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06.03.2023

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)
Department of Mechanical Engineering

BOARD OF STUDIES (BOS) PROCEEDING
DEPARTMENT OF MECHANICAL ENGINEERING
(MEETING DATED 14th Dec. 2022)

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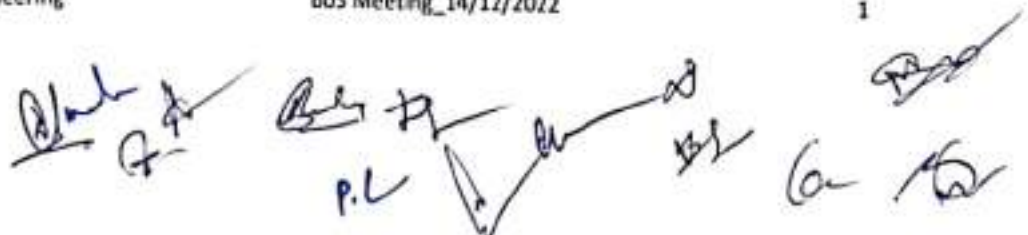
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MINUTES OF MEETING OF BOARD OF STUDIES (BoS)

An online meeting of following members (external and internal) was held on 14th December, 2022 at 11:00 AM through online mode (Google Meet Link meet.google.com/koy-andp-mje)

Following members were present:

- | | | |
|------|-----------------------------|---|
| (1) | Dr. M.K. Gaur | Head of the Department and Chairman of the Committee |
| (2) | Dr. Prashant Kumar Jain | Professor, HITDM, Jabalpur, RGPV Nominee |
| (3) | Dr. Mukul Shukla | Professor, MNNIT, Prayagraj, AC Nominee |
| (4) | Dr. A. K. Tiwari | Professor, NIT, Raipur, AC Nominee |
| (5) | Er. Anil Gupta | CEO, APN Technologies, New Delhi, Industry Expert |
| (6) | Er. Abhishek Khare | Aerodynamics Engineer Calidus, LLC, Abu Dhabi, Alumni |
| (7) | Er. Amit Lahariya | CPS Leader, Cummins India Pvt. Ltd., Alumni |
| (8) | Dr. Pratesh Jayaswal | Member |
| (9) | Dr. Manish Ku. Sagar | Member |
| (10) | Dr. C. S. Malvi | Member |
| (11) | Mr. R. P. Kori | Member |
| (12) | Mr. Vedansh Chaturvedi | Member |
| (13) | Dr. Jyoti Vimal | Member |
| (14) | Mr. Sharad Agrawal | Member |
| (15) | Mr. Vaibhav Shivhare | Member |
| (16) | Dr. Amit Aherwar | Member |
| (17) | Mr. Bhupendra K Pandey | Member |
| (18) | Dr. Nitin Upadhyay | Member |
| (19) | Dr. Surendra Ku. Chourasiya | Member |
| (20) | Dr. Gavendra Norkey | Member |
| (21) | Dr. Dinesh Kumar Rathore | Member |
| (22) | Soumya Shrivastava | Student, IV-year Mechanical |
| (23) | Shubham Chhipa | Student, IV-year Mechanical |
| (24) | Somya Kanthariya | Student, IV-year Automobile |
| (25) | Alok Sharma | Student, III-year Mechanical |



Agenda of the BoS Meeting

(Approved by Academic Development Cell of the Institute - BoS Meeting Scheduled on 14/12/2022)

| Course where revision was carried out | | | | | | | |
|---------------------------------------|-------------|---------------------------|-----------------------|---|-----------------|----------|------------------------------------|
| Course/ Subject name | Course Code | Year/Date of introduction | Year/Date of revision | Percentage of content added or replaced | Agenda Item No. | Page no. | Link of relevant documents/minutes |
| Nil. | | | | | | | |

| Course focusing on employability/entrepreneurship/skill development | | | | | |
|---|-------------|---|-----------------|----------|---|
| Course/ Subject name | Course Code | Activities/content which have a bearing on increasing skill and employability | Agenda Item No. | Page no. | Link of relevant documents / minutes |
| Quality Design and Control | 120851 | New tools for managing quality, Design aspects and various parameters. | ME3 | | https://docs.google.com/document/d/1nI9XcUK_L0ETWthGH1UCD887obKSnE15icdI2?usp=share_link&oid=10885958461624947473&rfp=true&sd=true |
| Robotics: Basics and Selected Advanced Concepts | 120852 | Industrial application of robots and working, codes uses in programming. | ME3 | | |
| Fundamentals of Theoretical and Experimental Aerodynamics | 190854 | Analyse the aerodynamic behaviour of component helps in designing the new products. | ME3 | | |
| Experimental Stress Analysis | 190855 | Study stress behaviour of different component. It helps in designing the component. | ME3 | | |
| Product Design and Manufacturing | 900609 | Designing aspects of new products, challenges in product design. | ME3 | | |

| New Course Added | | | | | |
|--|---------------|---|-----------------|----------|---|
| Course/Subject name | Course Code | Activities/content which have a bearing on increasing skill and employability | Agenda Item No. | Page no. | Link of relevant documents/minutes |
| Mechanical Vibration | 120615 | Various vibration monitoring tools and fault analysis through different techniques | ME5 | | https://docs.google.com/document/d/1z0E3S_T_XSjorORJ5nVvG9gTCSICDZzhVsdU?usp=share_link&oid=10885958461624947473&rfp=true&sd=true |
| Artificial Intelligence & Machine Learning | 120617/190617 | Can help organizations make sense of massive amounts of structured and unstructured data. | ME5 | | |

Feedback on curriculum received from stakeholders: Analysis & ATR

| Stakeholder | Student | Faculty | Alumni | Employer |
|---|---|---|---|---|
| No. of responses | 246 | 14 | 10 | 67 |
| Link of analysis | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true |
| ATR Link | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true |
| Link showing excel sheet of Google form details of stakeholders | https://docs.google.com/spreadsheets/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/spreadsheets/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/spreadsheets/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true | https://docs.google.com/spreadsheets/d/1bK3e1eFvW6_qNpW1poc_dzD164111M1c0d7?usp=share_link&oid=10885958461624947473&rfp=true&sd=true |

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Agenda of the BoS Meeting

(Approved by Academic Development Cell of the institute - BoS Meeting Scheduled on 14/12/2022)

| Course where revision was carried out | | | | | | | |
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| Course/Subject name | Course Code | Year/Date of introduction | Year/Date of revision | Percentage of content added or replaced | Agenda Item No. | Page no. | Link of relevant documents/minutes |
| NIL | | | | | | | |

| Course focusing on employability/entrepreneurship/skill development | | | | | |
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| Course/Subject name | Course Code | Activities/content which have a bearing on increasing skill and employability | Agenda Item No. | Page no. | Link of relevant documents / minutes |
| Quality Design and Control | 120851 | New tools for managing quality, Design aspects and various parameters. | ME3 | | https://docs.google.com/document/d/1z0E3S-TxSjzQR35nV-q09gTf5ICDzzhv6d7vzsp-share_link&mid=108885958461624947473&rfp=true&sd=true |
| Robotics: Basics and Selected Advanced Concepts | 120852 | Industrial application of robots and working, codes uses in programming | ME3 | | |
| Fundamentals of Theoretical and Experimental Aerodynamics | 190854 | Analyse the aerodynamic behaviour of component helps in designing the new products | ME3 | | |
| Experimental Stress Analysis | 190855 | Study stress behaviour of different component. It helps in designing the component. | ME3 | | |
| Product Design and Manufacturing | 900609 | Designing aspects of new products, challenges in product design. | ME3 | | |

| New Course Added | | | | | |
|--|---------------|---|-----------------|----------|---|
| Course/Subject name | Course Code | Activities/content which have a bearing on increasing skill and employability | Agenda Item No. | Page no. | Link of relevant documents/minutes |
| Mechanical Vibration | 120615 | Various vibration monitoring tools and fault analysis through different techniques | ME5 | | https://docs.google.com/document/d/1z0E3S-TxSjzQR35nV-q09gTf5ICDzzhv6d7vzsp-share_link&mid=108885958461624947473&rfp=true&sd=true |
| Artificial Intelligence & Machine Learning | 120617/190617 | Can help organizations make sense of massive amounts of structured and unstructured data. | ME5 | | |

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| ATR Link | https://docs.google.com/document/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link&mid=108885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link&mid=108885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link&mid=108885958461624947473&rfp=true&sd=true | https://docs.google.com/document/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link&mid=108885958461624947473&rfp=true&sd=true |
| Link showing excel sheet of Google form details of stakeholders | https://docs.google.com/spreadsheets/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link/edit#gid=108885958461624947473&rfp=true&sd=true | https://docs.google.com/spreadsheets/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link/edit#gid=108885958461624947473&rfp=true&sd=true | https://docs.google.com/spreadsheets/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link/edit#gid=108885958461624947473&rfp=true&sd=true | https://docs.google.com/spreadsheets/d/1bKkKzLzqzW6-qNw1pzd4e0Bv4H1Majd1Zagpshgrr-link/edit#gid=108885958461624947473&rfp=true&sd=true |

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BoS Agenda Items

Item ME1
 To confirm the minutes of previous BoS meeting held in the month of May 2022
 The minutes of the last BoS held on 24th May 2022 were confirmed. The BoS Minutes were presented & approved in Academic Council Meeting held on 10th June 2022.

Item ME2
 To propose the scheme structure of VIII Semester with the provision of ONE DE & ONE OC course to be offered in online mode with credit transfer for the batch admitted in 2019-20.
 (The total credits from I-VIII semester should be 170 for this batch).

| S.No. | Subject Code | Category | Subject Name & Title |
|-------|---------------|----------|------------------------------|
| 1. | DE* | DE | Departmental Elective (DE-5) |
| 2. | OC* | OC | Open Category (OC-1) |
| 3. | 120801/190801 | DLC | Internship/Project (DLC-9) |
| 4. | 120802/190802 | PD | Professional Development |

*Run through SWAYAM/NPTEL.

Item ME3
 To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in online mode under Departmental Elective (DE) category courses (DE-5) and open category (OC4) for credit transfer in the VIII Semester under the flexible curriculum (Batch admitted in 2019-20).

| Departmental Elective (DE) category courses (DE-5) | | | | | | Open Category (OC4) | |
|--|--------------|---|------------------------|--------------|---|------------------------|---|
| Mechanical Engineering | | | Automobile Engineering | | | Mechanical Engg. Dept. | |
| S.No. | Subject Code | Subject Name | S.No. | Subject Code | Subject Name | Subject Code | Subject Name |
| 1 | 120851 | Quality Design and Control | 1 | 190854 | Fundamentals of Theoretical and Experimental Aerodynamics | 900605 | Waste to Energy Conversion |
| 2 | 120852 | Robotics: Basics and Selected Advanced Concepts | 2 | 190855 | Experimental Stress Analysis | 900609 | Product Design and Manufacturing |
| 3 | 120855 | Carbon Materials and Manufacturing | | | | 900610 | Automatic Control |
| 4 | 120857 | Manufacturing Guidelines for Product Design | | | | 900631 | Nature and Properties of Materials |
| | | | | | | 900639 | Manufacturing Guidelines for Product Design |

Item ME4
 To propose the list of "Additional Courses" which can be opted for getting an
 (i) Honours (for students of the host department)
 (ii) Minor Specialization (for students of other departments)
 [These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the VI semester (for the batch admitted in 2020-21) and for VIII semester students for the batch admitted in 2019-20. The list should be additive; such that those MOOCs which were offered in previous semesters are also included provided they are being offered on the platform during Jan-June 2023 semester]

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| Honor's | | Minor Specialization | |
|--|--|--|---|
| VI (for the batch admitted in 2020-21) | VIII (for the batch Admitted in 2019-20) | VI (for the batch admitted in 2020-21) | VIII (for the Batch admitted in 2019-20) |
| IC Engines and Gas Turbines | Computer integrated Manufacturing | Fundamentals of Combustion | Computational Fluid Dynamics for Incompressible Flows |
| Theory and Practice of Non Destructive Testing | Solar Photovoltaic: Principles, Technologies & Materials | Introduction to Mechanical Micro Machining | Mechanics of Machining |
| | Oil Hydraulics and Pneumatics | | |

Item ME5 To review and finalize the scheme & syllabi for all Departmental Core (DC) Courses of VI Semester (for batches admitted in 2020-21) under the flexible curriculum along with their Cos.

| S.No. | Mechanical Engineering | | | Automobile Engineering | | |
|-------|------------------------|----------|------------------------------------|------------------------|----------|------------------------------------|
| | Subject Code | Category | Subject Name & Title | Subject Code | Category | Subject Name & Title |
| 1. | 120615 | DC | Mechanical Vibrations | 190615 | DC | Automotive Transmission |
| 2. | 120616 | DC | Refrigeration and Air-conditioning | 190616 | DC | Refrigeration and Air-conditioning |

Item ME6 To review and finalize the courses & syllabi to be offered (for batches admitted in 2020-21) under Departmental Elective (DE) Course in the VI Semester.
 Not Applicable for Batch admitted in 2020-21

Item ME7 To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered (for batches admitted in 2020-21) in online mode under Departmental Elective (DE) Course with credit transfer, in the VI Semester.

| S.No. | Automobile Engineering | | | Mechanical Engineering | | |
|-------|------------------------|----------|----------------------------------|------------------------|----------|--|
| | Subject Code | Category | Subject Name & Title | Subject Code | Category | Subject Name & Title |
| 1. | 190661 | DE | Fundamental of Automotive System | 120661 | DE | Fundamental of Welding Science and Technology |
| 2. | 190662 | DE | Viscous Fluid Flow | 120662 | DE | Viscous Fluid Flow |
| 3. | | | | 120663 | DE | Properties of Materials (Nature and Properties of Material: III) |

Item ME8 To review and finalize the courses & syllabi to be offered (for batches admitted in 2020-21) under the Open Category (OC) Courses (in traditional mode) for VI semester students of other departments along with their COs.

| Open Category (OC1) | |
|------------------------|----------------|
| Mechanical Engg. Dept. | |
| Subject Code | Subject Name |
| 91010 7 9 | Robotics |
| 91010 8 | Product Design |

Item ME9 To review and finalize the Experiment list/ Lab Manual for Laboratory Courses to be offered in VI semester (for batches admitted in 2020-21).

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| | Honor's | | | | Minor Specialization | | | |
|--|---|-----------------------------------|---|---|--|--|---|------------------------|
| | VI (for the batch admitted in 2020-21) | | VIII (for the batch Admitted in 2019-20) | | VI (for the batch admitted in 2020-21) | | VIII (for the Batch admitted in 2019-20) | |
| | IC Engines and Gas Turbines | Computer integrated Manufacturing | Fundamentals of Combustion | Computational Fluid Dynamics for Incompressible Flows | Theory and Practice of Non Destructive Testing | Solar Photovoltaic: Principles, Technologies & Materials | Introduction to Mechanical Micro Machining | Mechanics of Machining |

| | | | | | | | |
|----------|---|------------------------|------------------------------------|----------------------|------------------------|------------------------------------|-------------------------|
| Item ME5 | To review and finalize the scheme & syllabi for all Departmental Core (DC) Courses of VI Semester (for batches admitted in 2020-21) under the flexible curriculum along with their Cos. | | | | | | |
| | S.No. | Mechanical Engineering | | | Automobile Engineering | | |
| | | Subject Code | Category | Subject Name & Title | Subject Code | Category | Subject Name & Title |
| | 1 | 120615 | DC | Mechanical Vibration | 190615 | DC | Automotive Transmission |
| 2 | 120616 | DC | Refrigeration and Air-conditioning | 190616 | DC | Refrigeration and Air-conditioning | |

| | | | | | | | |
|----------|--|--|--|--|--|--|--|
| Item ME6 | To review and finalize the courses & syllabi to be offered (for batches admitted in 2020-21) under Departmental Elective (DE) Course in the VI Semester. Not Applicable for Batch admitted in 2020-21 | | | | | | |
|----------|--|--|--|--|--|--|--|

| | | | | | | | |
|----------|--|------------------------|--------------------|----------------------------------|------------------------|--|---|
| Item ME7 | To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered (for batches admitted in 2020-21) in online mode under Departmental Elective (DE) Course with credit transfer, in the VI Semester. | | | | | | |
| | S.No. | Automobile Engineering | | | Mechanical Engineering | | |
| | | Subject Code | Category | Subject Name & Title | Subject Code | Category | Subject Name & Title |
| | 1. | 190661 | DE | Fundamental of Automotive System | 120661 | DE | Fundamental of Welding Science and Technology |
| 2. | 190662 | DE | Viscous Fluid Flow | 120662 | DE | Viscous Fluid Flow | |
| 3. | | | | 120663 | DE | Properties of Materials (Nature and Properties of Material: III) | |

| | | | | | | | |
|----------|---|--------|--------------|----------------|--------------|--|--|
| Item ME8 | To review and finalize the courses & syllabi to be offered (for batches admitted in 2020-21) under the Open Category (OC) Courses (in traditional mode) for VI semester students of other departments along with their COs. | | | | | | |
| | Open Category (OC1) | | | | | | |
| | Mechanical Engg. Dept. | | | | | | |
| | | | Subject Code | | Subject Name | | |
| | | | 910107 | | Robotics | | |
| | | 910108 | | Product Design | | | |

| | | | | | | | |
|----------|---|--|--|--|--|--|--|
| Item ME9 | To review and finalize the Experiment list/ Lab Manual for Laboratory Courses to be offered in VI semester (for batches admitted in 2020-21). | | | | | | |
|----------|---|--|--|--|--|--|--|

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| Mechanical/Automobile Engg. VI Sem | | |
|------------------------------------|---------------|------------------------------------|
| S.No. | Subject Code | Subject Name |
| 1 | 120616/190616 | Refrigeration and Air-conditioning |
| 2 | 190615 | Automotive Transmission |
| 3 | 120615 | Mechanical Vibrations |

To review and finalize the scheme and syllabi of **B. Tech. IV Semester** (for batches admitted in 2021-22) under the flexible curriculum along with their COs.

| S.No. | Automobile Engineering | | | Mechanical Engineering | | |
|-------|------------------------|----------|---|------------------------|----------|---|
| | Subject Code | Category | Subject Name | Subject Code | Category | Subject Name |
| 1 | 100003 | DISC | Mathematics-III (DISC-4) | 100003 | DISC | Mathematics-III (DISC-4) |
| 2 | 190411 | DC | Theory of Machines-I (DC-6) | 120412 | DC | Design of Machine Elements (DC-6) |
| 3 | 190412 | DC | Automotive Electrical and Electronics System (DC-7) | 120413 | DC | Metal Cutting and Machine Tools (DC-7) |
| 4 | 190413 | DC | Engineering Thermodynamics (DC-8) | 120414 | DC | Engineering Thermodynamics (DC-8) |
| 5 | 100004 | MC | Cyber Security (MC) | 100004 | MC | Cyber Security (MC) |
| 6 | 190415 | DLC | Production Lab (DLC-2) | 120415 | DLC | Production Lab (DLC-2) |
| 7 | 200XXX | CLC | Novel Engaging Course (Informal Learning) | 200XXX | CLC | Novel Engaging Course (Informal Learning) |

To review and finalize the Experiment list/ Lab Manual for Laboratory Courses to be offered in **IV** (for batch admitted in 2021-22).

Item ME11

| Mechanical/Automobile Engg. | | |
|-----------------------------|---------------|----------------------------|
| S.No. | Subject Code | Subject Name |
| 1 | 120412 | Design of Machine Elements |
| 2 | 190411 | Theory of Machines-I |
| 3 | 120415/190415 | Production Lab |

To review and finalize the suggestive list of projects under the 'Skill based mini-project' category in various laboratory courses to be offered in Jan - June 2023 semester during **IV Semester** (for the batch admitted in 2021-22).

