot builder for regional languages)
8. **Pictory** – https://pictory.ai
   (AI tool to convert text into educational videos – useful for health and agriculture awareness)

M.Tech.(RT) (Part I) (Semester I) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Environmental Pollution, Monitoring, and Control

Course Code: MT-103

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Understand various treatment systems for water and wastewater.
2. Study the sanitation-related problems and their control.
3. Understand air pollution and its control technologies.
4. Understand the soil pollution and remediation technologies

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Air pollution:** Definition, sources, and classification of air pollutants. Transport and diffusion of pollutants, effect of air pollution on man and climate. Ambient air quality standards and air pollution indices. Air sampling and monitoring techniques – settleable and suspended particulate matter - dust fall jar and impingement method, high volume air sampler	15 Hrs.
2	**UNIT 2: Noise Pollution:** Definition, sources, and terminology; types of noise; Measurement of noise; Noise indices, noise exposure level and impact onHuman beings and climate. Noise control and abatement measures.	15 Hrs.
3	**UNIT 3: Aquatic and Soil Pollution:** Definition, sources and classification of aquatic pollutants. Consequences of pollution on surface, subsurface and mariner water sources. Soil Pollution – definition, sources and classification of soil pollutants and their impact on soil and plants. Bacteriological sampling and analysis of soil quality	15 Hrs.
4	**UNIT 4: Radioactive Pollution:** Definition, radioactivity, radionuclides, radiationemissions, sources, radioactive decay and build up. Biological effects of radiation ecosystem. Radiation exposure standards, radioactive pollution and pollution control measures. Biological dosimetry.	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.		

References: -

1. Gurjar, B. R., Molina, L. T., & Ojha, C. P. (2010). Air pollution: Health and Environmental Impacts. CRC Press.
2. Khitoliya, R. K. (2017). Environmental impact assessment and management. Discovery Publishing House Pvt Limited.
3. Narayanan, V., & Srivatsa, S. (2016). Environmental Studies: Experiments, Projects, Activities: Book 1. The Energy and Resources Institute (TERI).
4. Noor, M. (2012). Environment and water pollution: Cause, Effect and Control.
5. Prasad, P. N., & Amarnath, P. N. &. T. R. (2010). Environmental Law And Pollution Control.
6. Shafi, S. (2005). Environmental pollution. Atlantic Publishers & Dist.
7. Singh, R. M., Shukla, P., & Singh, P. (2020). Environmental processes and management: Tools and Practices. Springer Nature.

M.Tech (RT) (Part I) (Semester I) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Seminar-I

Course Code: SEM-104

Internal Marks: 50 Total Credits: 02
Theory: 02 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. To improve oral and written communication skills.
2. To use multiple thinking strategies to examine real-world issues, explore creative avenues of expression, solve problems, and make consequential decisions.
3. To help in exploring new ideas.
4. To develop the ability to seek clarification and defend the ideas of others effectively.

Seminar-I should be based on the literature survey on any topic relevant to Rural Technology (should be helpful for selecting a probable title of the dissertation). Each student has to prepare a write up of about 25-30 pages of "A4" size sheets and submit it in IEEE format in duplicate as the term work. The student has to deliver a seminar talk in front of the faculty of the department and his classmates. The concerned faculty should assess the students based onthe quality of work carried out, preparation and understanding of the candidates. Some marks should be reserved for the attendance of a student in the seminars of other students.

M.Tech (RT) (Part I) (Semester I) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Field Work

Course Code: FP-105

Internal Marks: 40 Total Credits: 04
External Marks: 60 Practical: 08 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. To identify the problems and needs of the rural people by the way of direct surveys and interaction with NGOs working for rural people.
2. To constitute a working group of innovators comprising academicians, scientists, personnel from NGOs, Governmental agencies and technical institutes, traditional craftsmen and artisans, farmers and social entrepreneurs
3. To educate the rural people on rural technologies/skills development by way of conducting workshops, short term courses and formal/non-formal interactions from time-to-time
4. To develop the spirit of entrepreneurship within the rural people so that some of them can use their know-how and resources for setting-up small scale self-sustaining industries.