Item ME12


| 120412: Design of Machine Elements | 120415/190415: Production Lab | 120411/190411 Theory of Machine I/II |
|---|---|--|
| 1. FEA of lap joint based on various geometrical parameters to study the behaviour of weld strength 2. Simulation of welding to study residual stress and distortions 3. Analysis of composite multi leaf spring using ANSYS 2020 R1 4. Heat Transfer analysis for different materials of ball bearing using ANSYS 2020 R1 5. Numerical analysis of Modified tooth in Spur Gear for increasing the performance by reducing the assembly errors and gear | 1. Design and simulation of venting passages to prevent blow hole defect. 2. Development of low-cost experimental setup to study metal flow through gating channels. 3. Preparation of different types of patterns by using wax/wood material. 4. Fabrication of working model of brazing and soldering setup. 5. Preparation of educational wooden model of different types of furnaces. 6. Working model of the coining machine and prepare the die for the coining. 7. Fabrication of plastic injection molding machine by using extrusion principle. 8. Preparation of educational model of powder metallurgy setup. 9. Demonstration model of MIG and TIG setup. 10. Battery operated working model of lathe machine. | 1. Investigation of gyroscopic couple for self-balancing vehicle 2. Understanding of balancing and alignment 3. Development of various toy mechanism 4. Understanding of Gear based quick return mechanism. 5. Investigation and understanding of geared cycle. 6. Understanding of gear mechanism used in watch. 7. Design of easy (make/use) cycle. 8. Working model of epicyclic gear train. |

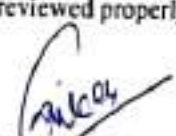
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| | | | | |
|------------------|--|--|--|---------------------------------------|
| | slippage in the axial direction during dynamic loading. | 11 Working setup of Arduino CNC plotter. 12 Working model of foot operated hammering machine for forging purpose. | 9 Investigation and understanding of sports cycle. | |
| Item ME13 | To ratify the <i>Scheme & Syllabi, list of experiments and skill based mini projects of First Semester & Second Semester B. Tech. programmes</i> [admitted batch 2022-23 Session]. There are some modifications for scheme of 2022 admitted batch. In view of present scenario, More Departmental Core (DC) courses are introduced in 1 st year. Therefore, subject of emerging/Interdisciplinary areas may accommodate in upcoming semesters. | | | |
| Item ME14 | To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for Jan-June 2022. | | | |
| | Mechanical Engineering | | | |
| | Total Number of courses | Total Number of COs | Number of COs not Attained | Percentage of COs not Attained |
| | 19 | 114 | 19 | 16.67 |
| | Automobile Engineering | | | |
| | Total Number of courses | Total Number of COs | Number of COs not Attained | Percentage of COs not Attained |
| | 19 | 114 | 28 | 24.56 |
| Item ME15 | To review curricula feedback from various stakeholders, its analysis and impact [Stakeholder feedback analysis must also contain an Action Taken Report (ATR) and the details/data of the stakeholders who have responded through GOOGLE form (such as Name, organization, mail id, phone no., if available) must also be shared along with the feedback of the alumni/employer] | | | |
| Item ME16 | To review Course Outcomes (COs) feedback of various courses, its analysis and impact. Reviewed and action taken report is attached herewith. | | | |
| Item ME17 | Any other matter | | | |

Apart from the above points, the following points were discussed/Suggested in meeting:

1. Experts suggest that, courses like (Data science, AI & ML) should be introduced in early semesters and should be taught by expert of that field.
2. Skill based projects should be reviewed properly.


Dr. Dinesh Kumar Rathore
(BoS Member)

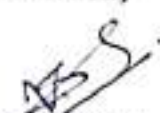

Dr. Gavendra Norkey
(BoS Member)

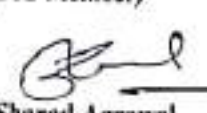

Dr. Nitin Upadhyay
(BoS Member)


Dr. Surendra Ku. Chourasiya
(BoS Member)

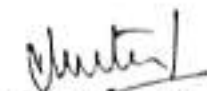

Mr. B. K. Pandey
(BoS Member)


Dr. Amit Ahirwar
(BoS Member)


Mr. V. Shivhare
(BoS Member)


Mr. Sharad Agrawal
(BoS Member)


Dr. Jyoti Vimal
(BoS Member)


Mr. V. Chaturvedi
(BoS Member)


Mr. R. P. Kori
(BoS Member)


Dr. C. S. Malvi
(BoS Member)


Dr. M. K. Sagar
(BoS Member)


Dr. Pratesh Jayaswal
(BoS Member)

online present
Er. Amit Lahariya
(Alumni)

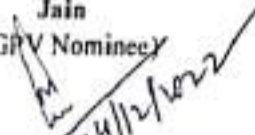
online present
Er. Abhishek Khare
(Alumni)


online present
Er. Anil Gupta
(Industry Expert)

online present
Dr. A. K. Tiwari
(AC Nominee)

online present
Dr. Mukul Shukla
(AC Nominee)

online present
Dr. Prashant Kumar
Jain
(RGPV Nominee)


Dr. M. K. Gaur
(BoS Chairman)


02.03.2023
DEAN (ACADEMICS)
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| Item ME2 | To propose the scheme structure of VIII Semester with the provision of ONE DE & ONE OC course to be offered in online mode with credit transfer for the batch admitted in 2019-20. (The total credits from I-VIII semester should be 170 for this batch). |
|---------------------|---|

Scheme of Examination. Bachelor of Technology (B.Tech.) Automobile Engineering

VIII Semester

For batches admitted in Session 2019-20

| S.No. | Subject Code | Category | Subject Name & Title | Maximum Marks Allotted | | | | | MOOCs | Total Marks | Contact Hours per week | | | Total Credits |
|--|-----------------------------|----------|-----------------------------------|--|----------|----------------|------------|------|-------|-------------|------------------------|---|----|---------------|
| | | | | Theory Slot | | Practical Slot | Assignment | Exam | | | L | T | P | |
| | | | | End Sem. | Mid Sem. | | | | | | | | | |
| 1. | DE* | DE | Departmental Elective - 5* (DE-5) | - | - | - | - | 25 | 75 | 100 | 4 | - | - | 4 |
| 2. | OC* | OC | Open Category - 4* (OC-4) | - | - | - | - | 25 | 75 | 100 | 2 | - | - | 2 |
| 3. | 190804 190811 | DLC | Internship/Project (DLC-9) | - | - | 250 | 150 | - | - | 400 | - | - | 12 | 6 |
| 4. | 190802* | PB | Professional Development | - | - | - | 50 | - | - | 50 | - | - | 2 | 1 |
| Total | | | | - | - | 250 | 200 | 50 | 150 | 650 | 6 | - | 14 | 13 |
| Additional Courses for obtaining Honors or minor Specialization by desirous students | | | | Permitted to opt for maximum two additional courses for the award of (i) Honors in parent discipline or (ii) Minor Specialization in engineering discipline other than the parent discipline | | | | | | | | | | |

| S.No. | Subject Code | Subject Name | S.No. | Subject Code | Subject Name |
|-------|--------------|---|-------|--------------|---|
| 1 | 190834 | Fundamentals of Theoretical and Experimental Aerodynamics | 1 | 900625 | Waste to Energy Conversion |
| 2 | 190855 | Experimental Stress Analysis | 2 | 900609 | Product Design and Manufacturing |
| | | | 3 | 900610 | Automatic Control |
| | | | 4 | 900631 | Material |
| | | | 5 | 900639 | Manufacturing guidelines for Product Design |

*All of these courses will run through SWAYAM/PIEL MOOC
 *Evaluation will be based on participation/awards brought by the students to the institution in national/state level technical and other events during the complete tenure of the U program participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOC and technical events

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| Item ME3 | To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in <i>online mode under Departmental Elective (DE) category courses (DE-5) and open category (OC4)</i> for credit transfer in the <i>VIII Semester</i> under the flexible curriculum (<i>Batch admitted in 2019-20</i>) |
|--------------------|---|

| Departmental Elective (DE) category courses (DE-5) | | | | | |
|--|--------------|---|------------------------|--------------|---|
| Mechanical Engineering | | | Automobile Engineering | | |
| S.No. | Subject Code | Subject Name | S.No. | Subject Code | Subject Name |
| 1 | 120851 | Quality Design and Control | 1 | 190854 | Fundamentals of Theoretical and Experimental Aerodynamics |
| 2 | 120852 | Robotics: Basics and Selected Advanced Concepts | 2 | 190855 | Experimental Stress Analysis |
| 3 | 120855 | Carbon Materials and Manufacturing | | | |

| Open Category (OC4) | | |
|---------------------|--------------|----------------------------------|
| S.No. | Subject Code | Subject Name |
| 1 | 900605 | Waste to Energy Conversion |
| 2 | 900609 | Product Design and Manufacturing |
| 3 | 900610 | Automatic Control |

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190854: Fundamentals of Theoretical and Experimental Aerodynamics

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|----------------------------|---|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE 5 | Fundamentals of Theoretical and Experimental Aerodynamics | 190854 | | | | As per SWAYAM/NPTEL norms |
| | | | 3 | - | - | |

SWAYAM/NPTEL Link for the course: https://onlinecourses.nptel.ac.in/noc23_me06/preview

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 14 Apr 2023 | 30 Apr 2023 | 12 Weeks |

COURSE LAYOUT

Week 1: Aerodynamics-relevance and applications ,Atmosphere · Flow velocity, pressure, skin friction ,Generation of aerodynamic forces and moments on an aircraft, Aircraft external shape and surfaces

Week 2: Eulerian and Lagrangian perspectives of flow, Fluid Kinematics, Conservation equations of mass, momentum and energy

Week 3: Inviscid and viscous flows- potential flow, boundary layer, Compressible and incompressible flow, Laminar and turbulent flow

Week 4: Airfoil geometry, Pressure distribution at an angle of attack (α), Aerodynamic centre, centre of pressure, C_l - α , C_l - C_d , C_m - α curves, Flow separation and stall, High lift devices, multi element airfoils, Laminar and turbulent flow over airfoil, Trailing edge noise

Week 5: Finite wing geometry, Control surfaces on wing, horizontal and vertical stabilizers, Airfoil and finite wing aerodynamics- a comparison, · Delta wing, high angle of attack aerodynamics, Unsteady effects in airfoils and wings- effect of gust, sudden change in angle of attack, Pitch, heave, flapping, leading edge vortex, dynamic stall

Week 6: Full Potential Equation and its application, Shock and expansion wave theory, Supersonic flow past a flat plate, Flow through a converging diverging nozzle, Transonic and supersonic flow past airfoil, Shock wave boundary layer interaction, Shock tube, Preliminary concepts of hypersonic flow

Week 7: Computing aerodynamic flows- main steps and resources, Panel and Vortex Lattice Method, Euler and Navier Stokes equations-I

Week 8: Euler and Navier Stokes equations-II, What information can be extracted from numerical solutions, Applications of computational aerodynamics- few examples

Week 9: Wind Tunnel: experimental tool in Aerodynamics, Types of wind tunnels, Wind Tunnel design basics, Similarity analysis, Scaling of wind tunnel models, Safety issues in wind tunnel handling

Week 10: Flow visualization techniques, Model design and fabrication, Model positioning system, Measurements involving mechanical sensors, Pressure ports, Pitot static tubes, Mechanical balances

Week 11: Measurements involving electronic transducers, Electronic pressure gages, Strain gage based balances, Data Acquisition System and software, Measurement uncertainty

Week 12: Velocity measurement using Particle Image Velocimetry, How wind tunnel and associated instrumentation are used for performing aerodynamic studies- few examples, Quick revision of course content & doubts clarification

Books and references

- Fundamentals of Aerodynamics: J. D. Anderson,
- McGrawHill Introduction to Flight: J. D. Anderson, McGrawHill

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- Low Speed Wind Tunnel Testing: J. B. Barlow, W. H. Rae, Alan Pope, Wiley-Interscience
- A First Course in Aerodynamics: A. Roy, Ventus Publishing, Denmark
- EL-Halwagi, M.M., "Biogas Technology- Transfer and Diffusion", Elsevier Applied Science.
- Hall, D.O. and Overreed, R.P., "Biomass - Renewable Energy", John Willy and Sons.
- Mondal, P. and Dalai, A.K. eds., 2017. Sustainable Utilization of Natural Resources. CRC Press.

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190855: Experimental stress Analysis

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|---------------------------|------------------------------|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE5 | Experimental stress Analysis | 190855 | 3 | - | - | As per SWAYAM/NPTEL norms |

SWAYAM/NPTEL Link for the course: https://onlinecourses.nptel.ac.in/noc23_me11/preview

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 14 Apr 2023 | 30 Apr 2023 | 12 Weeks |

Course layout

- Week 1: Overview of Experimental Stress Analysis
- Week 2: Physical Principle of Experimental Techniques, Introduction to Various experimental Techniques
- Week 3: Fringe Patterns – Richness of Qualitative Information, Multi Scale Analysis
- Week 4: Selection of Experimental Techniques, Introduction to Crystal Optics
- Week 5: Light Ellipse, Retardation Plates and Plane Polariscopes
- Week 6: Jones Calculus, Plane and Circular Polariscopes analysis
- Week 7: Compensation Techniques, Calibration of Photo-elastic Materials
- Week 8: Fringe ordering and Three-Dimensional Photo-elasticity
- Week 9: Photo-elastic Coatings
- Week 10: Brittle Coatings and Strain Gauges Introduction
- Week 11: Strain Gauge Alloys, Performance of Strain Gauge System
- Week 12: Correction factor for Special Applications

Books and references

1. K. Ramesh, Developments in Photoelasticity - A renaissance. IOP Publishing, 2021. DOI: <https://doi.org/10.1088/978-0-7503-2472-4>
2. K. Ramesh, P_Scope® – a virtual polariscopes, Photomechanics Lab, IIT Madras, 2017. URL: https://home.iitm.ac.in/kramesh/p_scope.html
3. K. Ramesh, e-Book on Experimental Stress Analysis, IIT Madras, 2009. URL: <https://home.iitm.ac.in/kramesh/ESA.html>
4. K. Ramesh, Digital Photoelasticity – Advanced Techniques and Applications, Springer, 2000. DOI: <https://doi.org/10.1007/978-3-642-59723-7>
5. W.N. Sharpe (Ed.), Springer Handbook of Experimental Solid Mechanics, Springer, 2008 DOI: <https://doi.org/10.1007/978-0-387-30877-7>
6. J.W. Dally and W.F. Riley, Experimental Stress Analysis, McGraw-Hill, 1991
7. L.S. Srinath, M.R. Raghavan, K. Lingaiah, G. Gargesa, B. Pant, and K. Ramachandra, Experimental Stress Analysis, Tata Mc Graw Hill, 1984

120851: Quality Design and Control

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|----------------------------|----------------------------|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE 5 | Quality Design and Control | 120851 | 3 | - | - | As per SWAYAM/NPTEL norms |
| | | | | | | |

SWAYAM/NPTEL Link for the course: https://onlinecourses.nptel.ac.in/noc23_me51/overview
 The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 14 Apr 2023 | 29 Apr 2023 | 12 Weeks |

Course layout

- Week 1: History and Evolution of Quality Control and Management
- Week 2: Management of Quality-I
- Week 3: Management of Quality-II
- Week 4: Statistical Process Control-I
- Week 5: Statistical Process Control-II
- Week 6: Process Capability Analysis
- Week 7: Acceptance Sampling-I
- Week 8: Acceptance Sampling-II
- Week 9: Design for Reliability-I
- Week 10: Design for Reliability-II
- Week 11: Quality by Experimental Design
- Week 12: Robust Design and Taguchi Method

Books and references

- Mitra, A. Fundamentals of Quality Control and Improvement, Prentice-Hall, 2nd Edn (1998), ISBN: 0-13-645086-5.
- Dukkupati, R V and Pradip K Ray, Product and Process Design for Quality, Economy and Reliability, New Age International, 1st Edn. (2010), ISBN: 978-81-224-2661-8.

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120852: Robotics: Basics and Selected Advanced Concepts

| Category | Title | Code | Credit - 4 | | | Theory Paper |
|----------------------------|--|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE 5 | Robotics Basics and Selected Advanced Concepts | 120852 | 1 | - | - | As per SWAYAM/NPTEL norms |

SWAYAM/NPTEL Link for the course: https://onlinecourses.nptel.ac.in/nptel23_me51/section

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 14 Apr 2023 | 30 Apr 2023 | 12 Weeks |

Course layout

- Week 1: Introduction, Elements of a robot
- Week 2: Mathematical preliminaries, D-H convention, Examples
- Week 3: Direct and Inverse kinematics of serial robots, Workspace, Analytical and numerical solutions
- Week 4: Parallel robots – direct and inverse kinematics, Mobility, Stewart-Gough platform
- Week 5: Applications of parallel robots in sun tracking, vibration isolation
- Week 6: Velocity analysis, Singularities in serial and parallel robots, Statics
- Week 7: Redundancy and resolution of redundancy in robots
- Week 8: Dynamic equations of motion, derivation & simulation using Matlab
- Week 9: Motion planning, Introduction to linear control, simulations & experiments
- Week 10: Nonlinear position and force control of robots, Simulations
- Week 11: Wheeled mobile robots, modeling and simulations
- Week 12: Over-constrained and deployable structures, Cable driven & pneumatically actuated flexible robots

Books and references

Robotics: Fundamental Concepts and Analysis, Oxford University Press, 2006

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ENME601 Carbon Material and Manufacturing

| Category | Title | Code | Credit | Priority |
|------------------------------|---|---------|--------|----------|
| Department Elective 1 (E) | Carbon Material and Manufacturing | ENME601 | 3 | 1 |

ENME601 Check for the course details in the following link: [https://www.unical.ac.in/academic/](#)

The details of the course are mentioned below.

| Course Start Date | Course End Date | Exam Date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jun 2021 | 14 Sep 2021 | 29 Sep 2021 | 17 Weeks |

Course layout

- Week 1:** Introduction to materials and manufacturing, mathematical representation of material properties, introduction to carbon, carbon on the Earth and in other types, carbon in technology and economy, carbon isotopes, carbon atomic structure and hybridization.
- Week 2:** Diamond, graphite, carbon and curved carbon, classification of carbon allotropic conversion of one allotropic form into another, phase diagram of carbon.
- Week 3:** Engineering carbon, graphite crystal structure, stacking faults and disordered graphite, graphite raw processing, synthetic graphite production from waste oils.
- Week 4:** Kish graphite, polymer-derived graphite, Highly Oriented Pyrolytic Graphite (HOPG), pyrolysis of gaseous hydrocarbons, kinetics of graphitization, polymer-derived carbon, rolling and charring mechanism.
- Week 5:** Microstructure of semi-graphitizing carbon, Quasi-like carbon: introduction, synthesis and industrial manufacturing, pyrolysis of polymers and other solid hydrocarbons, microfabrication with glass-like carbon.
- Week 6:** Photolithography, X-Ray and Nano-lithographic Lithography, conversion of microfabricated structure into carbon, activated carbon: introduction, properties and industrial manufacturing.
- Week 7:** Carbon black: introduction, properties and industrial manufacturing, carbon fiber: introduction and properties, melt spinning of polybenzoxazine pitches, electrospinning and viscoelasticity.
- Week 8:** Carbonization of polyacrylonitrile (PAN) fibers, mechanical property testing methods for carbon fibers, defects in carbon fibers, Carbon Fiber Reinforced Plastic (CFRP), machining of CFRPs.
- Week 9:** Carbon/carbon, carbon/metal and carbon/concrete composites: Manufacture and Properties, graphene: introduction and crystal structure, graphene: history and nomenclature, Chemical Vapor Deposition (CVD) of graphene.
- Week 10:** Graphene CVD parameter optimization, defects in graphene, (n,m) transition, carbon nanotube: introduction and properties, vapor phase growth of carbon nanotube.
- Week 11:** Vapor deposited diamond, diamond-like carbon, X-Ray Diffraction analysis of carbon, Raman spectroscopy of carbon, Transmissive Electron Microscopy of carbon.
- Week 12:** Gas adsorption isotherms and surface area analysis of porous carbons, numerical problem solving, large-scale industrial applications of carbon materials, micro and nano-scale applications of carbon materials, rigid and flexible carbon devices, device characteristics and challenges, supply chain of industrial carbons, summary and overview.

Books and references

Jenkins, G. M. & Kawamura, K. Polymeric carbons—carbon fibre, glass and char. (Cambridge University Press, 1976).
 Marsh, H. & Rodriguez-Reinoso, F. Activated carbon. (Elsevier, 2006).
 Kinoshita, K. Carbon: electrochemical and physicochemical properties. (Wiley, 1988).

Handwritten notes and signatures:
 Gil, S, Beg, P.K, and other initials.

900605: Waste to Energy Conversion

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|--------------------|----------------------------|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Open Category-OC 4 | Waste to Energy Conversion | 900605 | 3 | - | - | As per SWAYAM/NPTEL norms |

SWAYAM/NPTEL Link for the course: -https://onlinecourses.nptel.ac.in/noc23_ch05/provwnt

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 17 Mar 2023 | 26 Mar 2023 | 8 Weeks |

COURSE LAYOUT

Week 1 -Introduction, characterization of wastes.

Week 2 -Energy production from wastes through incineration, energy production through gasification of wastes.

Week 3 -Energy production through pyrolysis and gasification of wastes, syngas utilization.

Week 4 -Densification of solids, efficiency improvement of power plant and energy production from waste plastics.

Week 5 -Energy production from waste plastics, gas cleanup.

Week 6 -Energy production from organic wastes through anaerobic digestion and fermentation, introduction to microbial fuel cells.

Week 7 -Energy production from wastes through fermentation and transesterification.

Week 8 -Cultivation of algal biomass from wastewater and energy production from algae.

Books and references

- Rogoff, M.J. and Scrove, F., "Waste-to-Energy: Technologies and Project Implementation", Elsevier Store.
- Young G.C., "Municipal Solid Waste to Energy Conversion processes", John Wiley and Sons.
- Harker, J.H. and Backhurst, J.R., "Fuel and Energy", Academic Press Inc.

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900605: Product Design and Manufacturing

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|------------------------|-------------------------------------|--------|------------|---|---|---------------------------------|
| | | | L | T | P | |
| Open Category- OC 4 | Product Design and Manufacturing | 900609 | | | | As per SWAYAM/NPTEL norms |
| | | | 3 | - | - | |

SWAYAM/NPTEL Link for the course: - https://onlinecourses.nptel.ac.in/noc23_me14/preview
 The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 14 Apr 2023 | 29 Apr 2023 | 12 Weeks |

COURSE LAYOUT

- Week 1 : Introduction to Product Design and Manufacturing
- Week 2 : Product Design Morphology
- Week 3 : Visual Design, and Quality Function Deployment (QFD)
- Week 4 : Value Engineering
- Week 5 : Material, and Manufacturing process selection
- Week 6 : Design for Manufacturing, Assembly, and Maintenance
- Week 7 : Design for Environment, and Quality Control
- Week 8 : Patenting, and Creativity
- Week 9 : Rapid Prototyping
- Week 10 : Plant Layout Design
- Week 11 : Computer Integrated Manufacturing
- Week 12 : Reverse Engineering, and Managing Competitiveness

Books and references

- Eppinger, S. and Ulrich, K., 2015. Product design and development. McGraw-Hill Higher Education
- Magrab, E.B., Gupta, S.K., McCluskey, F.P. and Sandborn, P., 2009. Integrated product and process design and development: the product realization process. CRC Press.
- Boothroyd, G., 1994. Product design for manufacture and assembly. Computer-Aided Design, 26(7), pp505-520.

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900610: Automatic Control

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|------------------------|-------------------|--------|------------|---|---|---------------------------------|
| | | | L | T | P | |
| Open Category- OC 4 | Automatic Control | 900610 | 3 | - | - | As per SWAYAM/NPTEL norms |

SWAYAM/NPTEL Link for the course: - https://onlinecourses.nptel.ac.in/noc23_me15/psvswr

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 17 Mar 2023 | 26 Mar 2023 | 8 Weeks |

COURSE LAYOUT

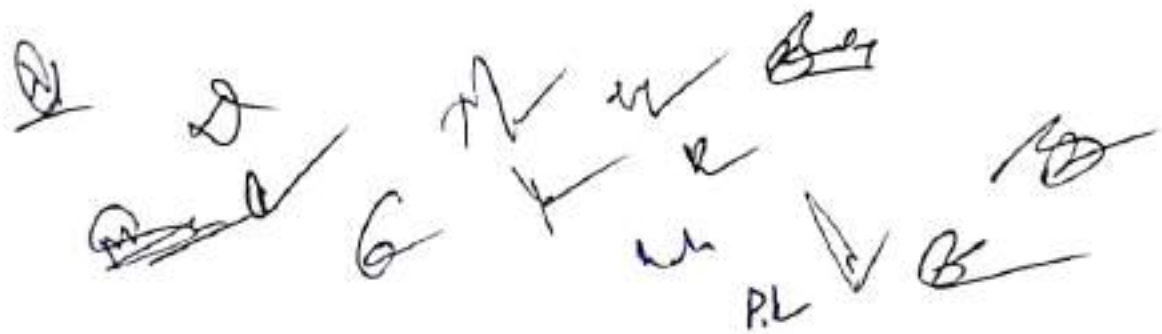
- Week 1: Automatic Control System.
- Week 2: Mathematical Modeling.
- Week 3: Transient Response Analysis.
- Week 4: Stability and Steady State Error.
- Week 5: Root Locus Technique.
- Week 6: Design via Root Locus and Compensation Techniques.
- Week 7: State Space Method.
- Week 8: Application of MATLAB in Automatic Control.

Books and references

- Nise, N.S., Control Systems Engineering, 5th Ed., Willey, 2008.
- Ogata, K., "Modern Control Engineering", 5th Ed., Prentice Hall of India, 2013.
- Kuo, B.C., "Automatic Control System", 5th Ed., Prentice Hall of India, 1995.
- Raven, F.H., "Automatic Control Theory", 5th Ed., McGraw Hill, 1995.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.)
A Govt. Aided UGC Autonomous & NAAC Accredited Institute, Affiliated to R.G.P.V., Bhopal
Department of Mechanical Engineering

| | |
|----------------------|--|
| Item ME4: | To propose the list of "Additional Courses" which can be opted for getting an (i) Honours (for students of the host department) (ii) Minor Specialization (for students of other departments) [These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the VI semester (for the batch admitted in 2020-21) and for VIII semester students for the batch admitted in 2019-20. The list should be additive; such that those MOOCs which were offered in previous semesters are also included provided they are being offered on the platform during Jan-June 2023 semester] |
|----------------------|--|



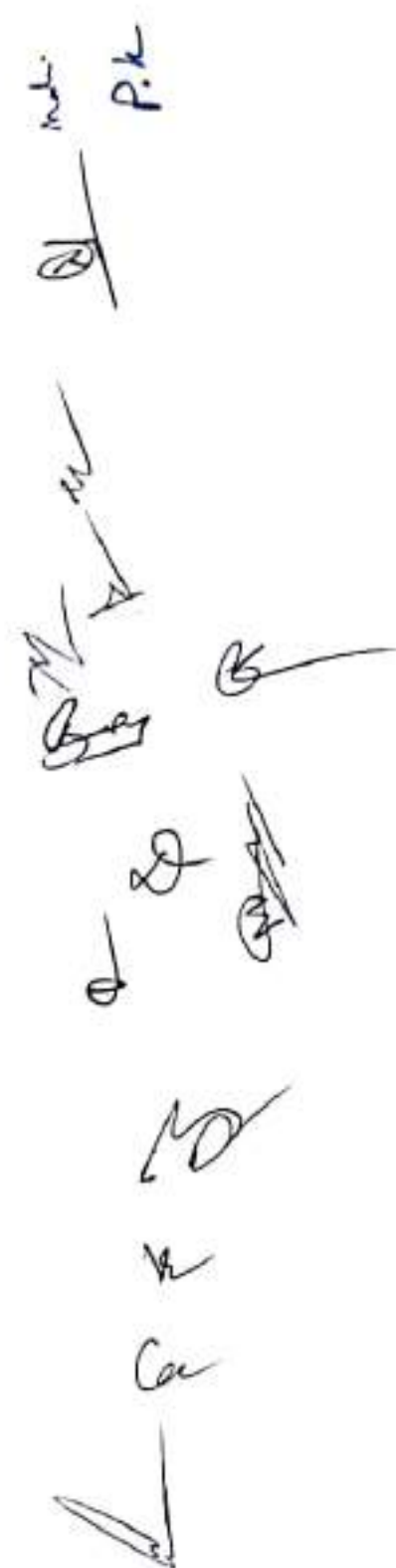
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Honors list (For Mechanical/Automobile Engg. Students)

| Sem | V (for the batch admitted in 2020-21) | VI (for the batch admitted in 2020-21) | VII (for the batch Admitted in 2019-20) | VIII (for the batch Admitted in 2019-20) |
|--------------------|---|---|---|--|
| Course Name | 1. Principle of Hydraulic Machines and System Design (12 Weeks) 2. System design for sustainability (12 Weeks) 3. Manufacturing Systems Technology Part I & II (12 Weeks) | 1. IC Engines and Gas Turbines (12Weeks) 2. Theory and Practice of Non Destructive Testing (8 Weeks) | 1. Fundamentals of Artificial Intelligence (12 Weeks) 2. Rapid Manufacturing (12 Weeks) 3. Heat Exchangers: Fundamentals and Design Analysis (12 Weeks) | 1. Computer integrated Manufacturing (12 Weeks) 2. Solar Photovoltaic: Principles, Technologies & Materials (8 weeks) |

Minors list (other than Mechanical/Automobile Engg. students)

| Sem | V (for the batch admitted in 2020-21) | VI (for the batch admitted in 2020-21) | VII (for the batch Admitted in 2019-20) | VIII (for the batch Admitted in 2019-20) |
|--------------------|--|--|---|--|
| Course Name | 1. Basics of Materials Engineering (12 Weeks) 2. Fluid Mechanics (12 Weeks) | 1. Fundamental of Combustion (12weeks) 2. Introduction to Mechanical Micro Machining (12 weeks) | 1. Engineering Metrology (12 Weeks) 2. Applied Thermodynamics for Engineers (12 Weeks) | 1. Computational Fluid Dynamics for Incompressible Flows (12 weeks) 2. Mechanics of Machining (8 weeks) |


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| | |
|----------|--|
| Item MF5 | To review and finalize the scheme & syllabi for all Departmental Core (DC) Courses of VI Semester (for batches admitted in 2020-21) under the flexible curriculum along with their COs. |
|----------|--|

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Scheme of Evaluation

B. Tech. VI Semester, Technical Engineering

Effective for academic session 2023-24

| S. No. | Subject Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | MORNING | | | Contact Hours per week | | | Mode of Teaching | % Mode of Exam. | Duration of Exam. | | | |
|--------|-----------------------|--------------|---|--------------------------------|-----------------------|-----------------|----------------|------------------------------|--------------------------|------------|-------------|----|------------------------|----|---------------|------------------|-----------------|-------------------|-----|--------|---|
| | | | End Term Evaluation | | Continuous Evaluation | | End Sem. Exam. | Lab work & Sectional Project | Skill Based Mini-Project | Assessment | Total Marks | L | T | P | Total Credits | | | | | | |
| | | | End Sem Exam. | Proficiency in subject /course | Mid Sem Exam | Qual/Assignm in | | | | | | | | | | | | | | | |
| 1. | 120615 | DC | Mechanical Vibrations (DC-14) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | - | - | 200 | 2 | 1 | 2 | 4 | Blended | PP | 2 hr | |
| 2. | 120616 | DC | Refrigeration and Air Conditioning (DC-15) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | - | - | 200 | 2 | 1 | 2 | 4 | Blended | PP | 2 hr | |
| 3. | 120617 | MC | Artificial Intelligence & Machine Learning (DE-1) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | - | - | 260 | 3 | - | 2 | 4 | Blended | MCO | 1.5 hr | |
| 4. | DE | DE | Departmental Elective* (DE-1) | - | - | - | - | - | - | - | 25 | 75 | 400 | 3 | - | - | 3 | Online | MCO | 1 hr | |
| 5. | OC | OC | Open Category (OC-1) | 50 | 10 | 20 | 20 | 60 | 40 | 40 | - | - | 100 | 2 | 1 | - | 3 | Blended | PP | 2 hr | |
| 6. | 120618 | DC | Minor Project-III | - | - | - | - | 60 | 40 | 40 | - | - | 100 | - | - | 4 | 2 | Offline | SO | - | |
| 7. | 200XXX | CLC | Novel Engaging Course (Informal Learning) | - | - | - | - | 50 | - | - | - | - | 50 | - | - | 2 | 1 | Offline | SO | - | |
| Total | | | | 200 | 40 | 80 | 80 | 240 | 100 | 60 | 25 | 75 | 950 | 12 | 3 | 12 | 21 | - | - | - | - |
| B. | 100008 | MIAC | Intellectual Property Rights (IPR) | 50 | 10 | 20 | 20 | - | - | - | - | - | 100 | 2 | - | - | - | Online | MCO | 1.5 hr | |

Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester

Permitted to opt for maximum two additional courses for the award of Honours or Minor Specialization

Proficiency in course/subject includes the weightage towards ability/skills/competence/knowledge level/ expertise attained etc. in that particular course/subject.

*MCO: Multiple Choice Question *PP: Pen Paper *SO: Submission + Oral

*Course run through SWAYAMINTEL/MCOE Learning Based Platform with credit transfer

| S.No. | Subject Code | Departmental Elective (DE-1)* | Subject Name | S.No. | Subject Code | Open Category (OC-1) | Subject Name |
|-------|--------------|--|--------------|--------|----------------|----------------------|--------------|
| 1 | 12061 | Fundamental of Working Science and Technology | 1 | SO1001 | Product Design | | |
| 2 | 12062 | Properties of Materials (Structure and Properties of Material III) | 2 | MI001 | Statistics | | |
| 3 | 12063 | | | | | | |

| Offline | Mode of Teaching | | | Mode of Examination | | | Total Credits |
|---------|------------------|---------|--------|---------------------|--------|---------------|---------------|
| | Online | Blended | Lab | Theory | Lab | Total Credits | |
| 0 | 3 | 15 | 3 | PP | MCO | SO | 21 |
| 0 | 14.28% | 71.4% | 14.28% | 0 | 7 | 3 | 21 |
| | | | | 0 | 33.33% | 14.28% | Credit % |

MCO 01.05.2023
DEAN (ACADEMICS)
MLTS
GWALIOR

Signature: [Handwritten Signature] Date: 28 P.M.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Evaluation

B. Tech. V, VI Semester (Automobile Engineering)

Effective from Academic Session 2020-21

| S. No. | Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | MOOC's | | | Contact Hours per week | | | Mode of Teaching | Mode of Exam. | Duration of Exam. | | |
|--------|--------------|---------------|--|---------------------|--------------------------------|-----------------------|-------------------|----------------|-----------------------------|--------------------------|------------|------|-------------|------------------------|---|----|------------------|---------------|-------------------|---------------|--------|
| | | | | End Term Evaluation | | Continuous Evaluation | | End Sem. Exam. | Continuous Evaluation | | Assignment | Exam | Total Marks | L | T | P | | | | Total Credits | |
| | | | | End Sem. Exam. | Proficiency in subject /course | Mod Sem. Exam. | Quiz/ Assignm ent | | Lab work & Seasonal Project | Skill Based Mini Project | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| 1. | 190615 | DC | Automotive Transmission (DC-14) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | - | - | - | 200 | 2 | 1 | 2 | 4 | Blended | PP | 2 hr |
| 2. | 190616 | DC | Refrigeration and Air-Conditioning (DC-15) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | - | - | - | 200 | 2 | 1 | 2 | 4 | Blended | PP | 2 hr |
| 3. | 190617 | MC | Artificial Intelligence & Machine Learning | 50 | 10 | 20 | 20 | 60 | 20 | 20 | - | - | - | 200 | 3 | - | 2 | 4 | Blended | MCQ | 1.5 hr |
| 4. | DE | DE | Departmental Elective* (DE-1) | - | - | - | - | - | - | - | 25 | 75 | 100 | 3 | - | - | - | 3 | Online | MCQ | 3 hr |
| 5. | OC | OC | Open Category (OC-1) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended | PP | 2 hr |
| 6. | 190618 | DLC | Minor Project-II | - | - | - | - | 60 | 40 | - | - | - | 100 | - | - | 4 | 2 | Offline | SO | - | |
| 7. | 200XXX | CLC | Novel Engaging Course (Informal Learning) | - | - | - | - | 50 | - | - | - | - | 50 | - | - | 2 | 1 | Offline | SO | - | |
| Total | | | | 200 | 40 | 80 | 80 | 290 | 100 | 60 | 25 | 75 | 950 | 12 | 3 | 12 | 21 | - | - | - | - |
| 8. | 100008 | MAC | Intellectual Property Rights (IPR) | 50 | 10 | 20 | 20 | - | - | - | - | - | 100 | 2 | - | - | - | Grade | Online | MCQ | 1.5 hr |

Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester

Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

*Proficiency in course/subject includes the weightage towards ability/skill/competence/knowledge level/ experience attained etc. in that particular course/subject.

*MCQ: Multiple Choice Question *PP: Pen Paper *SO: Submission + Oral

*Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform with credit transfer

| Departmental Elective (DE-1) | | | | Open Category (OC-1) | | | |
|------------------------------|--------------|-------|------------------------------------|----------------------|--------------|-------|----------------|
| S.No. | Subject Code | S.No. | Subject Name | S.No. | Subject Code | S.No. | Subject Name |
| 1 | 190601 | 1 | Fundamentals of Automobile Systems | 1 | 910108 | 1 | Product Design |
| 2 | 190602 | 2 | Vehicle Fuel Flow | 2 | 910109 | 2 | Robotics |

| Mode of Teaching | | | | Mode of Examination | | | | Total Credits | |
|------------------|--------|---------|---------|---------------------|----|--------|--------|---------------|-------------|
| Theory | | Lab | | Theory | | Lab | | Total Credits | |
| Offline | Online | Blended | Offline | PP | AO | MCQ | SO | Lab | SO |
| 0 | 3 | 15 | 3 | 11 | 0 | 7 | 3 | 3.33% | 21 |
| 0 | 14.28% | 71.4% | 14.28% | 52.38% | 0 | 33.33% | 14.28% | 14.28% | 6 credits % |

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GWALIOR
P. R.

Signature: [Handwritten Signature]
Date: [Handwritten Date]

Academic session 2020-21 admitted

120615: Mechanical Vibrations

| Category | Title | Code | Credit - 4 | | | Theory Paper Max.Marks-50 Duration-2 hrs. |
|---------------------------|--------------------------|--------|------------|---|---|---|
| | | | L | T | P | |
| Departmental Core - DC | Mechanical Vibrations | 120615 | 2 | 1 | 2 | |
| | | | | | | |

Prerequisite: Engineering Mathematics, Engineering Mechanics

Course Objectives:

1. To impart basic knowledge and importance on Mechanical Vibration in Engineering Fields among the students.
2. To create the awareness on Mechanical Vibration in Research and Application area

Syllabus

Unit-I:

Introduction: Importance and scope of vibrations, Definitions, Types of vibrations, Simple Harmonic Motion (S.H.M.), Work done by harmonic force, Principle of super position applied to SHM, Beats, Fourier transform and problems.

Undamped (Single Degree of Freedom) Free Vibrations: Derivations for spring mass systems, Methods of analysis, Natural frequencies of simple systems, Springs in series and parallel, Torsional and transverse vibrations, Effect of mass of spring and Problems.

Unit-II:

Damped free vibrations (1DOF): Types of damping, Analysis with viscous damping - Derivations for over, critical and under damped systems, Logarithmic decrement and Problems.

Whirling of shafts: Whirling of shafts with and without damping, discussion of speeds above and below critical speeds and Problems.

Unit-III Forced Vibrations (1DOF)

Introduction, Analysis of forced vibration with constant harmonic excitation - magnification factor, rotating and reciprocating unbalances, excitation of support (relative and absolute amplitudes), force and motion transmissibility, Energy dissipated due to damping and Problems.

Unit-IV

Systems with two degrees of Freedom:

Principle modes of vibrations, Normal mode and natural frequencies of systems (without damping), Torsional system, Semidefinite system

Multi Degree Freedom System: Free Vibration equation of motion. Stiffness influence coefficients, flexibility influence coefficient, inertia influence coefficient

Unit V

Numerical Methods: Dunkerley's Methods, Rayleigh's Method, Holzer's Method, Methods of Matrix iterations, Jacobi's method

Vibration Control: Transducers and vibration pickup, Vibrometer, accelerometer, velometer, frequency measuring instrument, FFT analyser, vibration exciters.

Course Outcomes: After completing this course students are able to:

- CO1: Able to understand basics concept of mechanical vibration.
- CO2: Able to define the physical systems in to spring-mass-damper systems.
- CO3: Able to use different methods and principles applicable to dynamic systems.
- CO4: Able to determine responses of vibrating systems.