Prepare a detailed project report on any one or similar of the following issues –

1. Inadequate Water Purification Technology

Observe drinking water sources (wells, handpumps, piped supply)
Check for absence or inefficiency of purification technologies
Identify scope for introducing low-cost water filters, solar disinfection (SODIS), etc.

2. Outdated Irrigation Techniques

Visit farms using flood irrigation or traditional methods
Identify water wastage, energy consumption issues
Explore the feasibility of introducing drip, sprinkler, or solar-powered irrigation systems

3. Lack of Cold Storage or Food Preservation Technology

Visit vegetable and milk-producing villages
Study post-harvest losses due to lack of storage or cooling
Suggest solar-powered cold storage or low-cost preservation methods

4. Improper Waste Management Systems

Observe handling of plastic waste, agricultural residue, and domestic waste
Identify the absence of composting units, segregation, recycling methods
Suggest biodegradable waste solutions, biogas digesters, or compact recycling units

5. Energy Inefficiency in Households and Farming

Observe use of diesel pumps, traditional chulhas, etc.
Identify energy wastage, pollution, and fuel dependency
Explore adoption of solar pumps, improved cookstoves, or LED lighting

6. Lack of Mechanization in Farming

Observe manual labor in sowing, harvesting, threshing, etc.
Identify time-consuming and labor-intensive processes
Suggest small-scale farm machinery or mobile-based agri-tools

7. Poor Digital Infrastructure and Connectivity

Study mobile network, internet availability in schools or Gram Panchayat
Identify lack of access to digital platforms for education, health, governance
Suggest solutions like offline content servers, community Wi-Fi, CSC upgrades

8. Limited Use of Assistive Technologies in Health/Education

Observe functioning of schools and primary health centers
Check for absence of tech aids like digital thermometers, projectors, or smart health kiosks
Propose simple health-monitoring devices, AR/VR for rural education, etc.

9. Traditional Construction Techniques Without Innovation

Observe use of old building materials and designs without thermal efficiency
Identify opportunities for low-cost improvements (mud bricks, fly ash bricks, insulation techniques)

10. Underutilized Renewable Energy Sources

Study areas where solar/wind/biogas potential exists but isn't used
Identify causes like lack of awareness, maintenance issues, or upfront cost
Suggest microgrid solutions, solar street lighting, community biogas plants

Expected Student Report Format:

1. Title of Problem Observed
2. Location/Village Name
3. Brief Description of Existing System
4. Identified Technological Gap or Problem
5. Photos/Sketches of the Site (if possible)
6. Proposed Technological Solution
7. Feasibility in Rural Context
8. Conclusion & Recommendations

M.Tech (RT) (Part I) (Semester I) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Watershed Management

Course Code: ET-106

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Acquire knowledge of hydrological study.
2. Study the soil and water conservation concepts.
3. Understand the rainwater harvesting systems.
4. Study the irrigation concepts.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Watershed Management:** Definition, size, concept of watershed, effect of watershed on the community, watershed characteristics, objectives of watershed management, selection of watershed, watershed management plan, monitoring and evaluation in watersheds, participatory rural appraisal watershed program (PRA), watershed map, Format for watershed management Plan	15 Hrs.
2	**UNIT 2: Natural Resources and Climates:** Units of Measurement of water &land, Needs & availability in watershed, size & shape of watershed, Norms of Government, Qualities & standards for human being & agriculture, meteorological lab, rainfall, rainfall intensity, rainfall patterns rain gauges, evaporation, Evapourimeter, wind, anemometer, humidity, dry & wet bulb thermometer, sunshine recorder, water budgeting. Steps in watershed management.	15 Hrs.
3	**UNIT 3: Hydrology and Geo-hydrology of Watershed:** Precipitation, forms of precipitation, Rainfall pattern in India, Rain fall parameter, Rainfall measurement, Selection of rain gauge sites, estimation of runoff,measurement of stream discharge. Availability of ground water, Distribution of subsurface water, soil moisture, aquifer, water table, springs, Ground water recharge, recharges structure, Water harvesting.	15 Hrs.