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CO5: Able to analyse the behaviours of physical systems.

CO6: Able to design the mechanical systems by considering vibration.

Text Books:

1. Grover, G.K., " Mechanical Vibrations", 7th Ed., Nem Chand & Bros.
2. Rao, S.S., " Mechanical Vibrations", 5th Ed., Addison-Wesley Longman, Incorporated.

References Books:

1. Theory of Vibrations with Applications: W T Thomson CBS Publishers Delhi
2. Fundamentals of Vibration: Leonard Meirovitch , McGraw Hill International Edison.
3. Principles of Vibration Control: Asok Kumar Mallik, Affiliated East-West Press.
4. Mechanical Vibrations A H Church, John Wiley & Sons Inc
5. Mechanical Vibrations J P Den Hartog , McGraw Hill.
6. Mechanical Vibration Analysis: Srinivasan, McGraw Hill.

List of Experiments

1. To verify the relation of simple pendulum.
2. To determine the radius of gyration of given compound pendulum.
3. To study undamped free vibration of equivalent spring mass system.
4. To study the torsional vibration of single rotor system
5. To study damped free vibration of equivalent spring mass system.
6. To study the damped torsional oscillation.
7. To study the forced vibration of spring mass system
8. To study the free vibration of Two rotor system.
9. To determine the whirling of shaft.
10. To verify the Dunkerley's rule.

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120616/190616: Refrigeration and Air-conditioning

| Category | Title | Code | Credit-4 | | | Theory Paper |
|--------------------------|---------------------------------------|---------------|----------|---|---|--------------------------------|
| | | | L | T | P | |
| Departmental Core -DC | Refrigeration and Air-conditioning | 120616/190616 | 2 | 1 | 2 | Max.Marks-50 Duration-2 hrs |

Course Objectives: To make the students to understand

1. The fundamental principles and different methods of refrigeration and air conditioning.
2. Different refrigerants with respect to properties, applications and environmental issues.
3. The various equipment, operating principles, operating and safety controls employed in refrigeration air conditioning systems.

Pre-requisite: Engineering Thermodynamics

Syllabus

Unit I: Introduction to Refrigeration: –Basic Definition, ASHRAE Nomenclature, Air Refrigeration: Air Refrigeration Cycles-reversed Carnot cycle, Bell-Coleman cycle analysis, Air Refrigeration systems-merits and demerits, analysis.

Unit II: Vapour Compression Refrigeration System (VCRS): Carnot Vapour compression refrigeration cycle, Working and analysis, Limitations, Standard Vapour Compression Refrigeration system, Working and analysis, Effects of sub cooling and super heating, Multi-Pressure or Compound Vapour Compression Refrigeration Systems, Flash Gas removal, Flash inter cooling and water inter cooling.
Refrigerants: Classification, Selection of Refrigerants and Nomenclature of refrigerants, Desirable Properties of an ideal refrigerant, A discussion on Ozone layer Depletion and Global Warming.

Unit III: Vapour Absorption Systems: Absorbent – Refrigerant combinations, Water-Ammonia Systems, Water Lithium Bromide System, Contrast between the two systems, Modified Version of Aqua-Ammonia Brief Discussion on (i) Steam-Jet refrigeration system and (ii) Thermoelectric refrigeration system
Refrigeration System Equipment – Compressors, Condensers, Expansion Devices and Evaporators, System with Rectifier and Analyser Assembly

Unit IV: Psychrometry: Introduction to Air-Conditioning, Basic Definition, Classification, ASHRAE Nomenclature pertaining to Air-Conditioning, Applications of Air-Conditioning, Psychrometry –Air-water vapour mixtures, Psychrometric Properties, Psychrometric or Air-Conditioning processes, Psychrometric Chart.

Unit V: Air-Conditioning: Mathematical Analysis of Air-Conditioning Loads, Related Aspects, Numerical Problems, Different Air-Conditioning Systems-Central – Station Air-Conditioning System, Unitary Air-Conditioning System, Window Air-Conditioner and Packaged Air-Conditioner, Components related to Air-Conditioning Systems

Course outcomes: After the successful completion of this course, the student will be able to:

1. Understand vapour compression refrigeration system.
2. Describe the working principles of air, vapour absorption, thermoelectric and steam-jet refrigeration systems.
3. Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems.
4. Analyze the basic air conditioning processes on psychrometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.
5. Develop thermal comfort conditions with respect to temperature and humidity

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6. Estimate cooling and heating loads in an air-conditioning system.

List of Experiments (Expandable):

1. Demonstration of fundamental study of Absorption Refrigeration System.
2. To study Performance of Ice-Candy unit.
3. Demonstration of C.O.P. and Performance of Air-Conditioner.
4. Demonstration of fundamental study of Vapour Compression cycle (Ice candy Unit)
5. Determination of C.O.P. in Vapour compression Refrigeration system.
6. Demonstration of Electrolux Refrigerator.
7. Equipment and controls of Refrigeration Systems.
8. Equipment and controls of Air Conditioning Systems
9. To study duct and induct type AC
10. To study refrigeration and fault simulator
11. Demonstration of C.O.P. and other performance parameters for Mech. Heat Pump.
12. Demonstration of C.O.P. and other performance parameters for Mech. Heat Pump.

Text Books:

1. Arora C.P., Refrigeration and Air-conditioning, Tata McGraw-Hill Latest Edition, New Delhi

References Books :

1. Roy J. Dossat, Principles of Refrigeration, Wiley Limited
2. Stoecker W.F., and Jones J.W., Refrigeration and Air-conditioning, McGraw-Hill, New Delhi

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Academic session 2020-21 admitted

190615: Automotive Transmission

| Category | Title | Code | Credit-4 | | | Theory Paper Max.Marks-50 Duration-2 hrs. |
|-------------------------|----------------------------|--------|----------|---|---|---|
| | | | L | T | P | |
| Departmental Core-DC | Automotive Transmission | 190615 | 2 | 1 | 2 | |

Course Objectives

To make the students:

1. develop the basic knowledge of the students in mechanics, torque conversion areas.
2. understand various transmission system.
3. develop the skills to work in the areas of alternative drives.

Syllabus

UNIT -I TRANSMISSION REQUIREMENTS:

Requirements of transmission system, general arrangement of power transmission, general arrangement of rear-engine vehicle with live axles, general arrangement of dead- axle and axles transmission; four-wheel-drive transmission.

UNIT -II CLUTCHES:

Clutches Requirements of clutches, principle of friction clutches, types of clutches and materials used- cone, single-plate, diaphragm-spring, multi-plate, centrifugal, over-running and electromagnetic clutch.

UNIT -III GEAR BOX:

Need of gear boxes, types- sliding mesh, constant mesh and epicyclic, gear boxes;

Synchronizers: principle, early and later Warner synchronizer, Vauxhall synchronizer- gear materials lubrication and design of gear box; Hydrodynamic drive: Advantages and limitations, principle of fluid coupling, constructional details, torque-capacity performance characteristics, drag torque, methods of minimizing drag torque; Torque converter: performance characteristics; single, multistage and poly phase torque converters, converter-coupling-performance characteristics, coupling-blade angle and fluid flow, converter fluid.

UNIT-IV TRANSMISSION SYSTEMS-DRIVE LINE:

Definition, forces & torques acting; types of drives-Hotchkiss, torque tube & radius rod drives; components- propeller shaft, slip joint, universal joints & constant velocity universal joints; front wheel drive; Final drive: definition; types- worm-wheel, straight-bevel gear, spiral-bevel gear & hypoid-gear drives; double-reduction & twin-speed final drives; Differential: Function, principle, construction and working; non-slip differential; differential lock; rear axle- loads acting & types; multi-axled vehicles.

UNIT -V AUTOMATIC TRANSMISSION:

Chevrolet "turbo glide" transmission, power glide transmission, hydraulic control system of automatic transmission; Electric drive: advantages and limitations, principle of early and modified Ward-Leonard system, modern electric drive for buses; performance characteristics.

Course Outcomes:

After successful completion of this course students will be able to:

- CO1: State the need of transmission System in an Automobile.
CO2: Describe the working of different component of transmission system.
CO3: Identify the working principle used in various transmissions.

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- CO4: Compare the various transmission systems according to their applications.
CO5: Analyze the merits and demerits of different components of transmission.
CO6: Design the transmission system for different types of vehicles.

Text & References Books:

1. Heldt P.M.; Torque converters; Chilton Book Co.
2. Giri NK; Automobile Engineering; Khanna Publisher
3. Newton, Steeds & Garret; Motor Vehicles; B.H. Publication.
4. Judge, A.W., Modern Transmission Systems, Chapman & Hall Ltd.
5. Check Chart; Automatic Transmission; Harper & Row Publication.

List of Experiments:

1. Study of transmission of front and rear engine vehicles
2. Study of front and rear-wheel-drive vehicle
3. Study of four wheel-drive vehicles
4. Study of various gear boxes and pre synchronization systems
5. Study of fluid couplings, hydrodynamic drives and torque converters
6. Automatic transmission system study.

Laboratory Course Outcomes:

After successful completion of this course students will be able to:

- CO1: Describe the concept of gear motions, drive line positions.
CO2: Explain about different types of gearboxes.
CO3: Know about the multi stage and poly phase torque converters, performance characteristics.
CO4: Demonstrate about Automatic transmission.
CO5: Learn about the different drive systems.
CO6: Apply the mechanics of transmission system.

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| S.No. | Automobile Engineering | | | Mechanical Engineering | | |
|-------|------------------------|----------|----------------------------------|------------------------|----------|--|
| | Subject Code | Category | Subject Name & Title | Subject Code | Category | Subject Name & Title |
| 1. | 190661 | DE | Fundamental of Automotive System | 120661 | DE | Fundamental of Welding Science and Technology |
| 2. | 190662 | DE | Viscous Fluid Flow | 120662 | DE | Viscous Fluid Flow |
| 3. | | | | 120663 | DE | Properties of Materials (Nature and Properties of Material: III) |

190661: Fundamental of Automotive System

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|----------------------------|----------------------------------|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE 2 | Fundamental of Automotive System | 190661 | 3 | - | - | As per SWAYAM/NPTEL norms |
| | | | | | | |

SWAYAM/NPTEL Link for the course: https://onlinecourses.nptel.ac.in/noc23_de01/preview

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 14 Apr 2023 | 29 Apr 2023 | 12 Weeks |

Course layout

- Week 1 : Course Overview, Classification of Internal Combustion Engines, Engine Components, Operation of Four Stroke Engines
- Week 2 : Two Stroke Engines, Engine Cycles
- Week 3 : Engine Performance, Supercharging, Combustion in Spark Ignition Engines
- Week 4 : Combustion in Compression Ignition Engines, Carburetion, Fuel Introduction Systems
- Week 5 : Engine Emissions, Emission Control Systems, Automotive Powertrain
- Week 6 : Automotive Clutch, Transmission, Powertrain Analysis
- Week 7 : Transmission Matching and Introduction to Brake System
- Week 8 : Components of Brake System, Hydraulic Brake
- Week 9 : Air Brake, Antilock Brake System
- Week 10 : Braking Analysis, Introduction to Steering System, Manual Steering System
- Week 11 : Power Steering System, Wheel Alignment, Introduction to Suspension System
- Week 12 : Components of Suspension System, Dependent and Independent Suspension, Introduction to Electric and Hybrid Powertrain, Tyres.

Books and references

- D. Crolla, D. E. Foster, T. Kobayashi and N. Vaughan (Editors-in-Chief), Encyclopedia of Automotive Engineering, Parts 1-6, Wiley, 2015.
- R. Stone and J. K. Ball, Automotive Engineering Fundamentals, SAE International, 2004.
- T. K. Garrett, K. Newton, and W. Steeds, The Motor Vehicle, 13th Edition, SAE International, 2001.
- D. B. Astow, G. Howard and J. P. Whitehead, Car Suspension and Handling, 4th Edition, SAE International, 2004.
- R. Limpert, Brake Design and Safety, SAE International, 1992.
- V. Ganesan, Internal Combustion Engines, 3rd Edition, Tata McGraw Hill, 2007.
- M. Ehsani, Y. Gao and A. Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, 2nd Edition, CRC Press, 2010.

190662/120662: Viscous Fluid Flow

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|----------------------------|--------------------|---------------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE 2 | Viscous Fluid Flow | 190661/120662 | 3 | - | - | As per SWAYAM/NPTEL norms |

SWAYAM/NPTEL Link for the course: https://onlinecourses.nptel.ac.in/noc23_me57/preview

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 14 Apr 2023 | 30 Apr 2023 | 12 Weeks |

Course layout

- Week 1: Introduction
- Week 2: Steady One-dimensional Rectilinear Flows
- Week 3: Steady Axisymmetric Flows
- Week 4: Transient One-dimensional Unidirectional Flows
- Week 5: Steady, Two-dimensional Rectilinear Flows
- Week 6: Lubrication Theory
- Week 7: Laminar Boundary Layers - I
- Week 8: Laminar Boundary Layers - II
- Week 9: Laminar Free Shear Flows
- Week 10: Stability Theory
- Week 11: Turbulent Flows - I
- Week 12: Turbulent Flows - II

Books and references

- White, F. M., Viscous Fluid Flow, McGraw-Hill, 2011.
- Papanastasiou, T. C., Georgiou, G. C., and Alexandrou, A. N., Viscous Fluid Flow, CRC Press, 2000.
- Sherman F. S., Viscous Flow, McGraw-Hill College, 1990.
- Ockendon H., and Ockendon J.R., Viscous Flow, Cambridge University Press, 1995.
- Schlichting, H., and Gersten, K., Boundary Layer Theory, Springer- Verlag, 2000.

120661: Fundamental of Welding Science and Technology

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|----------------------------|---|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE 2 | Fundamental of Welding Science and Technology | 120661 | 3 | - | - | As per SWAYAM/NPTEL norms |

SWAYAM/NPTEL. Link for the course: https://onlinecourses.nptel.ac.in/noc23_me29/prev/cm

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 23 Jan 2023 | 17 Mar 2023 | 26 Mar 2023 | 8 Weeks |

Course layout

- Week 1 : Introduction and classification of welding
- Week 2 : Nomenclature and symbol of welding joints
- Week 3 : Power source of welding
- Week 4 : Physics and principle of arc welding
- Week 5 : Different type of welding methods and their details
- Week 6 : Different type of welding methods their details
- Week 7 : Different type of welding methods their details
- Week 8 : Welding defects and inspection

Books and references

1. V. M. Radhakrishnan, Welding Technology and Design, New age. 2002.
2. Dr. O. P. Khanna, Welding Technology, Reprint: 2002.
3. J. A. Goldak, Computational Welding Mechanics, Springer 2005.
4. O. Grong, Metallurgical Modelling of Welding, 2nd Ed. IOM publication, 1997.
5. L-E Lindgren, Computational Welding Mechanics, Woodhead Publishing Limited, 2007.
6. J. F. Lancaster (Ed), The Physics of welding, Pergamon, 1986.
7. R.W. Messler, Principles of Welding, John Wiley and Sons, 1999.

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120663: Properties of Materials (Nature and Properties of Material: III)

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|----------------------------|--|--------|------------|---|---|---------------------------|
| | | | L | T | P | |
| Departmental Elective-DE 2 | Properties of Materials (Nature and Properties of Material: III) | 120663 | 3 | - | - | As per SWAYAM/NPTEL norms |
| | | | | | | |

SWAYAM/NPTEL Link for the course: https://onlinecourses.nptel.ac.in/noc23_mm08/preview

The details of the course are mentioned below:-

| Course Start Date | Course End Date | Exam date | Duration |
|-------------------|-----------------|-------------|----------|
| 20 Feb 2023 | 14 Apr 2023 | 29 Apr 2023 | 8 Weeks |

Course layout

- Week 1 : Introduction and Basic Elasticity
- Week 2 : Mechanical testing and plastic deformation
- Week 3 : Plastic deformation mechanisms
- Week 4 : Strengthening mechanisms
- Week 5 : Electrical properties of metals
- Week 6 : Quantum mechanics and band theory
- Week 7 : Semiconductor properties
- Week 8 : Thermal properties

Books and references

1. V. Raghavan, Materials Science and Engineering
2. W.D. Callister, Materials Science and Engineering
3. H.W. Hayden, W.G. Moffatt and J.W. Wulff, Mechanical Behaviour (Volume III: Structure and Properties of Materials)
4. L.F. Pease, R.M. Rose and J. Wulff, Electronic Properties (Volume IV: Structure and Properties of Materials)
5. A. Guinier and R. Julien, The Solid State

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| | |
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| Item MES | To review and finalize the courses & syllabi to be offered (for batches admitted in 2020-21) under the Open Category (OC) Courses (in traditional mode) for VI semester students of other departments along with their COs |
|-------------|--|

M L B S
G O
P L

| Open Category (OC-I) | | |
|----------------------|--------------|----------------|
| S.No. | Subject Code | Subject Name |
| 1 | 910108 | Product Design |
| 2 | 910109 | Robotics |

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Academic session 2020-21 admitted

910108 (OC-1): Product Design

| Category | Title | Code | Credit - 3 | | | Theory Paper Max.Marks-50 Duration-2 hrs. |
|----------------|----------------|--------|------------|---|---|---|
| | | | L | T | P | |
| Open Course-OC | Product Design | 910108 | 1 | 1 | 1 | |
| | | | 2 | 1 | - | |

Course Objectives: To make the students to understand:

1. The multidisciplinary aspects of product development and innovation.
2. The basic methodology and tools that can be used in product development projects.

SYLL ABUS

Unit 1: Basic: Significance of product design, product characteristics, product design and development process, the challenges of product development, design morphology, sequential engineering design method.
Product Planning: Identifying opportunities evaluate and prioritize projects, allocation of resources.

Unit 2: Identifying Customer Needs: Interpret raw data in terms of customers need, organize needs in hierarchy and establish the relative importance of needs, Translating customer needs
Product Specifications: Establish target specifications, setting final specifications, product costing.

Unit 3: Concept Generation: Activities of concept generation, clarifying problem, search both internally and externally, explore the output.
Industrial Design: Assessing need for industrial design, industrial design process, management, assessing quality of industrial design, design for manufacturing, design for assembly, and design for maintenance, design for environment.

Unit 4: Concept Selection: Overview, concept screening and concept scoring, methods of selection, Creativity techniques.

Theory of inventive problem solving (TRIZ): Fundamentals, methods and techniques, general theory of innovation and TRIZ, Value engineering applications in product development and design, Model-based technology for generating innovative ideas.

Unit 5: Concept Testing: Elements of testing: qualitative and quantitative methods including survey, measurement of customer's response.

Intellectual Property: Elements and outline, patenting procedures, claim procedure.

Cour.e Outcome: - After the completion of the course the student will be able to
 CO1. Analyze the demands and needs of customers to conceptualize product.

CO2. Describe the different steps involved in the product design.

CO3. Analyze the shortcoming in the product development.

CO4. Identify the opportunities to develop the product.

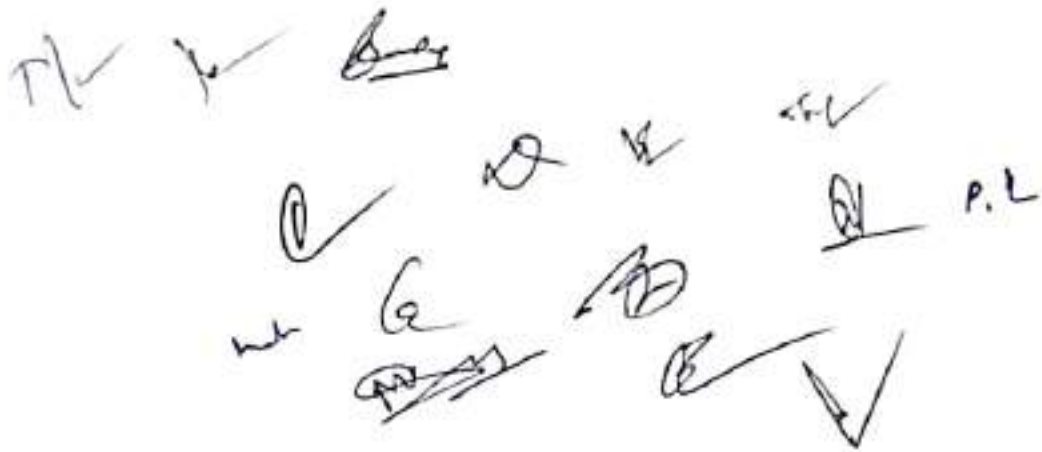
CO5. Utilize the recourses available in efficient manner for maximum productivity.

CO6. Forecast the impact of product on the surrounding environment.

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Text books and References:

1. Ulrich K. T. and Eppinger S.D, Product Design and Development, Tata McGraw Hill.
2. Otto K. and Wood K, Product Design, Pearson.
3. George Dieter, Engineering Design, MGH New York.
4. Engineering of creativity: introduction to TRIZ methodology of inventive Problem Solving, By Semyon D. Savransky, CRC Press.
5. Inventive thinking through TRIZ: a practical guide, By Michael A. Orloff, Springer.
6. Systematic innovation: an introduction to TRIZ ; (theory of inventive Problem Solving), By John Terninko, AllaZusman, CRC Press.



Academic session 2020-21 admitted

910109 (OC-I): Robotics

| Category | Title | Code | Credit - 3 | | | Theory Paper |
|----------------|----------|--------|------------|---|---|---------------------------------|
| | | | L | T | P | |
| Open Course-OC | Robotics | 910109 | 2 | 1 | - | Max.Marks-50 Duration-2 hrs. |

Course Objectives: To make the students to understand:

1. Study and understand the concepts of robotics and mechatronics.
2. Impart basic knowledge about the different sensors and their applications in robotics.
3. Learn the basic fundamentals of actuation Systems.
4. To impart knowledge on the basic concepts of measurement, static and dynamic characteristics of measurement systems.
5. To work professionally in the area of robot programming.
- 6.

Syllabus

UNIT - I Robotics-Introduction-classification with respect to geometrical configuration (Anatomy), Controlled system, Chain type: Serial manipulator and Parallel Manipulator. Components of Industrial robotics-recession of movement-resolution, accuracy and repeatability

Kinematic and Dynamic characteristics- speed of motion, load carrying capacity & speed of response-
Sensors-Internal sensors: Position sensors, Velocity sensors, External sensors: Proximity sensors, Tactile Sensors, Force or Torque sensors.

UNIT - II Grippers - Mechanical Gripper-Grasping force, Magnetic gripper, vacume cup gripper-considerations in gripper selection and design, **Industrial robots** specifications. Selection based on the Application.

UNIT - III Kinematics-Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix. Direct and Inverse Kinematics for industrial robots. Differential Kinematics for planar serial robots. Dynamics: Equations of motion, State-Space equation,

UNIT - IV Trajectory planning: Joint space scheme- Cubic polynomial fit, Obstacle avoidance in operation space-cubic polynomial fit with via point, Introduction Cartesian space scheme. Control- Interaction control, Rigid Body mechanics, **Control architecture-** position, path velocity, and force control systems, computed torque control, adaptive control, and Servo system for robot control.

UNIT - V Basics of data acquisition systems, Programming of Robots - programming methods (Arduino MATLAB, Bond Graph, etc.), Vision System, Bioinspired robots and applications, Teach pendent-overview of various textual programming languages, Application of knowledge.

Course Outcomes: After successful completion of this course students will be able to:

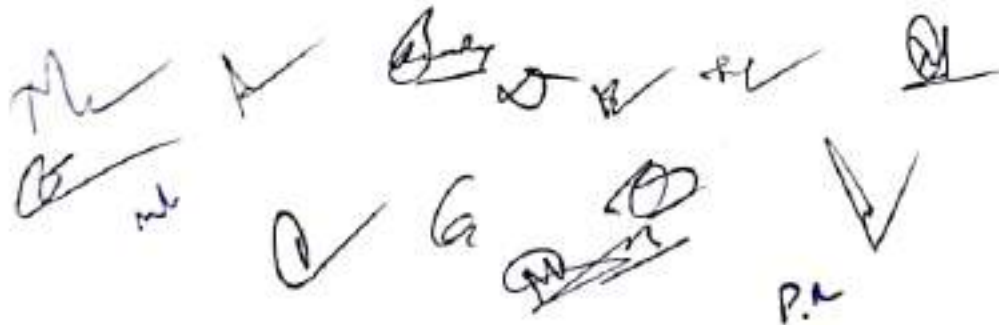
- CO1. Understand importance of robotics and its impact on human safety, quality of life,economy, environment, etc.; basics of open-ended type of Robotic manipulators.
- CO2. Discuss Kinematics and dynamics of open ended robotic mechanisms; Fixing frames
- CO3. Ability to formulate, derive, analyse, design and synthesize kinematics and dynamics of open ended robotic mechanisms.
- CO4. Apply detailed concepts relating to various actuators, sensors, and their integration with drives and signal conditioning for robotics

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CO5. Impart knowledge on the basic concepts of measurement, static and dynamic characteristics of measurement systems, control theory and applying them to design and development of robots.

Text & References Books:

1. Introduction to Robotics: Mechanics and Control, by John J. Craig, Addison-Wesley.
2. Introduction to Robotics by S. K. Saha, Tata McGraw-Hill Publishing Company Ltd.
3. Introduction to Robotics Analysis Systems, Applications by S. B. Niku of Pearson Education.
4. Industrial Robotics-Technology Programming and Applications by M. P. Groover, M. Weiss, R. N. Nagel and N. G. Odrey of McGraw-Hill Book and Company
5. Robotics: Fundamental Concepts and Analysis by A. Ghosal of Oxford University Press.
6. Robot Dynamics and Control, by Spong M. W., and Vidyasagar M., John Wiley & Sons.
7. Mechatronic Systems: Fundamentals by R. Iserman of Springer.
8. Fundamentals of Mechatronics by Musa Jouaneh of Cengage Learning.
9. Mechatronics by W. Bolton, Pearson education.
10. Micromechatronics, Modeling, Analysis, and Design with MATLAB by V. Giurgiutiu and S. E. Lyshevski, CRC Press.
11. Bond Graph in Modeling, Amalendu Mukherjee, Ranjit Karmakar and Arun Kumar Samantaray, Simulation and Fault Identification, I. K. International Publishing House Pvt.



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| Item ME9 | To review and finalize the Experiment list/ Lab Manual for Laboratory Courses to be offered in VI semester <i>(for batches admitted in 2020-21)</i> . |
|-------------|---|

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| Mechanical/Automobile Engg. VI Sem | | |
|------------------------------------|---------------|------------------------------------|
| S.No. | Subject Code | Subject Name |
| 1 | 120616/190616 | Refrigeration and Air-conditioning |
| 2 | 190615 | Automotive Transmission |
| 3 | 120615 | Mechanical Vibration |

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| Item ME10 | To review and finalize the scheme and syllabi of B. Tech. IV Semester (for batches admitted in 2021-22) under the flexible curriculum along with their COs. |
|--------------|--|

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Scheme of Evaluation

B. Tech. IV Semester (Mechanical Engineering)

Effective for academic session 2021-22

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | Total Marks | | | Contact Hours per week | | | Mode of Teaching | Mode of Exam. | Duration of Exam. | | | |
|--------|--------------|---------------|---|------------------------|-------------------------------|-----------------------|-----------------|-----------------------|-------------------|-------------|-----|----|------------------------|-------|---------|------------------|---------------|-------------------|---|---|--------------------------|
| | | | | Theory Slot | | | Practical Slot | | | Total | L | T | P | Total | L | | | | T | P | |
| | | | | End Term Evaluation | | Continuous Evaluation | End Sem. Exams. | Continuous Evaluation | | | | | | | | | | | | | Skill Based Mini Project |
| | | | | End Sem Exam | Proficiency in subject/course | | | Mid Sem Exam | Quiz/ Assignm ent | | | | | | | | | | | | |
| 1. | 1000023 | BSC | Engg. Mechanics (I) (BSC-4) | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended | PP | 2 hr | | | |
| 2. | 120412 | DC | Design of Machine Elements (IX-6) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended | AO | 2 hr | | | |
| 3. | 120416 | DC | Metal Cutting and Machine Tools (IX-7) | 50 | 10 | 20 | 20 | - | - | 100 | 3 | 1 | - | 4 | Blended | PP | 2 hr | | | | |
| 4. | 120417 | DC | Engineering Thermodynamics (DC-8) | 50 | 10 | 20 | 20 | - | - | 100 | 3 | 1 | - | 4 | Blended | PP | 2 hr | | | | |
| 5. | 1000009 | MC | Cyber Security (MC) | 50 | 10 | 20 | 20 | - | - | 100 | 2 | - | - | 2 | Blended | MCO | 1.5 hr | | | | |
| 6. | 120415 | DLC | Production Lab (DLC-2) | - | - | - | - | 60 | 20 | 20 | 100 | - | - | 4 | 2 | Offline | SO | | | | |
| 7. | 200XXX | CLC | Novel Engaging Course (Informal Learning) | - | - | - | - | 50 | - | 50 | 50 | - | - | 2 | 1 | Offline | SO | | | | |
| Total | | | | 250 | 50 | 100 | 100 | 170 | 40 | 40 | 750 | 12 | 4 | 8 | 20 | | | | | | |
| 8. | 1000001 | MAC | Indian Constitution and Traditional Knowledge | 50 | 10 | 20 | 20 | - | - | 100 | 2 | - | - | Grade | Online | MCO | 1.5 hr | | | | |

Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester

Proficiency in course/subject includes the weightage for oral ability skill, computer/knowledge level/ expertise trained etc. in that particular course/subject.

^aAO: Assignment + Oral ^bPP: Pen Paper ^cSO: Submission + Oral

| Theory | Mode of Teaching | | | Mode of Examination | | | Total Credits |
|--------|------------------|---------|-----|---------------------|-----|---------------|---------------|
| | Offline | Blended | Lab | Theory | Lab | Total Credits | |
| | 0 | 17 | 3 | AO | SO | | |
| 0 | 0 | 17 | 3 | 4 | 3 | 20 | |
| 0 | 0 | 85% | 15% | 20% | 10% | 15% | Credits % |

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Scheme of Evaluation

B. Tech. IV Semester (Automobile Engineering)

Maximum Marks Allowed

| S. No. | Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | | Contract Hours per week | | | Mode of Teaching | Mode of Exam. | Duration of Exam. | | | |
|--------------|--------------|---------------|--|---------------------|-------------------------------|-----------------------|------------------|----------------|-----------------------------|--------------------------|---|----|------------------|---------------|-------------------|-----|---------------|-------------|
| | | | | End Term Evaluation | | Continuous Evaluation | | End Sem. Exam. | End Evaluation | | L | T | | | | P | Total Credits | |
| | | | | End Sem Exam | Proficiency in subject/course | Mid Sem Exam | Quiz/Assignments | | Lab work & Seasonal Project | Skill Based Mini Project | | | | | | | | Total Marks |
| 1 | 1000023 | BSC | ENGINEERING Mathematics-III | 50 | 10 | 20 | 20 | - | - | - | 2 | 1 | - | 3 | Blended | PP | 2 hr | |
| 2 | 1000024 | DX | Theory of Machines-1 (TX-4) | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 2 | 1 | 2 | 4 | Blended | AO | 2 hr | |
| 3 | 1000027 | DX | Automotive Electrical and Electronic System (DX-7) | 50 | 10 | 20 | 20 | - | - | - | 3 | 1 | - | 4 | Blended | PP | 2 hr | |
| 4 | 1000028 | DX | Engineering Thermodynamics (DX-8) | 50 | 10 | 20 | 20 | - | - | - | 3 | 1 | - | 4 | Blended | PP | 2 hr | |
| 5 | 1000034 | MC | Cyber Security (MC) | 50 | 10 | 20 | 20 | - | - | - | 2 | - | - | 2 | Blended | MCO | 1.5 hr | |
| 6 | 190415 | DLC | Production Lab (DLC-2) | - | - | - | - | 60 | 20 | 20 | - | - | 4 | 2 | Offline | SO | - | |
| 7 | 200000X | CLC | Novel Engaging Course (Informal Learning) | - | - | - | - | 50 | - | - | - | - | 2 | 1 | Offline | SO | - | |
| Total | | | | 250 | 50 | 100 | 100 | 170 | 40 | 40 | - | 12 | 4 | 8 | 20 | - | - | - |
| 8 | 1000001 | MAC | Indian Constitution and Traditional Knowledge | 50 | 10 | 20 | 20 | - | - | - | 2 | - | - | - | Online | MCO | 1.5 hr | |

Summer Internship Project-II (Softskills Based) for two weeks duration: Evaluation in V Semester

Proficiency in course subjects includes the weightage towards ability/skill/competence/acknowledged level's experience attained etc. in that particular course/subject.

MACQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SQ: Submission + Oral

| Mode of Teaching | Theory | | | Lab | | | Mode of Examination | | | Total Credits |
|------------------|---------|---------|--------|---------|---------|--------|---------------------|-----|-----|---------------|
| | Offline | Blended | Online | Offline | Blended | Online | AO | MCO | MCQ | |
| | 0 | 17 | 0 | 3 | 4 | 4 | 4 | 2 | 2 | 20 |
| | 0 | 85% | 0 | 15% | 20% | 20% | 55% | 10% | 15% | Credits % |

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For batches admitted in Academic Session 2021-22

120412: Design of Machine Elements

| Category | Title | Code | Credit-4 | | | Theory Paper |
|-------------------------|-------------------------------|--------|----------|---|---|---------------------------------|
| | | | L | T | P | Max.Marks-50 Duration-2 hrs. |
| Departmental Core-DC | Design of Machine Elements | 120412 | 2 | 1 | 2 | |
| | | | | | | |

Note: Use of PSG Design Data book is permitted in exam.

Course Pre-Requisites:

Mathematics-I
 Mechanics of Materials

Course Objectives: To make the students:

1. Able to identify, formulate and solve design engineering problems.
2. Develop an ability to use the techniques, skills and modern design engineering tools necessary for engineering practice.
3. Demonstrate the ability to make proper assumptions, perform correct analysis while design upon various mechanical machine elements.

Syllabus

Unit-I Introduction: Design process, Factor of safety, design standards and units, Material selection in Mechanical Design, surface finish symbols, Surface Roughness, limit, fit, and tolerance, Gauge design, Tolerance analysis in manufacturing and assembly, Design for Manufacturability, Comparison between conventional design process and modern design process

Unit-II Bolted, Riveted and Welded joints: Definition, Nomenclatures, Classifications, Applications, Methods of joining, Loadings & Failures, Design procedures, Eccentric loading problems.

Unit-III Cotter and Knuckle joints: Definitions, Nomenclature, Classifications, Comparison between keys and cotters, Design of Socket and spigot cotter joint, Sleeve type Cotter joint, Cotter with Gib, Knuckle Joint, Suspension link, Pin joint, Adjustable joint, Turn-buckle.

Unit-IV Shafts, Keys and Couplings: Definitions, Classifications and Applications. Design under various loads and cases.

Unit-V Theories of Failures: Maximum normal stress and shear stress theory, maximum normal strain and shear strain theory, maximum distortion energy theory. Applications of theories to different material. Introduction to 2D, 3D modules and tools, Fundamentals and applications of CAD/CAM. Concept of computer aided drafting and Machine drawing.

Course Outcomes: After successful completion of this course students will be able to:

CO1 Describe the basic design process and function of Permanent and temporary joints used in Machine Design

CO2 Summarize the design techniques, skills and tools used in design

CO3 Solve the various design engineering problems by formulate and proper assumptions for practice.

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- CO4 Analyze** the stress and strain on mechanical components; and understand, identify and quantify failure modes for mechanical parts
CO5 Evaluate the cases of Temporary and permanent joints problems successfully
CO6 Create design techniques for a mechanical component under variety of environmental and service conditions.

Text & Reference Books

1. Mechanical Engineering Design by Shigley JE et al; TMH
2. Machine Design by Mubeen
3. Design of Machine elements by Bhandari VB; TMH
4. Text Book of Machine Drawing by John KC; PHI Learning
5. Engineering design – George Dieter, MGH, New York.
6. Machine Drawing by Bhat, ND; Charotar.
7. Machine Drawing by Narayana and Reddy; New age, Delhi.
8. Design data book by PSG
9. Fundamental of Engg Drawing Interactive Graphics by Luzzader WJ, Duff JM; PHI.
10. Mechanical design data book by Mahadevan and Reddy's; CBS

NPTEL Link for Design of Machine Elements

<http://nptel.ac.in/courses/112105124/>

List of Experiments

1. Design and drawing of Single, double and triple riveted joint
2. Design and drawing of Single and double strap butt joint
3. Design and drawing of Welded joint
4. Design and drawing of Socket and Spigot cotter joint
5. Design and drawing of Gib and Cotter joint.
6. Design and drawing of Knuckle joint
7. Study of Theories of failure
8. Design and drawing of Solid and hollow shaft
9. Design and drawing of Rigid coupling
10. Design and drawing of Flexible coupling

Laboratory Course Outcomes: After the completion of the course Lab students will be able to
CO1 Design and analysis the different part of an I.C Engine like Piston, cylinder, connecting rod, crank shafts, flywheel.

CO2 Compare the materials used in designing the automobile engine parts.

CO3 Use the software like AUTO CAD, CATIA, PRO/E, SOLID WORKS.

CO4 Select the spring for a proper application also can select the proper material of spring.

CO5 Design the different types of gear like spur gear, helical gear, worm gear, bevel gear and also able to know their practical applications.

CO6 Create a gear box for modern Automotive vehicles and can use this for the benefits of society.

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For batches admitted in Academic Session 2021-22

Metal Cutting and Machine Tools

| Category | Title | Code | Credit: 4 | | | Theory Paper |
|-------------------------|------------------------------------|--------|-----------|---|---|---------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Metal Cutting and Machine Tools | 120413 | | | | Max.Marks-50 Duration-2 hrs. |
| | | | 3 | 1 | - | |

Course Objectives: To make the students understand:

1. The fundamental knowledge and principles in material removal processes.
2. The fundamentals and principles of metal cutting to practical applications through
3. The fundamentals of machining processes and machine tools.

Syllabus

Unit-I Mechanics of Metal Cutting: Introduction to manufacturing and machining, Classification of metal removal processes, Geometry of single point cutting tool and tool angles. Tool nomenclature. Conversion of tool angles from one system to another, Mechanics of chip formation and types of chips, chip breakers. Orthogonal and oblique cutting, cutting forces and power required, theories of metal cutting. Thermal aspects of machining and measurement of chip tool interface temperature. Friction in metal cutting. **Machinability & Cutting Fluids:** Concept and evaluation of machinability, tool life, mechanism of tool failure, tool life and cutting parameters, machinability index, factors affecting machinability. Advanced Cutting Tool Materials, Cutting Fluids

Unit-II General Purpose Machine Tool: Constructional detail of milling, shaper and planer machines. Tooling, attachments and operations performed, selection of cutting parameters, calculation of forces and time for machining. Broaching operation. Capston and turret Lathes, single and multiple spindle automates, operations, planning and tool layout.

Unit-III Abrasive Processes & surface Finishing: Abrasive, natural and synthetic, manufacturing nomenclature. Selection of grinding wheels, wheel mounting and dressing. **Surface Finish:** Elements of surface roughness, evaluation and representation and measurement of surface roughness, relationship of surface roughness to production methods.

Unit-IV Gear Manufacturing Processes: Introduction, materials, methods of gear manufacturing, Gear Milling, Gear Hobbing & Gear Shaping Machine Tools and processes. Modern gear manufacturing methods, gear inspection.

Unit-V Non Conventional machining: Benefits, general application and survey of Non-conventional machining processes. Mechanism of metal removal, tooling and equipment and specific applications of EDM, LBM, EBM, ECM, USM, AJM, WJM, AWJM, PAM processes

Course Outcomes: After successful completion of this course students will be able to

- CO1: apply cutting mechanics to metal machining based on cutting force and power consumption.
- CO2: operate lathe, milling machines, drill press, grinding machines, etc.
- CO3: select cutting tool materials and tool geometries for different metals.
- CO4: choose appropriate machining processes and conditions for different metals.
- CO5: optimize parameters for material removal in unconventional machining processes.
- CO6: identify the process parameters, their effect and applications of different processes

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Text Books

1. Fundamentals of Metal Cutting and Machine Tool by Boothroyd Geofery; McGH, Kogakuha Ltd.
2. Production Technology by Jain, R.K. and Gupta, S.C; Khanna Publishers.