4	**UNIT 4: Soil and AMP;** Water Conservation, Treatment on land: Erosion & their types, soil & amp; water conservation, treatments, drainage line treatments, gully plugs, brushwood dams, Vanarai bandhara,loose boulder dams, gabian bandhara, underground bandhara earthen nalla bund, cement nallabund, Kadia pattern, shirpur pattern, Soil conservation on wastelands, contour and staggere dtrenching, gully control structures, Tree plantation, grasses, contour trenches, compartment bunding, land leveling, grading, smoothening, farm ponds, recharging of wells bores, Mapping, Scales, Symbols, drawings. Land capability & land use planning.	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.		

References: -

1. Goyal, M. K. (2016). ENGINEERING HYDROLOGY. PHI Learning Pvt. Ltd.
2. Jain, S. K., Agarwal, P. K., & Singh, V. P. (2007). Hydrology and Water Resources of India. Springer Science & Business Media.
3. König, K. W. (2001). The Rainwater Technology Handbook: Rain harvesting in Building [international Fundamentals, Practical Aspects, Outlook ; Includes Materials and Tools for Planning and Design!].
4. Mahnot, S., Chaplot, P., & Singh, P. (2012). Soil and water conservation and watershed management.
5. Modi, P. (1998). Water Supply Engineering: Vol - 2. Rajsons Publications Pvt. Ltd.
6. Murty, J. V. S. (1998). Watershed management.
7. Patra, K. C. (2001). Hydrology and Water Resources engineering. Narosa Publishing House.

M.Tech (RT) (Part I) (Semester I) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Remote Sensing and GIS for Rural Planning

Course Code: ET-107

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Acquire knowledge of water resources structure and transportation engineering.
2. Study the concepts of remote sensing
3. Apply the knowledge of mapping and monitoring of natural disasters.
4. Understand the fundamentals of GIS and its applications.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Introduction:** Introduction to civil engineering, Surveying, Elements of building construction, Water resources development, Transportation engineering	15 Hrs.
2	**UNIT 2: Concepts of remote sensing;** Energy sources and Radiation principles, spectral characteristics of earth's surface and of atmosphere. Sensors and their characteristics; Radiometers, cameras, multi-spectral scanners and microwave systems. Aerial and satellite platforms. Optical, infrared and microwave imagery, Analysis of imagery, Visual and machine interpretation of imagery, Ground truth data, Digital image processing.	15 Hrs.
3	**UNIT 3: Land use and Land cover mapping,** biodiversity, forestry and agriculture, soil erosion, water resources, wetland mapping, Wild life ecology, Environmental assessment, Environmental management, Urban and regional planning, Monitoring natural disasters.	15 Hrs.
4	**UNIT 4: Fundamentals of GIS:** Definition, Components, spatial data, thematic characteristics, raster's and vectors, databases and database management. Data input and Editing: Data stream, data encoding, map digitization and conversion, data analysis, network and surface analysis in GIS, analytical modelling, forms of GIS output, decision support systems, GIS project design and management. GIS applications	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.		

References: -

1. Allum, J. a. E. (2013). Photogeology and regional mapping. Elsevier.
2. Bhatta, B. (2011). Remote sensing and GIS. OUP India.
3. Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. (2015). Principles of geographical information systems. Oxford University Press.
4. Elachi, C., & Van Zyl, J. J. (2006). Introduction to the physics and techniques of remote sensing. John Wiley & Sons.
5. Heywood, D. I., Heywood, I., Cornelius, S., & Carver, S. (2011). An introduction to geographical information systems.
6. Lillesand, Kiefer, & Chipman. (2011a). Remote Sensing And Image Interpretation, 6th Edition.
7. Miller, V. C. (1961). Photogeology: By Victor C. Miller, Assisted by Calvin F. Miller.
8. Modi, P. N., & N, P. (2008). Irrigation Water Resources And Water Power Engineering.