Reference Books:

1. Workshop Technology by Chapman, Volume I, II, & III, ELBS.
2. Production Technology by HMT; McGraw Hill, New Delhi.

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For batches admitted in Academic Session 2021-22

Engineering Thermodynamics

| Category | Title | Code | Credit-3 | | | Theory Paper |
|-------------------------|-------------------------------|-------------------|----------|---|---|---------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Engineering Thermodynamics | 120414/ 190413 | 2 | 1 | - | Max.Marks-50 Duration-2 hrs. |
| | | | | | | |

Course Objective: To make students able to:

1. Understand the nature and role of the various thermodynamic properties of matter.
2. Represent a thermodynamic system by a control mass or control volume and identify work and/or heat interactions between the system and surroundings.
3. Recognize the different forms of energy and restrictions imposed by the laws of thermodynamics on conversion from one form to another.

Course Prerequisites: Basic Mechanical Engineering

Syllabus

Unit-I Basic Concepts: Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, Statement and significance, Concept of an Ideal gas, Gas Laws, Avogadro's Hypothesis, Heat and work transfer. First law of thermodynamics –Statement of first law of thermodynamics, first law applied to closed system undergoing a cycle, Process analysis of closed system flow process, Flow energy, Steady flow process analysis of closed system processes, Limitations of first law of thermodynamics.

Unit -II Properties of pure substances: - P-V-T surfaces, h-s, T-S, P-V, P-h, T-V diagrams of pure substance, saturated and sub-cooled liquid, superheated vapour, quality of steam, Mollier diagram, steam table, different processes, measurement of quality of steam

Unit -III Second law of thermodynamics: Heat engine, Heat reservoir, Refrigerator, Heat pump, COP, Carnot's theorem, Carnot's cycle, Efficiency of Carnot's cycle, Statement of second law, Reversible and Irreversible processes, Consequences of Second law.

Unit -IV Availability and Irreversibility: Entropy, Entropy changes of Ideal gas, Available energy, T-S diagram, Availability and Irreversibility.

Unit- V Thermodynamics Relations: Thermodynamics relations, e.g Maxwell relations and their applications.

Air Standard Cycles: Carnot, Sterling, Ericsson, Otto, Diesel, Dual cycles and determination of their air standard efficiencies and their comparison. Brayton cycle, Atkinson cycle. PVT relationship, Mixture of ideal gases Properties of mixture of gases.

Course Outcomes: After successful completion of this course students will be able to:

CO1: Define energy interactions between system and surroundings.

CO2: Correlate the law of thermodynamics to real life applications

CO3: Apply the laws of thermodynamics to analyze boilers, heat pumps, refrigerators, heat engines, compressors and nozzles

CO4: Analyze the thermal efficiency of air standard cycles

CO5: Analyze the entropy concept in thermodynamic systems.

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CO6: Describe benefits of improvements to thermodynamic systems.

Text & Reference Books:

1. Engineering thermodynamics by P.K. Nag
2. Thermal engineering by R.K. Rajput
3. Thermal engineering by P.L. Ballaney
4. P.L. Dhar Thermal Engineering

NPTEL Link for Engineering Thermodynamics

https://onlinecourses.nptel.ac.in/noc18_ch03/preview

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P.K. Nag
R.K. Rajput
P.L. Ballaney
P.L. Dhar
P.K.

For batches admitted in Academic Session 2021-22

Theory of Machines-I

| Category | Title | Code | Credit-I | | | Theory Paper |
|-------------------------|----------------------|--------|----------|---|---|---------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Theory of Machines-I | 190411 | | | | Max.Marks-50 Duration-2 hrs. |
| | | | 2 | 1 | 2 | |

Pre-Requisite:

Engineering Graphics, Mechanics of Material

Course Objectives:

To make the students:

1. Familiarize with different types of mechanisms.
2. Understand the basics of synthesis of simple mechanisms.
3. Apply fundamental of mechanics to machines which include engines, linkages etc.,

Syllabus:

Unit-I Mechanism: Machine, Mechanism, Kinematics Links, Pairs, Chains, Degree of freedom, Mechanisms and its Inversions; Slider, Double Slider and 4 bar mechanism. Lower pair mechanisms: pantograph, Straight line motions, Davis and Ackerman Steering Mechanisms.

Unit-II Kinematic Analysis: Displacement, velocity and acceleration analysis of plane mechanisms; relative velocity, instantaneous Centre, Kennedy's Theorem, Klein's construction methods. Coriolis component.

Unit-III Dynamic Analysis: D'Alembert's principle, Equivalent dynamic system, Graphical and analytical methods of dynamic forces, analysis of mechanisms and machines including reciprocating engines.

Flywheel: Introduction, Turning-moment diagrams and Flywheel analysis.

Unit-IV Brakes: Analysis of simple brake assuming uniform pressures and uniform wear, band brake, block brakes, internal and external shoe brakes, braking of vehicles.

Clutches: Single plate and multi plate clutches, cone clutches, centrifugal clutches.

Dynamometers: Different types and their applications.

Unit-V Governors: Introduction, Types of governors, Various gravity and spring-controlled governors, governor characteristics, Effort and power of a governor, Controlling force diagrams, Coefficient of insensitiveness.

Gyroscopes: Gyroscopic couple, Effect of Gyroscopic couple on the stability of four wheel and two-wheel vehicles, Aeroplanes and Naval ships, Gyrostabilisers.

Course Outcomes:

After successful completion of this course students will be able to:

CO 1. Identify basic mechanisms in real life applications.

CO 2. Discuss about mechanics of various machines.

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- CO 3. Apply fundamental principles of statics and dynamics to machinery.
CO 4. Analyze various types of motions and mechanisms of machinery.
CO 5. Evaluate the applications of concepts of components e.g. governor, clutch, brakes, flywheel etc.
CO 6. Create the mechanism or components to justify the demands of work such as flywheel, mechanism etc.

Text Books:

1. Theory of Machines by Rattan, SS; TMH
2. Theory of Machine by Norton, RL; TMH
3. Theory of Machine by Ballaney, PL; Kanna Pub.
4. Mechanism and Machine Theory by Ambekar, AG; PHI.
5. Theory of Mechanism and Machines by Sharma, CS and Purohit K; PHI.
6. Theory of Machines by Bevan, Thomas; Pearson/ CBS PUB Delhi.
7. Mechanism and Machine Theory by Rao, JS and Duggipati; NewAge Delhi.
8. Theory of Machines by Lal, Jagdish; Metropolitan Book Co; Delhi -
9. Theory of Mechanisms & Machines by Ghosh, A., Mallik, AK; Affiliated East West Press, Delhi.

NPTEL Link for Theory of Machines-I

<http://nptel.ac.in/courses/112104121/1> and <http://nptel.ac.in/courses/112104114/>

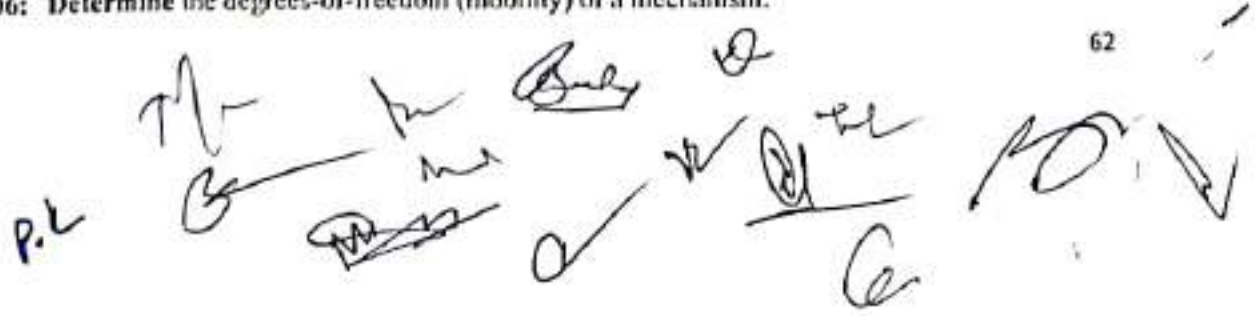
List of experiments

1. Study of Kinematics links pairs and chains.
2. To find degree of freedom of a given mechanism.
3. To study all inversions of four-bar mechanisms using models.
4. Draw velocity and acceleration polygons of all moving link joints in slider crank mechanism.
5. Study of inertia forces in reciprocating parts and analysis of flywheel.
6. Study of various types of governors.
7. Study of various types of clutch.
8. Study of various types of brakes.
9. Study of various types of dynamometer.
10. Use virtual lab for any two experiments.
11. Determine the gyroscopic effect of a rotating disc.
12. Determine the Coriolis's component of acceleration.
13. Find the total slip, creep, velocity ratio and coefficient of friction between belt and pulley system.
14. Measure the percentage slip at fixed belt tension by varying load on brake drum

Course Outcomes:

After successful completion of this course students will be able to:

- CO1: Design and analyze mechanism required for the specified type of motion.
CO2: Construct different types of cam profile for a given data.
CO3: Draw inversions and determine velocity and acceleration of different mechanisms.
CO4: Analyze various motion transmission elements like gears, gear trains, cams, belt drive and rope drive.
CO5: Compare the various components related to machines and mechanism.
CO6: Determine the degrees-of-freedom (mobility) of a mechanism.

P.L. 

For batches admitted in Academic Session 2021-22

Automotive Electrical & Electronics System

| Category | Title | Code | Credit-4 | | | Theory Paper Max.Marks-50 Duration-2hrs. |
|-------------------------|--|--------|----------|---|---|--|
| | | | L | T | P | |
| Departmental Core-DC | Automotive Electrical & Electronics System | 190412 | 3 | 1 | - | |

Pre-requisite:

Basic Electrical and Electronics Engineering

Course Objectives:

To make the students:

1. Provide knowledge about application of electrical and electronics in automobile engineering
2. Develop skill of finding faults and rectification of ignition circuits and wiring.
3. Study different types of sensors, working and their applications.

Syllabus:

UNIT I ELECTRIC POWER SOURCE:

Storage Batteries: Requirements, Basic Principle, construction, charging and discharging of battery, battery characteristics, battery Capacity, Efficiency, Rating and performance of lead acid battery, Battery types: Maintenance free battery, AGM battery, Deep cycle resistant battery, Battery maintenance, Electrolyte, Battery tests, Battery charging equipment and methods. Battery malfunctions.

UNIT II STARTER AND CHARGING SYSTEMS:

Starter and charging system: Requirements of starter, design factors, classification, operation of starter, triggering the starter, characteristics of starter motor, type of starting, motor drive mechanisms, starter switch, starter system fault Diagnosis.

Charging systems and Accessories: D.C. generator & A.C. alternators, Magneto, Armature reaction, Cut out relay, Voltage and Current regulatory system for generator and alternators. Electrodynamics and electromagnetic principle.

UNIT III AUXILLIARY SYSTEMS:

Symbols used in circuit diagrams, Lighting equipment's: low beam and high beam head lamp (Reflection headlamps, facet-type reflector, PES headlamps, Xenon headlamps, Bi-Litronic), tail lamps, fog lamps, brake light, side indicator, parking and other indicating lights. Principle of automotive illumination, dash board lights, indicators and meters, speedometers, electric horn, windshield wiper, heaters & defrosters, electric horn and relay devices.

Different types of gauges and indicators. Electrical fuel pump. Ignition system: Contact less electronic ignition system, electronic spark timing and its control. EG Rcontrol.

Electronic ignition systems – Spark advance correction schemes: Vacuum Advance Mechanism, Centrifugal Advance Mechanism, fuel injection timing control.

UNIT IV ELECTRONIC VEHICLE MANAGEMENT SYSTEM: Cruise control system, Electronic suspension system, Low tire pressure warning system. Microprocessor and microcomputer-controlled devices in automobiles such as voice warning system, travel information system, keyless entry system, Automatic transmission system, Electronic steering system

Sensors: Basic sensor arrangements. Types of sensors – oxygen sensor, hot wire anemometer sensor, vehicle speed sensor, detonation sensor, accelerometer sensor, Crank position sensor.

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UNIT V SAFETY SYSTEMS:

Antilock braking system, air bag restraint system, voice warning system, seat belt system, road navigation system, antitheft system.

Text Books:

1. Modern Electrical Equipment of Automobiles by Judge. A.W; Chapman & Hall, London, 1992
2. Automobile Electrical Equipment by Young A. P., & Griffiths L.; English Language Book Society & New Press, 1990
3. Automotive electrical equipment's, P.L. Kohli, TMH
4. Electrical Ignition Equipment, Constable & Co Ltd. by Spreadbury. F.G; London, 1962
5. Automotive computers and Digital Instrumentation by Robert N Brady; A Reston Book, Prentice Hill, Eagle Wood Cliffs, New Jersey, 1988..

Course Outcomes:

After successful completion of this course students will be able to:

- CO1 State various laws of Basic Electrical & Electronics.
- CO2 Identify the different types of electrical and Electronics components of Automotive Vehicles.
- CO3 Explain the working principle of different electrical & Electronic components.
- CO4 Apply the knowledge of electrical & Electronics to calculate different performance parameters.
- CO5 Analyse the performance of various components used in different Conditions.
- CO6 Create vehicle electrical and electronic circuits as per various segments of vehicles.

List of Experiments (Expandable):

1. Experiment on testing and study of different types of Batteries and constructions.
2. Testing, Assembling and dismantling of starter motor used in automobile.
3. Testing, Assembling and dismantling of alternator used in automobile.
4. Study of different color code system used in automotive wiring system.
5. Demonstration and study of Battery Ignition System and their parts used in Automobile Vehicles.
6. Study of different Electrical Equipment's & Accessories (Speedometer, Warning lights, Electric Horn, Wind shield wipers system)
7. Study of different sensor used in modern automotive system.
8. Study of various electronics system (Electronic fuel injection system, Electronic ignition system, Air bag, ABS, Electronic fuel injector cleaner).
9. Demonstration and experiment on lighting system, head light
10. Demonstration, experiment and diagnosis on ignition system.

Course Outcomes:

After successful completion of this course students will be able to:

- CO1 Define the Starting, Charging and ignition system.
- CO2 Explain the working principle of different electrical & Electronic components.
- CO3 Apply the knowledge of sensors and safety related devices of electrical system in Vehicles.
- CO4 Evaluate the different Ignition, Charging & Safety systems in vehicles.
- CO5 Analyse the performance of various components used in different Conditions.
- CO6 Develop vehicle electrical and electronic circuits as per various segments of vehicles.

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For batches admitted in Academic Session 2021-22

Production Lab

| Category | Title | Code | Credit-2 | | | Practical Slot |
|------------------------------|-------------------|---------------|----------|---|---|------------------------------|
| | | | L | T | P | |
| Departmental Lab Core-DLC | Production Lab | 120415/190415 | L | T | P | Max.Marks-60 Min.Marks-19 |
| | | | - | - | 4 | |

Course Objective:

1. To demonstrate the fundamentals of machining processes and machine tools.
2. To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.
3. To apply the fundamentals and principles of metal cutting to practical applications through multiple labs using lathes, milling machines, grinding machines, etc.

List of Experiments:

1. Step Turning and Taper Turning on Lathe.
2. Threads Cutting and Knurling on Lathe.
3. Machining Flat Surface using Shaper Machine.
4. Manufacturing of Spur Gear using Milling Machine.
5. Making Internal Splines using Slotting Machine.
6. Hole on work piece through Drilling.
7. Grinding of Single Point Cutting Tool
8. Slot / Groove cutting using shaping machine.
9. Performance on mold making of Simple component.
10. Performance on pattern making of Simple component.
11. Performance on Metal Casting of Simple component.
12. Performance on Welding of simple work piece (Example Arc Welding)
13. Performance on Sheet Metal work of Simple component.
14. Performance on hot forging of Simple component
15. All Students must complete one skill based project assigned by faculty

Laboratory Course Outcomes: After the completion of the course Lab student will be able to:

- CO1 Define the different conventional method of material removal and function of different parts.
- CO2 Apply the theory of metal cutting in experiments.
- CO3 Perform step, taper turning, knurling and threading.
- CO4 Produce stepped surface using shaper and keyway using milling machine.
- CO5 Demonstrate knowledge of different machine tools used in machine shop.
- CO6 Evaluate the chip thickness ratio, shear angle and material removal rate.

| | |
|--------------|--|
| Item ME11 | To review and finalize the Experiment list/ Lab Manual for Laboratory Courses to be offered in IV (for batch admitted in 2021-22). |
|--------------|--|

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| Mechanical/Automobile Engg. | | |
|-----------------------------|---------------|----------------------------|
| S.No. | Subject Code | Subject Name |
| 1 | 120412 | Design of Machine Elements |
| 2 | 190411 | Theory of Machines-I |
| 3 | 120415/190415 | Production Lab |

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Academic session 2021-22 admitted

120412: Design of Machine Elements

| Category | Title | Code | Credit-4 | | | Theory Paper |
|----------------------|----------------------------|--------|----------|---|---|---------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Design of Machine Elements | 120412 | 2 | 1 | 2 | Max.Marks-50 Duration-2 hrs. |
| | | | | | | |

List of Experiments

1. Design and drawing of Single, double and triple riveted joint
2. Design and drawing of Single and double strap butt joint
3. Design and drawing of Welded joint
4. Design and drawing of Socket and Spigot cotter joint
5. Design and drawing of Gib and Cotter joint.
6. Design and drawing of Knuckle joint
7. Study of Theories of failure
8. Design and drawing of Solid and hollow shaft
9. Design and drawing of Rigid coupling
10. Design and drawing of Flexible coupling

Laboratory Course Outcomes: After the completion of the course Lab students will be able to

- CO1 Design and analysis the different part of an I.C Engine like Piston, cylinder, connecting rod , crank shafts , flywheel.
- CO2 Compare the materials used in designing the automobile engine parts.
- CO3 Use the software like AUTO CAD , CATIA , PRO/E, SOLID WORKS.
- CO4 Select the spring for a proper application also can select the proper material of spring.
- CO5 Design the different types of gear like spur gear, helical gear , worm gear , bevel gear and also able to know their practical applications.
- CO6 Create a gear box for modern Automotive vehicles and can use this for the benefits of society.

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190411: Theory of Machines-I

| Category | Title | Code | Credit-4 | | | Theory Paper |
|-------------------------|----------------------|--------|----------|---|---|---------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Theory of Machines-I | 190411 | L | T | P | Max.Marks-50 Duration-2 hrs. |
| | | | 2 | 1 | 2 | |

List of experiments

1. Study of Kinematics links pairs and chains.
2. To find degree of freedom of a given mechanism.
3. To study all inversions of four-bar mechanisms using models.
4. Draw velocity and acceleration polygons of all moving link joints in slider crank mechanism.
5. Study of inertia forces in reciprocating parts and analysis of flywheel.
6. Study of various types of governors.
7. Study of various types of clutch.
8. Study of various types of brakes.
9. Study of various types of dynamometer.
10. Use virtual lab for any two experiments.
11. Determine the gyroscopic effect of a rotating disc.
12. Determine the Coriolis's component of acceleration.
13. Find the total slip, creep, velocity ratio and coefficient of friction between belt and pulley system.
14. Measure the percentage slip at fixed belt tension by varying load on brake drum

Course Outcomes:

After successful completion of this course students will be able to:

- CO1: Design and analyze mechanism required for the specified type of motion.
- CO2: Construct different types of cam profile for a given data.
- CO3: Draw inversions and determine velocity and acceleration of different mechanisms.
- CO4: Analyze various motion transmission elements like gears, gear trains, cams, belt drive and rope drive.
- CO5: Compare the various components related to machines and mechanism.
- CO6: Determine the degrees-of-freedom (mobility) of a mechanism.

120415/190415: Production Lab

| Category | Title | Code | Credit-2 | | | Practical Slot |
|------------------------------|-------------------|---------------|----------|---|---|------------------------------|
| | | | L | T | P | |
| Departmental Lab Core-DLC | Production Lab | 120415/190415 | L | T | P | Max.Marks-60 Min.Marks-19 |
| | | | - | - | 4 | |

List of Experiments:

- 1.- Step Turning and Taper Turning on Lathe.
2. Threads Cutting and Knurling on Lathe.
3. Machining Flat Surface using Shaper Machine.
4. Manufacturing of Spur Gear using Milling Machine.
5. Making Internal Splines using Slotting Machine.
6. Hole on work piece through Drilling.
7. Grinding of Single Point Cutting Tool
8. Slot / Groove cutting using shaping machine.
9. Performance on mold making of Simple component.
10. Performance on pattern making of Simple component.
11. Performance on Metal Casting of Simple component.
12. Performance on Welding of simple work piece (Example Arc Welding)
13. Performance on Sheet Metal work of Simple component.
14. Performance on hot forging of Simple component

Laboratory Course Outcomes: After the completion of the course Lab student will be able to:

- CO1 Define the different conventional method of material removal and function of different parts.
- CO2 Apply the theory of metal cutting in experiments.
- CO3 Perform step, taper turning, knurling and threading.
- CO4 Produce stepped surface using shaper and keyway using milling machine.
- CO5 Demonstrate knowledge of different machine tools used in machine shop.
- CO6 Evaluate the chip thickness ratio, shear angle and material removal rate.

| | |
|----------------------|--|
| Item ME12 | To review and finalize the suggestive list of projects under the 'Skill based mini-project' category in various laboratory courses to be offered in Jan - June 2023 semester during IV Semester (for the batch admitted in 2021-22). |
|----------------------|--|

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1

| Mechanical/Automobile Engg. (IV Sem) | | |
|--------------------------------------|---------------|----------------------------|
| S.No. | Subject Code | Subject Name |
| 1 | 120412 | Design of Machine Elements |
| 2 | 190411 | Theory of Machines-I |
| 3 | 120415/190415 | Production Lab |

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Academic session 2021-22 admitted

120412: Design of Machine Elements

1. FEA of lap joint based on various geometrical parameters to study the behaviour of weld strength
2. Simulation of welding to study residual stress and distortions
3. Analysis of composite multi leaf spring using ANSYS 2020 R1
4. Heat Transfer analysis for different materials of ball bearing using ANSYS 2020 R1
5. Numerical analysis of Modified tooth in Spur Gear for increasing the performance by reducing the assembly errors and gear slippage in the axial direction during dynamic loading.

190411: Theory of Machines-I

1. Investigation of gyroscopic couple for self-balancing vehicle
2. Understanding of balancing and alignment
3. Development of various toy mechanism
4. Understanding of Gear based quick return mechanism.
5. Investigation and understanding of geared cycle.
6. Understanding of gear mechanism used in watch.
7. Design of easy (make/use) cycle.
8. Working model of epicyclical gear train.
9. Investigation and understanding of sports cycle.

120415/190415: Production Lab

1. Design and simulation of venting passages to prevent blow hole defect.
2. Development of low-cost experimental setup to study metal flow through gating channels.
3. Preparation of different types of patterns by using wax/wood material.
4. Fabrication of working model of brazing and soldering setup.
5. Preparation of educational wooden model of different types of furnaces.
6. Working model of the coining machine and prepare the die for the coining.
7. Fabrication of plastic injection molding machine by using extrusion principle.

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8. Preparation of educational model of powder metallurgy setup.
9. Demonstration model of MIG and TIG setup.
10. Battery operated working model of lathe machine.
11. Working setup of Arduino CNC plotter.
12. Working model of foot operated hammering machine for forging purpose.





MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Mechanical Engineering

Scheme of Evaluation

B. Tech. I Semester (Mechanical Engineering)

Total Marks of all Subjects = 800

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | | | | | Contact Hours per week | | Total Credits | Mode of Exam. | Duration of Exam. | | |
|--|--------------|---------------------------|--|------------------------|-----------------------|----------------|----------------|-----------------------|----------------------|-------------|-----------|------------|-----------|--------------------------|-----------|---------------|---------------|-------------------|---------|---------|
| | | | | Theory Slot | | | Practical Slot | | | Total Marks | L | T | P | | | | | | | |
| | | | | End Term Evaluation | Continuous Evaluation | | End Sem. Exam. | Continuous Evaluation | | | | | | | | | | | | |
| | | | | | End Sem. Exam. | Mid Sem. Exam. | | Quiz/Assignment | Lab Work & Sessional | | | | | Skill Based Mini Project | | | | | | |
| 1. | 2100011 | BSC | Engineering Mathematics-I | 50 | 10 | 20 | 20 | - | - | - | - | 100 | 3 | 1 | - | 4 | Open Book | PP | 2 hrs | |
| 2. | 2100122 | ESC | Computer Programming | 50 | 10 | 20 | 20 | 80 | 20 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Restricted | AO | 2 hrs | |
| 3. | 2100021 | ESC | Basic Mechanical Engineering | 50 | 10 | 20 | 20 | - | - | - | - | 100 | 2 | 1 | - | 3 | Restricted | AOQ | 1.5 hrs | |
| 4. | 2100022 | ESC | Basic Electrical and Electronics Engineering | 50 | 10 | 20 | 20 | 80 | 20 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Restricted | AOQ | 1.5 hrs | |
| 5. | 2100020 | ESC | Basic Civil Engineering and Mechanics | 50 | 10 | 20 | 20 | - | - | - | - | 100 | 2 | 1 | - | 3 | Restricted | PP | 2 hrs | |
| 6. | 2120026 | ESC | Basic Mechanical Engineering Lab | - | - | - | - | 60 | 20 | 20 | 20 | 100 | - | - | 2 | 1 | Open Book | - | - | |
| Total | | | | 250 | 50 | 100 | 100 | 180 | 60 | 60 | 60 | 800 | 11 | 05 | 06 | 19 | - | - | - | - |
| 7. | 3000003 | Natural Sciences & Skills | Environmental Engineering | 50 | 10 | 20 | 20 | 30 | 10 | 10 | 10 | 150 | 1 | - | 2 | 3 | Open Book | Blended | MCQ | 1.5 hrs |
| Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept. Branch & Innovations. | | | | | | | | | | | | | | | | | | | | |

¹Proficiency in course/subject – includes the weightage towards ability/skill/competency/knowledge level/expertise attained etc. in that particular course/subject
 Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language
 Credits of Natural Sciences & Skills will be added in the VI Semester
 MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

M. K. S. S. S. S.
DEAN (ACADEMICS)
 M.I.T.S.
 Gwalior

M. K. S. S. S. S.
DEAN (ACADEMICS)
 M.I.T.S.
 Gwalior

M. K. S. S. S. S.
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 M.I.T.S.
 Gwalior



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Department of Mechanical Engineering
Scheme of Evaluation

B. Tech. II Semester (Mechanical Engineering)

For marks allotted in Academic session 2022-23

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | Contact Hours per week | | | Mode of Learning | Mode of Exam. | Duration of Exam. | | | | | |
|--------------|--------------|---------------------------|----------------------------|------------------------|-----------------------|--------------------------------|----------------|-----------------------|------------------|------------------------|----|-----|------------------|---------------|-------------------|-------|---------------|--------------------------|---------------------|---|
| | | | | Theory Slot | | | Practical Slot | | | Total Marks | L | T | | | | P | Total Credits | | | |
| | | | | End Term Evaluation | Continuous Evaluation | | End Sem. Exam. | Continuous Evaluation | | | | | | | | | | Skill Based Mini Project | | |
| | | | | | End Sem. Exam | Proficiency in subject /course | | Mid Sem. Exam. | Quiz/ Assignment | | | | | | | | | | Lab Work & Seasonal | |
| 1. | 2120221 | DC | Natural Science | 50 | 10 | 20 | 20 | - | - | - | - | 100 | 2 | 1 | - | 3 | Blended | PP | 2 hrs | |
| 2. | 2120222 | DC | Manufacturing Processes | 50 | 10 | 20 | 20 | - | - | - | - | 100 | 2 | 1 | - | 3 | Blended | PP | 2 hrs | |
| 3. | 2120223 | DC | Engineering Thermodynamics | 50 | 10 | 20 | 20 | - | - | - | - | 100 | 3 | 1 | - | 4 | Blended | PP | 2 hrs | |
| 4. | 2100014 | ESC | Engineering Graphics | 50 | 10 | 20 | 20 | - | - | - | - | 100 | 2 | 1 | - | 3 | Offline | AO | 2 hrs | |
| 5. | 2160222 | ESC | Python Programming | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended | AO | 2 hrs | |
| 6. | 2100014 | ESC | Manufacturing Practices | - | - | - | - | 60 | 20 | 20 | 20 | 100 | - | - | 2 | 1 | Offline | SO | - | |
| 7. | 2100018 | ESC | Engineering Graphics Lab | - | - | - | - | 60 | 20 | 20 | 20 | 100 | - | - | 2 | 1 | Offline | SO | - | |
| Total | | | | 250 | 50 | 100 | 100 | 180 | 60 | 60 | 60 | 800 | 11 | 05 | 06 | 19 | - | - | - | - |
| B. | 3000004 | Natural Sciences & Skills | Language | 50 | 10 | 20 | 20 | 30 | 10 | 10 | 10 | 150 | 1 | - | 2 | GRADE | Blended | MCQ | 1.5 hrs | |

Induction programme of three weeks (MCQ): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept. Branch & Innovations.

Proficiency in course/subject - includes the weightage towards ability/skill/competency /Acadmic level /expertise attained etc. in that particular course/subject

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language. Credits of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question

AO: Assignments + Oral

OB: Open Book

PP: Pen Paper

SO: Submission + Oral

M.D. 09/05/2023
DEAN (ACADEMICS)

| Mode of Teaching | | | | Mode of Examination | | | | Total Credits |
|------------------|-----|---------|---------|---------------------|-----|-----|------|---------------|
| Theory | Lab | Blended | Offline | Theory | Lab | MCQ | SO | |
| 3 | 1 | 14 | 2 | PP | 10 | 0 | 54.3 | |
| 15.78 | - | 7.368 | 10.5 | 52.6 | 0 | 0 | 10.5 | |
| | | | | | | | | 19 |
| | | | | | | | | 19 |
| | | | | | | | | 10.5 |
| | | | | | | | | 10.5 |

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

Basic Mechanical Engineering

| Category | Title | Code | Credit-3 | | | Theory Paper Max.Marks-50 Duration-2 hrs. |
|--------------------------------|------------------------------------|---|----------|---|---|---|
| | | | L | T | P | |
| Engineering Science- ESC | Basic Mechanical Engineering | 2100021/100204/CEL/ MEL/CSL/EEL/ ELL/TL/CHL/ BTL114/2X24 | 2 | 1 | - | |

Course Objectives: To make the students:

1. Develop the fundamentals of Engineering materials, measurement and reciprocating machines.
2. Develop an ability to understand the Thermodynamic laws, steam generator and reciprocating machines for solving engineering problems.
3. Demonstrate Engines and Boiler fundamentals using models.

Syllabus

UNIT-I:

Materials: Classification of engineering material, composition of cast iron and carbon steels on iron-carbon diagram and their mechanical properties; Alloy steel and their applications; Stress-Strain diagram, Hooks law and modulus of elasticity. Tensile, shear, hardness and fatigue testing of materials.

UNIT-II:

Measurement: Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainty analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lathe drilling, milling and shaping machines.

UNIT-III

Fluids: Fluid properties, pressure, density and viscosity; pressure variation with depth, static and kinetic energy; Bernoulli's equation for incompressible fluids, viscous and turbulent flow, working principle of fluid coupling, pumps, compressors, turbines, positive displacement machines and pneumatic machines. Hydraulic power & pumped storage plants for peak load management as compared to base load plants.

UNIT-IV

Thermodynamics: Zeroth, First, second and third law of thermodynamics; steam properties, steam processes at constant pressure, volume, enthalpy & entropy, classification and working of boilers, efficiency & performance analysis, natural and induced draught, calculation of chimney height. Refrigeration, vapour absorption and compression cycles, coefficient of performance (COP).

UNIT-V

Reciprocating Machines: Steam engines, hypothetical and actual indicator diagram; Carnot cycle and ideal efficiency; Otto and diesel cycles; working of two stroke & four stroke petrol and diesel IC engines.

Course Outcomes: After successful completion of this course students will be able to:

- CO1. Define the essential concepts of thermal, design and production used in Mechanical Engineering.
- CO2. Summarize fundamental techniques and process used in power generating machines
- CO3. Solve the various problems based on basic concepts of Mechanical Engineering.

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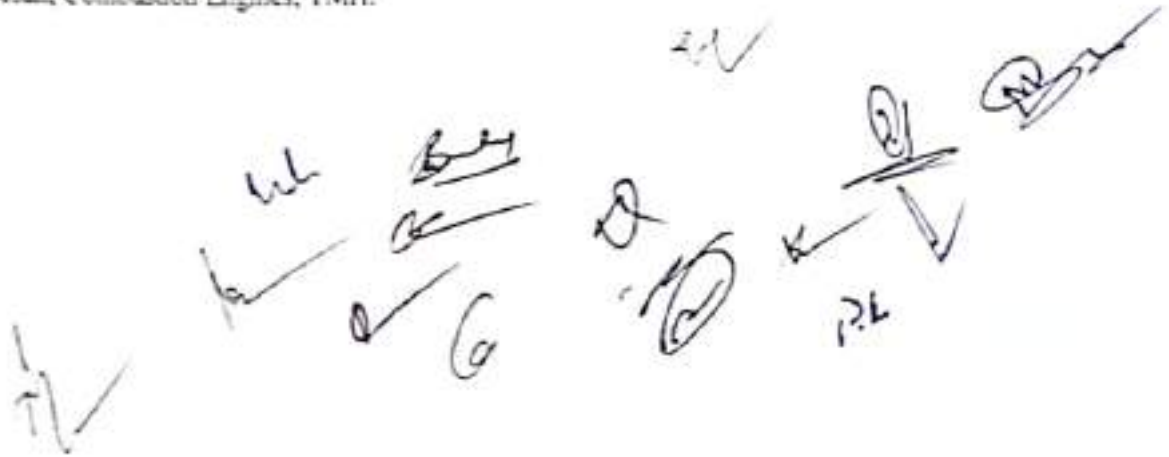
CO4. Analyze the various gas, steam and air cycles.

CO5. Evaluate the problems of Steam Generator. Thermodynamics, Steam and I.C. engines

CO6. Generate the skills to demonstrate steam Generator and reciprocating machine in depth.

Reference Books:

1. Narula, Material Science; TMH
2. Agrawal B & CM; Basic Mechanical Engineering; TMH
3. Nag PK, Tripathi et al; Basic Mechanical Engineering; TMH
4. Rajput; Basic Mechanical Engineering;
5. Sawhney GS; Fundamentals of Mechanical Engineering; PHI
6. Nakra and Chaudhary; Instrumentation and Measurement; TMH
7. Nag PK; Engineering Thermodynamics; TMH
8. Ganeshin; Combustion Engines; TMH.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
 (A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to IGIPV, Bhopal)
 Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

Basic Mechanical Engineering Lab

| Category | Title | Code | Credit-1 | | | Practical End Sem Max.Marks-60 Min.Marks-19 |
|-------------------------|----------------------------------|---------|----------|---|---|---|
| | | | L | T | P | |
| Engineering Science-ESC | Basic Mechanical Engineering Lab | 2120026 | L | T | P | |
| | | | - | - | 2 | |

Lists of Experiments:

1. Study of vertical boilers.
2. Study of Locomotive boilers.
3. Study of Babcock and Wilcox boilers.
4. Study of Lancashire, Cornish and Cochran boilers.
5. Study of boiler mounting and accessories.
6. Study of 2 stroke diesel and petrol engines.
7. Study of 4 stroke diesel and petrol engines.
8. Study of steam engines.
9. Study of Lathe machine.
10. Study of Vernier and Micrometer.
11. Study of Internal Combustion Engine Parts.

Skill Based Projects:

1. Measurement and calibration using slip gauges
2. Performing energy audit using stroboscope and lux meter
3. Make a Free energy Steam Engine at home
4. Make an Air Compressor at home
5. Mini Bench Tapping machine project
6. Make a Robotic Arm
7. Tornado in a bottle
8. Make a Hydraulic Lift
9. Thermal Expansion project
10. Make a positive displacement pump
11. Make a mini thermal power plant
12. Make a fire hydrant.
13. How an airplane wing creates lift and how wind turbine blades are spun by the wind. Make a model.
14. To make a model for measuring the pressure distribution in a convergent – divergent duct to confirm Bernoulli's equation.
15. Make a digital hydraulic bench.
16. To make a model for induced draught and natural draught

Course Outcomes: After successful completion of this course students will be able to:

- CO1. Define the essential concepts of thermal, design and production used in Mechanical Engineering.
- CO2. Summarize fundamental techniques and process used in power generating machines
- CO3. Solve the various problems based on basic concepts of Mechanical Engineering.
- CO4. Analyze the various gas, steam and air cycles.
- CO5. Evaluate the problems of Steam Generator, Thermodynamics, Steam and I.C. engines

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CO6. Generate the skills to demonstrate steam Generator and reciprocating machine in depth.

Reference Books:

1. Narula; Material Science; TMH
2. Agrawal B & CM; Basic Mechanical Engineering; TMH
3. Nag PK, Tripathi et al; Basic Mechanical Engineering; TMH
4. R jput; Basic Mechanical Engineering;
5. Sawhney GS; Fundamentals of Mechanical Engibneering; PHI
6. Nakra and Chaudhary; Instrumentation and Measurement; TMH
7. Nag PK; Engineering Thermodynamics; TMH
8. Ganesan; Combustion Engines; TMH



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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to BGPV, Bhopal)

Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

100014: Engineering Graphics

| Category | Title | Code | Credit-3 | | | Theory Slot |
|-------------------------|----------------------|--|----------|---|---|--|
| | | | L | T | P | |
| Engineering Science-ESC | Engineering Graphics | 2100014/100105/CEL/MEL/CSL/ EEL/ELL/ITL/CHL/ BTL105/1X25/BEEL/BELL/ BETL/BCHL/BAUL105/ BCEL/BMEL/BCSL/ BITL/BBTL204 | 2 | 1 | - | Max.Marks-50 Min.Marks-16 Duration-2hrs. |

Course Objective:

1. To inculcate the imagination and mental visualization capabilities for interpreting the geometrical details of common engineering objects.
2. To impart knowledge about principles/methods related to projections of one, two and three dimensional objects.

Syllabus:

Unit - 1

Introduction and scale: Basics of instruments, Lettering and dimensioning, Plane geometrical constructions. Plain and diagonal scale - Representative fraction, Unit conversion and Exercises based on linear, area, volume and speed. Scale of chord.

Engineering curves: Cycloidal curves - cycloid, epicycloid and hypocycloid curve, tangent and normal. Spiral curves - Archimedean and logarithmic spiral curves. Tangent & normal on the curves. Involute curve.

Unit - 2

Projection of points: Introduction, types of projections, quadrant system, positions of points and Exercise.
Projection of straight line: Introduction, Orientation of a straight line, Traces of a line and Exercise.

Unit - 3

Projection of planes: Introduction, Types of planes, Traces of planes, Position of planes and Exercise.
Projection of solids: Introduction, Types of solids, Positions of solids and Exercise.

Unit - 4

Section of solids: introduction, Types of section planes and Anti-section and Exercise.

Development of surfaces of right solids: Introduction, Methods of development & anti-development and Exercise.

Intersection of cylinders: Introduction, methods of developments, intersection of cylinder by another cylinder and exercise.

Unit - 5

Isometric projections: Introduction, isometric scale, isometric axis, isometric view and isometric projections from orthographic views, orthographic views from pictorial view and exercise.

Computer Aided Drafting using Auto CAD: Introduction, software's basic commands, transformation and editing commands.



Course Outcomes: After successful completion of this course students will be able to:

- CO1. Visualize the geometric details of engineering objects.
- CO2. Translate the geometric information of engineering objects into engineering drawings.
- CO3. Draw orthographic projections and sections.
- CO4. Develop knowledge to read, understand and explain drawing.
- CO5. Improve their skills so that they can apply these skills in developing new products.
- CO6. Prepare simple layout of factory, machine and buildings.