M.Tech (RT) (Part I) (Semester II) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Rural Waste Management

Course Code: MT-201

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Analysing waste treatment methods.
2. Designing waste management systems.
3. Understanding health and environmental issues.
4. Computing waste quantities.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Introduction of Rural waste**, Type of waste, Necessity of systematic collection and disposal of waste, Types of sewerage systems. Sewage Treatment concept, Meaning and principle of primary and secondary treatment, constructional details of screening chamber, grit chamber, clarifier, trickling filters, General composition of sewage, importance & method of determination of B.O.D. and C.O.D.	15 Hrs.
2	**UNIT 2: Disposal of night soil, Village latrines**- collection and disposal of garbageand refuse. Construction of low cost latrines in rural areas. Septic tanks, cess pools/soak pit, privy pit and bore hole latrines.	15 Hrs.
3	**UNIT 3: Wastewater management**, Drainage, topography, storm water, natural passage, development of drains. Technological options at household level management, leach pit, soakage pit, soak way channel, plantation with intercepting chamber.	15 Hrs.
4	**UNIT 4: Solid waste management**, Prospects and problems of solid waste management in rural areas, approach and steps for effective management of solid waste through composting, biogas technology and landfills. Garbage, ash, rubbish, collection methods, transportation, disposal – salvaging, dumping, controlled tipping, incineration, composting, dung disposal – digester, biogas plant.	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc. based on above syllabus.		

Reference Books:

1. John, S. V. V. K. &. S. (2015). Water supply engineering. Vikas Publishing House.
2. Modi, P. (1998b). Water Supply Engineering: Vol - 2. Rajsons Publications Pvt. Ltd.
3. Rangwala, S. C. (2005). Water Supply and Sanitary Engineering.

M.Tech (RT) (Part I) (Semester II) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Recent Trends in Engineering and Technology

Course Code: MT-202

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Ability to design and implement AI-based solutions.
2. Apply ML algorithms to solve real-world problems.
3. Understand the ethical considerations of AI.
4. Design and develop IoT-based systems and applications.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Introduction:** Introduction and components of Computer-aided design (CAD), Basic concepts of graphics, Rendering; Graphical user interface, Computer-aided drafting systems; Geometric modeling systems – wireframe, surface , and solid modeling systems.	15 Hrs.
2	**UNIT 2: Augmented reality and virtual reality technology**, Introduction to 3D, Basics of Unity software, Vuforia SDK, Marker-based AR	15 Hrs.
3	**UNIT 3: 3D Printing:** Introduction to 3D Modeling and Software. Introduction to 3D printing, History and evolution of 3D printing technology, Basics of 3D printing process (generalized process chain), Design for 3D printing, Overview of 3D printing technologies and printable materials.	15 Hrs.
4	**UNIT 4: Artificial Intelligence:** Basics of Artificial Intelligence, Application of AI in Rural Technology, Constrain Satisfaction Problem, State space Water Jug Problem, Heuristic search.	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based onabove syllabus.		

Reference Books:

1. Gibson, I., Rosen, D., & Stucker, B. (2014). Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing. Springer.
2. Gibson, I., Rosen, D., & Stucker, B. (2016). Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing. Springer.
3. Norvig, P. R. (2021). ARTIFICIAL INTELLIGENCE: A Modern Approach, Global Edition.
4. Russell, S., & Norvig, P. (2016). Artificial intelligence: A Modern Approach. Createspace Independent Publishing Platform.
5. Srivastava, M., Rathee, S., Maheshwari, S., & Kundra, T. (2019). Additive manufacturing: Fundamentals and Advancements. CRC Press.

M.Tech (RT) (Part I) (Semester II) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Power Plant Engineering

Course Code: MT-203

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Understanding different types of power plants and their operational principles.
2. Apply knowledge of thermo to design and analyse power generation systems.
3. Design systems for fuel handling, combustion, and emission control.
4. Understand the concepts of load estimation, power generation efficiency, and plant performance metrics.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Introduction:** Choice of power generation; load & load duration curves;load factor; diversity factor; load deviation curve; load management; number and size of generating units, combustion of fuels.	15 Hrs.
2	**UNIT 2: Coal-Fired Power Plant:** Steam power plant, Rankin cycle, Carnot cycle, mean temperature of heat addition, effect of variation of steam condition on thermal efficiency of steam power plant, reheating of steam, regeneration, regenerative feed water heating, feed water heaters, canonization of Rankin cycle, optimum degree of regeneration, optimum degree of regeneration, supercritical pressure cycle, steam power plant appraisal, deaerator, typical layout of steam power plant, efficienciesin a steam power plant, cogeneration of power and process heat	15 Hrs.
3	**UNIT 3: Diesel Engine Power Plant:** Basics of a diesel engine and its parts' combustion in a CI engine, pressure- volume curves, applications of dieselengines in power field, advantages and disadvantages of diesel engine power plant, types of diesel plants, general layout, , performance characteristics, supercharging, layout of a diesel engine power plant.	15 Hrs.
4	**UNIT 4: Hydroelectric Power Plant:** Advantages and disadvantages of water power, optimization of hydro-thermal mix, selection of site for a hydroelectric plant, hydrological cycle, hydrographs, storages and pondage, essential elements of a hydroelectric power plants, classification of hydroelectric power plants, hydraulic turbines, turbine size, Peltonwheel, degree of reaction, Francis turbines, propeller and Kaplan turbines,Deriaz turbine, bulb turbine, specific speed, comparison of turbines, cavitations, governing of hydraulic turbines, governing of reaction turbines, surge tanks, performance of turbines	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.		

Reference books: -

1. Chang, S. H. (2012). Nuclear power plants. BoD – Books on Demand.
2. Gupta, M. K. (2012). POWER PLANT ENGINEERING. PHI Learning Pvt. Ltd.
3. Jog, M. G. (1989). Hydro-Electric and pumped storage plants. Wiley.
4. Murray, R., & Holbert, K. E. (2019). Nuclear energy: An Introduction to the Concepts, Systems, and Applications of Nuclear Processes. Butterworth-Heinemann.
5. Nagpal, G. R. (1980). Power plant Engineering.
6. Petridis, G. K., & Nicolau, D. (2012). Nuclear power plants.
7. Raja, A. K., & Srivastava, A. P. (2006). Power plant Engineering. New Age International.
8. Rust, J. H. (1979). Nuclear Power Plant Engineering.
9. Sharma, P. C. (1985). A text book of Power plant engineering.
10. Skrotzki, B. G. A., & Vopat, W. A. (1960). Power station engineering and Economy. McGraw-Hill Companies.
11. Power Plant Familiarization, Manual of Central Training Resources Unit of NTPC India,

M.Tech (RT) (Part I) (Semester II) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: SEMINAR –II

Course Code: SEM-204

Internal Marks: 50 Total Credits: 02
Theory: 02 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. To improve oral and written communication skills.
2. To develop the ability to seek clarification and defend the ideas of others effectively.
3. To use multiple thinking strategies to examine real-world issues, explore creative avenues of expression, solve problems, and make consequential decisions.
4. To help in exploring new ideas.

Seminar II shall be based on tentative topic of dissertation such as review paper on some specific well defined area/ specialized stream of Rural Technology. Each student has to prepare a write up of about 25-30 pages of "A4" size sheets and submit it in IEEE format in duplicate as the term work. The student has to deliver a seminar talk in front of the faculty of the department and his classmates. The faculty, based on the quality of work, carried out, preparation and understanding of the candidates. Some marks should be reserved for the attendance of a student in the seminars of other students.

M.Tech (RT) (Part I) (Semester II) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Minor Project

Course Code: FP-205

Internal Marks: 40	Total Credits: 04
External Marks: 60	Practical: 08 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Develop an approach for finding the solutions of various issues in rural area.
2. Understand real problems of rural area.
3. Contribute as an individual or in a team in rural development of technical projects
4. Acquire practical knowledge within the chosen area of technology for project development.

Prepare a detailed project report on any one of the following issues –

1. Smart Irrigation System for Small Farms using Solar Power"
2. "Low-Cost Water Purifier using Local Materials"
3. "Mobile Health Alert System for Pregnant Women in Villages"
4. "Village Waste to Brick: Eco-Brick Maker Prototype"
5. "Automatic Cattle Feeder using Local Materials"
6. "Solar-Powered Street Light with Motion Sensor for Rural Lanes"
7. "Smart Cattle Tracker using GPS and Mobile Alerts"
8. "Biogas Plant Model for Household Organic Waste Management"
9. "Wind-Powered Mobile Charging Station for Remote Villages"
10. "Rainwater Harvesting and Filter Unit for School Rooftops"
11. "Multipurpose Agricultural Tool for Women Farmers"
12. "Low-Cost Drip Irrigation Kit using Plastic Bottles"
13. "Portable Smoke-Free Stove for Rural Kitchens"
14. "Hand-Cranked Mobile Charger for Emergency Use in Villages"
15. "Community E-Learning Kiosk Powered by Solar Panels"

M.Tech (RT) (Part I) (Semester II) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Greenhouse Technology

Course Code: ET-206

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Understand Applications in Agri-Fundamentals of Greenhouse Technology
2. Understand the Structure and Construction of a Greenhouse
3. Understand the Installation and erection of the greenhouse structure
4. Understand greenhouse environment regulations

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Green house technology-** Introduction , Components and design of green houses, Advantages, Applications in agriculture Fundamentals of GreenHouse Technology	15 Hrs.
2	**UNIT 2: Structure and Construction of a Green House.** Designing and layout of green house, laying the greenhouse	15 Hrs.
3	**UNIT 3: Installation of greenhouse structure,** erection of greenhouse structureCovering the greenhouse with nets and sheets Checking the first time leakages through the gutter Maintenance of greenhouse	15 Hrs.
4	**UNIT 4: Greenhouse Technology-** Instruction in greenhouse structures and greenhouse environment regulations. Plant growth, development and propagation, production and maintenance of bedding and container produced plants.	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.		

Reference Books: -

1. Tiwari, G. N. (2003). Greenhouse technology for controlled environment. Alpha Science Int'l Ltd.
2. Patil N. N. (2016). Greenhouse Technology - Management, Operations and Maintenance
3. Castilla, N. (2013). Greenhouse Technology and Management. CABI.
4. Greenhouse Technology and Managemen14 December 2012by Nicolas Castilla and Esteban Baeza

M.Tech (RT) (Part I) (Semester II) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Irrigation Techniques

Course Code: ET-207

Internal Marks: 40 Total Credits: 04
External Marks: 60 Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course, the student will be able to

1. Prepare a layout of irrigation and drainage systems for fields.
2. Calculate Irrigation efficiencies and understand the scheduling aspects of the irrigation system
3. Prepare a layout of irrigation and drainage systems for fields.
4. Carry out a performance evaluation of an irrigation system and understand the irrigation water management aspects.

Sr. No.	Details	No. of Lectures
1	**UNIT 1: Measurement of Land,** i.e. size, shape, Calculation formulae, Land shaping, Leveling, grading, Measurement of slope &it's methods.	15 Hrs.
2	**UNIT 2:** Measurement of water storage, flows, instruments used, Applicationmethods for different types of crops, Furrows, Basin, Raised beds, Borders.	15 Hrs.
3	**UNIT 3: Different crops;** Horticulture, sericulture, cereals, Pules, cash crops, their stages, crop water requirements, formulae, Evapotranspiration of crops.	15 Hrs.
4	**UNIT 4: Pressurized irrigation systems,** types, Sprinkler irrigation – parts, functioning, Layouts, Evaluation Maintenance & Repairing, Government facilities. Drip irrigation – Parts, layout, functioning, Evaluation, Government. Facilities, underground systems & miscellaneous.	15 Hrs.
Any 10 Assignments/Case Studies/Seminars/Quiz/Group Discussions etc based on above syllabus.		

References: -

1. D, L. (2005). Irrigation and Drainage.
2. Luthin, J. N. (1978). Drainage Engineering.
3. Michael, A. M. (2009). Irrigation Theory and Practice - 2Nd Edn: Theory and Practice. Vikas Publishing House.
4. Modi, P. (1998). Water Supply Engineering: Vol - 2. Rajsons Publications Pvt. Ltd.
5. Singh, G. (1980). Irrigation engineering. Rajsons Publications Pvt. Ltd.
6. Waller, P., &Yitayew, M. (2015). Irrigation and drainage engineering. Springer.

M.Tech (RT) (Part II) (Semester III) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Dissertation Phase – I

Course Code: DP-301

Internal Marks: 40	Total Credits: 14
External Marks: 60	Practical: 08 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Having sufficient collection of the literature/experimental data for the implantation/experimentation in Dissertation Phase-II.
2. Gets exposure to construct and justify research questions related to the topic.
3. Able in a position to design a research investigation that incorporates appropriate theoretical approaches, conceptual models, and a review of the existing literature.
4. Learn to structure a discussion in a coherent and convincing way by synthesizing the material in the context of the research questions

The work submitted by the student shall include:

1) Work diary maintained by the student and counter signed by his guide.

2) The content of work diary shall reflect the efforts taken by candidates for (a) Searchingthe suitable project work. (b)Visits to different factories or organizations. (c) The brief reportof feasibility studies carried to come to final conclusion. (d) Rough sketches. (e) Design calculations etc. carried by the student.

3) The student has to make a presentation in front of panel of experts in addition to guide as decided by department head.

A Synopsis of Dissertation should be prepared, presented and submitted to university authority in a stipulated time period.

M.Tech (RT) (Part II) (Semester III) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Industrial Training

Course Code: OJT-302

Internal Marks: 100 Total Credits: 4

Course Outcome (CO): After the successful completion of this course the student will be able to

1. An understanding of the impact of engineering solutions and industrial safety in a global and social context.
2. Develop the capacity to integrate class room theory and practice knowledge
3. Awareness of the social, cultural, global and environmental responsibility as an engineer.
4. Learn to make use of professional relationship and referrals to deal with human problems

The student has to prepare the report of training undergone in the industry during vacation after semester II. It shall include the brief details of assignment completed by the candidate and general observation and analysis. The identified areas for undertaking the dissertation work shall form part of report. The term work marks should be based on report and departmental oral exams. The training should be of minimum two weeks from reputed industries and certificate of the same should be a part of the report.

M.Tech (RT) (Part II) (Semester III) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Comprehensive Viva-I

Course Code: CV-303

Internal Marks: 100 Total Credits: 4

Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Demonstrate integrated knowledge of core subjects.
2. Analyze and solve domain-specific problems.
3. Exhibit effective communication and presentation skills.
4. Evaluate and synthesize information from multiple sources.

The students have to prepare for all subjects that they have studied in Ist and II nd semesters. The viva will be conducted by the External/Internal Examiner jointly, and their appointments will be made by the university. The in-depth knowledge, preparation and subjects understanding will be assessed by the Examiners.

M.Tech (RT) (Part II) (Semester IV) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Dissertation Phase – II

Course Code: DP-401

Internal Marks: 100	Total Credits: 18
External Marks :200	Practical: 10 hrs/week

Course Outcome (CO): After the successful completion of this course, the student will be able to

1. Demonstrate in-depth knowledge of the selected research/problem domain.
2. Exhibit independent learning and problem-solving abilities.
3. Analyse and interpret data critically.
4. Demonstrate professionalism and ethical responsibility in research

The dissertation submitted by the student on a topic already approved by the university authorities on the basis of an initial synopsis submitted by the candidate shall be according to the following guidelines. Format of dissertation report: The dissertation work report shall be typed on A4-size bond paper. The total No. of minimum pages shall not be less than 60. Figures, graphs, annexure, etc be as per the requirement. The report should be written in the standard format.

1. Title sheet
2. Certificate
3. Acknowledgement
4. List of figures, Photographs/Graphs/Tables
5. Abbreviations.
6. Abstract
7. Contents.
8. Text with usual scheme of chapters.
9. Discussion of the results and conclusions Bibliography (the source of illustrative matter be acknowledged clearly at appropriate place IEEE/ASME/Elsevier Format)

A Dissertation Report should be prepared, presented and submitted to university authority in a stipulated time period.

M.Tech (RT) (Part II) (Semester IV) (NEP-2020)
(Introduced from Academic Year 2025-26)

Title of Course: Comprehensive Viva-II

Course Code: CV-402

Internal Marks: 100 Total Credits: 4

Theory: 04 hrs/week

Course Outcome (CO): After the successful completion of this course the student will be able to

1. Analyse and solve domain-specific problems.
2. Exhibit effective communication and presentation skills.
3. Evaluate and synthesize information from multiple sources.
4. Reflect on academic and professional growth.

The students have to prepare on all subjects which they have studied in Ist and IInd semesters. The viva will be conducted by the External/Internal Examiner jointly, and their appointments will be made by the university. The in-depth knowledge, preparation and subjects understanding will be assessed by the Examiners.