Text books:

- 1. Engineering Drawing by N. D. Bhatt, Charotar Publication Pvt. Ltd.
- 2. Engineering Drawing by P.S. Gill, S. K. kataria& sons, Delhi
- 3. Engineering Drawing by BasantAgrawal& C. M. Agrawal, Tata McGraw Hill Education Pvt. Ltd.
- 4. Engineering Graphics by K. Venugopal, New Age International Publication, India

NPTEL Link for Engineering Graphics:

<http://nptel.ac.in/courses/112103019/>



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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

Engineering Graphics Lab

| Category | Title | Code | Credit-1 | | | Practical End Sem |
|----------|--------------------------|---------|----------|---|---|-------------------|
| | | | L | T | P | |
| ESC | Engineering Graphics Lab | 2100018 | | | | Max.Marks-60 |
| | | | - | - | 2 | Min.Marks-19 |

Laboratory Work

List of Experiments:

- 1.To prepare sheet of Plain scale, diagonal scale and Scale of chord.
- 2.To prepare sheet of Cycloidal curves.
- 3.To prepare sheet of Projection of points and lines.
- 4.To prepare sheet of Projection of Planes.
- 5.To prepare sheet of Projection of Solids.
- 6.To prepare sheet of Section of Solids.
- 7.To prepare sheet of Development of Surfaces.
- 8.To prepare sheet of Isometric and Intersection of Solids

Skill Based Projects:

1. To prepare the 3D view of any object.
2. To Prepare scale for your home and make a map using this scale.
3. To prepare cut section models drawing of any object.
4. To make paper object, cut and show the development of surfaces.

Course Outcomes: After successful completion of this course students will be able to:

- CO1. Visualize the geometric details of engineering objects.
- CO2. Translate the geometric information of engineering objects into engineering drawings.
- CO3. Draw orthographic projections and sections.
- CO4. Develop knowledge to read, understand and explain drawing.
- CO5. Improve their skills so that they can apply these skills in developing new products.
- CO6. Prepare simple layout of factory, machine and buildings.

Text books:

- 1.Engineering Drawing by N. D. Bhatt, Charotar Publication Pvt. Ltd.
- 2.Engineering Drawing by P.S. Gill, S. K. kataria& sons, Delhi
- 3.Engineering Drawing by BasantAgrawal& C. M. Agrawal, Tata McGraw Hill Education Pvt. Ltd.
- 4.Engineering Graphics by K. Venugopal, New Age International Publication, India



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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

100024: Manufacturing Practices

| Category | Title | Code | Credit-I | | | Practical End Sem Max.Marks-60 Min.Marks-19 |
|-------------------------|-------------------------|---------|----------|---|---|---|
| | | | L | T | P | |
| Engineering Science-ESC | Manufacturing Practices | 2100024 | - | - | 2 | |

Course Objectives:

1. To familiarize with the basics of tools and equipment used in fitting, carpentry, sheet metal, welding and smithy.
2. To with the production of simple models in the above trades.
3. To develop general machining skills in the students.

Syllabus

UNIT-I

Introduction: Manufacturing Processes and its Classification, Casting, Machining, Plastic deformation and Metal forming, Joining Processes, Heat treatment process, Assembly process.

Black Smithy Shop

Use of various smithy tools. Forging operations; Upsetting, Drawing down, Fullering, swaging, Cutting down, forge welding, Punching and drafting.

Suggested Jobs: Forging of chisel, forging of Screw Driver.

UNIT-II Carpentry Shop

Timber: Type, Qualities of timber disease, Timber grains, Structure of timber, Timber seasoning, Timber preservation, Wood Working Tools: Wood Working Machinery, joints and joinery, various operations of planning using various carpentry planes sawing & marking of various carpentry joints.

Suggested Jobs: Name Plate, Any of the carpentry joint like mortise or tennon Joint.

UNIT-III Fitting Shop:

Study and use of measuring instruments, Engineer steel rule, Surface gauges caliper, Height gauges, feeler gauges, Micrometer. Different types of files, File cuts, File grades, Use of surface plate, Surface gauges drilling tapping Fitting Operations: Chipping filling, Drilling and Tapping.

Suggested Jobs: Preparation of job piece by making use of filing, sawing and chipping, drilling and tapping operation.

UNIT-IV Foundry:

Pattern Making: Study of pattern materials, pattern allowances and types of patterns, Core box and core print, Use and care of tool used for making wooden patterns.

Moulding: Properties of good mould& Core sand, Composition of Green, Dry and Loam sand. Methods used to prepare simple green and bench and pit mould dry sand bench mould using single piece and split patterns.

UNIT-V Welding: Study and use of tools used for Brazing, Soldering, Gas& Arc welding. Preparing Lap & Butt joints using Gas and Arc welding methods, study of TIG and MIG welding processes. Safety

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precautions.

Course Outcome: After successful completion of this course students will be able to:

- CO1. Discuss the hand tools, machine tools and power tools.
- CO2. Utilize appropriate tools required for specific operation.
- CO3. Apply safety measures required to be taken while using the tools in floor shops, Machine shops and carpentry shop.
- CO4. Use the techniques, skills, and modern engineering tools necessary for manufacturing and production engineering.
- CO5. Conduct experiments in the field of Production engineering.
- CO6. Design a system, components, or process to meet desired needs, ethical, health and safety, manufacturability and sustainability.

Text & References Books:

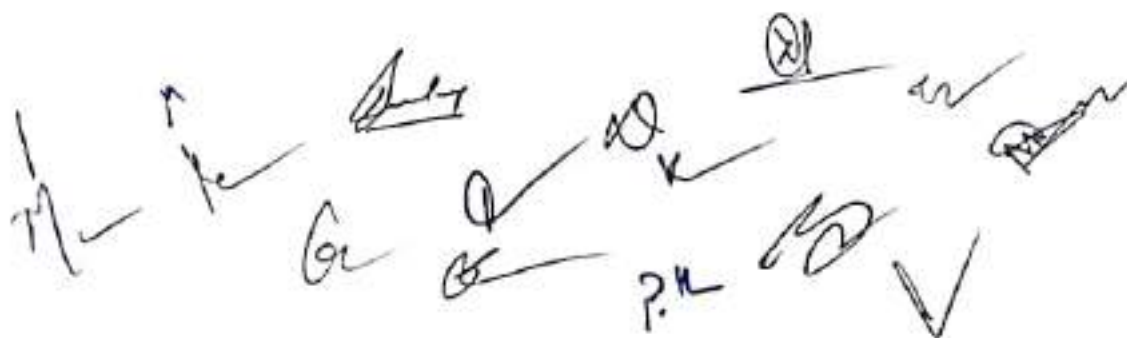
- 1. Bawa HS; Workshop Practice, TMH
- 2. Rao PN; Manufacturing Technology-Vol.1 & 2, TMH
- 3. John KC; Mechanical Workshop Practice; PHI
- 4. HazraChoudhry; workshop Practice-Vol.1 & 2.
- 5. Jain R. K.; Production Technology

NPTEL Link for Manufacturing Practices

<http://npTEL.ac.in/courses/112107145/>

Laboratory Work:

Relevant shop floor exercises involving practice in forging, Carpentry, fitting, pattern making, Sand casting, Moulding, Welding, Sheet metal fabrication techniques.



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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

120221/190221: Material Science

| Category | Title | Code | Credit-3 | | | Theory Paper Max.Marks-50 Duration-2hrs. |
|-------------------------|---------------------|--------------------------------|----------|---|---|--|
| | | | L | T | P | |
| Departmental Core-DC | Material Science | 2120221/2190221/ 190211/120211 | 2 | 1 | | |

Course Objectives: To make the students to understand:

1. The basic fundamentals of materials science and engineering.
2. The different classes of materials, their properties, structures and imperfections present in them.
3. The functional properties of materials and the roles of microstructure, heat treatment defects and environment play in typical engineering applications.

Syllabus

Unit-I Structure of materials

Fundamentals of crystal structures and crystal system, crystallographic planes and directions, linear and planar density, single crystal, polycrystalline material and non-crystalline materials, Homogeneous and heterogeneous solidifications, Crystal imperfections: point, line, surface and volume defects.

Unit-II Material testing and mechanical properties

Mechanical properties in static tensile, compression and bending tests, Hardness: Rockwell, Brinell, Vicker's, Impact toughness and fracture toughness.
Role of dislocations in plastic deformation, slip and twinning processes. Mechanism of ductile and brittle fracture. Fatigue: Cyclic stresses, S-N curve, crack initiation and propagation, factors affecting fatigue life; Creep: Generalized creep behavior, stress and temperature effects.

Unit-III Engineering Materials

Ferrous (Steels and Cast irons with role of different alloying elements) and non-ferrous metals and alloys (Aluminum, Magnesium, Titanium, Copper, Nickel alloys), Nano-materials, Ceramic material, Composite material with their properties and applications, Smart materials, Bio-materials

Unit-IV Phase diagrams and phase transformation of metal alloys

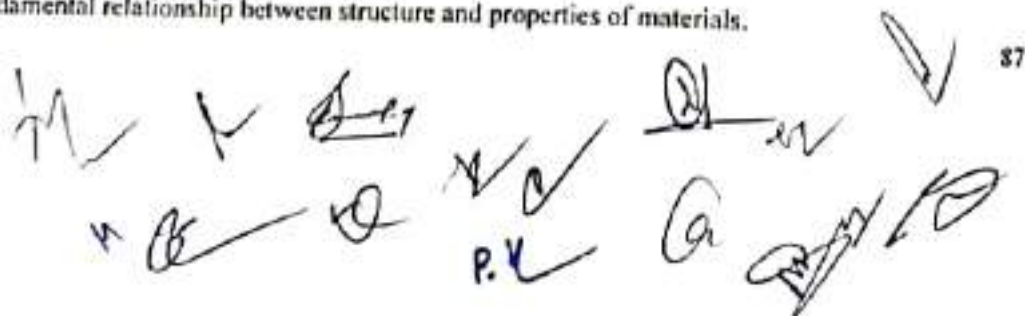
Concept of phases, Gibb's phase rule, Lever-rule, binary isomorphous and eutectic phase diagrams, Eutectoid, Peritectic and Peritectoid systems, allotropy in iron, Fe-Fe₃C phase diagram; Isothermal transformation of austenite, continuous cooling transformation of austenite, Objectives of heat treatments, Annealing, Normalizing, Hardening (bulk and surface)

Unit-V Environmental consideration and some case studies

Corrosion: Introduction, types & its prevention; generalized material selection process, material selection for torsionally-stressed cylindrical shaft, Automotive valve spring, orthopedic implants, Integrated circuit and etc.

Course Outcomes: After successful completion of this course students will be able to:

CO1. State fundamental relationship between structure and properties of materials.



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 Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

120222/190222: Manufacturing Processes

| Category | Title | Code | Credit-3 | | | Theory Paper |
|-------------------------|----------------------------|--|----------|---|---|--------------------------------|
| | | | L | T | P | Max.Marks-50 Duration-2hrs. |
| Departmental Core-DC | Manufacturing Processes | 2120222/21902 22/120311/190 319/190414/12 0403/190404 | 2 | 1 | - | |

Course Objectives: To make students:

1. Able to learn the various methods and types of castings, welding processes, sheet metal forming, powder metallurgy
2. Able to examine the principles associated with basic operations involving the forming, machining and welding of engineering materials;
3. Aware of the necessity to manage manufacturing processes and systems for the best use of material and human resources.

Course Pre-Requisites: Manufacturing Practice

Syllabus

Unit-I Casting: Brief History, Basic principle & survey of casting processes. Sand casting, pattern materials, and allowances. Green and dry moulding, moulding methods, moulding sand properties and testing. Elements of mould and design considerations. Cores use, core materials and core making practice. Die, investment and centrifugal casting processes. Melting practice and concepts in solidification. Inspection and defects analysis.

Unit-II Forming: Elastic and plastic deformation, Concept of strain hardening. Rolling, forging, extrusion, spinning, wire and tube drawing processes, machines and equipment's, parameters and force calculations.

Unit-III Sheet Metal Working: Role of sheet metal components. Cutting mechanism. Description of cutting processes like blanking, Piercing, lancing etc. Description of forming processes like bending cup drawing, coining, embossing etc. Basic elements of presses for sheet metal working. Punch and Die clearances and die elements.

Unit-IV Welding: Principle of welding, soldering, brazing and adhesive bonding. Survey of welding and allied processes. Arc welding: power sources and consumables. MMAW, TIG & MIG processes and their parameter selection. Resistance Welding: principle and equipment. Spot, projection and Seam welding processes, Gas welding and cutting: Processes and equipment.

Unit-V Powder Metallurgy: Powder manufacturing, compaction and sintering processes. Advantages and applications of P/M. Manufacturing of Powder metallurgy components.

Course Outcomes: After successful completion of this course students will be able to:

CO1- Describe the different types of manufacturing processes and their applications.

CO2- Identify suitable manufacturing process to achieve the required product shape with the aim of avoid defects, material and time wastage.

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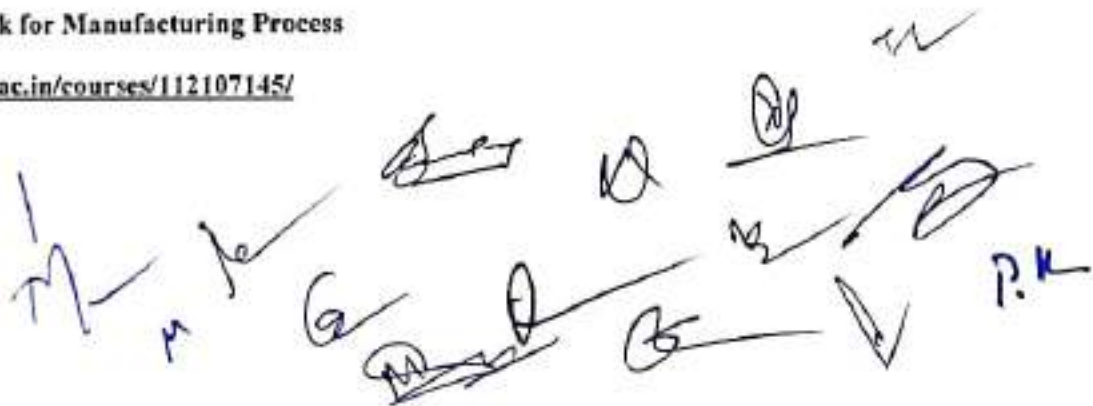
- CO3-Illustrate the advantage and limitations of various manufacturing processes with regard to shape formation and surface quality.
- CO4-Analyse the manufacturing processes for given problem and able to select an appropriate process according to a specific requirement.
- CO5-Evaluate the procedures and techniques involved for the manufacturing of components for its optimization.
- CO6-Propose a simplified manufacturing processes with the aim of reduction of cost and manpower.

Text & Reference Books

1. Jain R.K., Production Technology, Khanna Publishers, 2001.
2. Hajra Choudhry, Elements of Workshop Technology, Vol - X Media Promoters & Publishers, 1994.
3. Production Technology by HMT, Tata McGraw-Hill.
4. Chapman, W.A.J., Workshop Technology, Vol - II, Oxford & IBH Publishing Co. Ltd.,
5. Manufacturing Processes by Amstead, B.H., P.F. Oswald and M.L. Begeman, John Wiley and Sons Inc., New York.
6. Manufacturing Technology Vol. 1 by P.N. Rao.
7. Modern Manufacturing Process Engineering by Neibel, B.W., Alan B. Draper and R.A. Wysk, McGraw-Hill Publishing Co., New York.
8. Manufacturing Engineering and Technology by Kalpakjian, S, Addison-Wesley Publishing Co., New York.
9. Materials and Processes in Manufacturing by E. Paul DeGarmo, J. Temple Black, and Ronald Kohser, Macmillan Publishing Co., New York.
10. Introduction to Manufacturing Processes John A. Schey, McGraw-Hill Book Co., New York.

NPTEL Link for Manufacturing Process

<http://nptel.ac.in/courses/112107145/>



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

120223/190223: Engineering Thermodynamics

| Category | Title | Code | Credit-4 | | | Theory Paper |
|-------------------------|-------------------------------|---------------------|----------|---|---|---------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Engineering Thermodynamics | 2120223/ 2190223 | 3 | 1 | - | Max.Marks-50 Duration-2 hrs. |
| | | 120414/ 190413 | | | | |

Course Objective: To make students able to:

1. Understand the nature and role of the various thermodynamic properties of matter.
2. Represent a thermodynamic system by a control mass or control volume and identify work and/or heat interactions between the system and surroundings.
3. Recognize the different forms of energy and restrictions imposed by the laws of thermodynamics on conversion from one form to another.

Course Prerequisites: Basic Mechanical Engineering

Syllabus

Unit-I Basic Concepts: Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, Statement and significance, Concept of an Ideal gas, Gas Laws, Avogadro's Hypothesis, Heat and work transfer. First law of thermodynamics –Statement of first law of thermodynamics, first law applied to closed system undergoing a cycle, Process analysis of closed system flow process, Flow energy, Steady flow process analysis of closed system processes, Limitations of first law of thermodynamics.

Unit –II Properties of pure substances: - P-V-T surfaces, h-s, T-S, P-V, P-h, T-V diagrams of pure substance, saturated and sub-cooled liquid, superheated vapour, quality of steam, Mollier diagram, steam table, different processes, measurement of quality of steam

Unit –III Second law of thermodynamics: Heat engine, Heat reservoir, Refrigerator, Heat pump, COP, Carnot's theorem, Carnot's cycle, Efficiency of Carnot's cycle, Statement of second law, Reversible and Irreversible processes, Consequences of Second law.

Unit –IV Availability and Irreversibility: Entropy, Entropy changes of Ideal gas, Available energy, T-S diagram, Availability and Irreversibility.

Unit- V Thermodynamics Relations: Thermodynamics relations, e.g Maxwell relations and their applications.

Air Standard Cycles: Carnot, Sterling, Ericsson, Otto, Diesel, Dual cycles and determination of their air standard efficiencies and their comparison. Brayton cycle, Atkinson cycle. PVT relationship, Mixture of ideal gases Properties of mixture of gases.

Course Outcomes: After successful completion of this course students will be able to:

CO1: Define energy interactions between system and surroundings.

CO2: Correlate the law of thermodynamics to real life applications

CO3: Apply the laws of thermodynamics to analyze boilers, heat pumps, refrigerators, heat engines, compressors and nozzles

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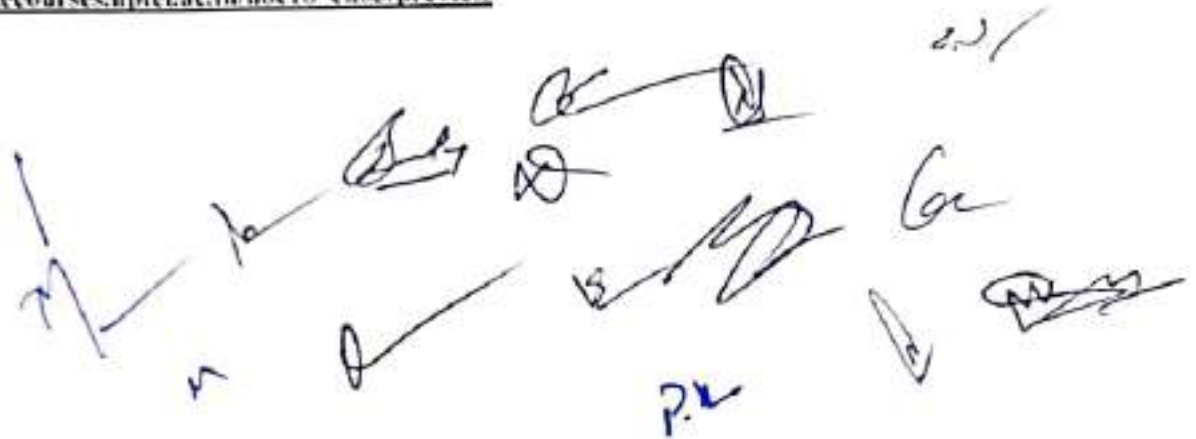
- CO4: Analyze the thermal efficiency of air standard cycles
- CO5: Analyze the entropy concept in thermodynamic systems.
- CO6: Describe benefits of improvements to thermodynamic systems.

Text & Reference Books:

1. Engineering thermodynamics by P.K. Nag
2. Thermal engineering by R.K. Rajput
3. Thermal engineering by P.L. Ballaney
4. P L Dhar Thermal Engineering

NPTEL Link for Engineering Thermodynamics

https://onlinecourses.nptel.ac.in/noc18_ch03/preview





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Department of Mechanical Engineering
Scheme of Evaluation

B. Tech. I Semester (Automobile Engineering)

(For batch admitted in academic session 2022-23)

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | | | | | Total Marks | Contact Hours per week | | | Mode of Exam. | Duration of Exam. |
|--------------|--------------|---------------------------|--|------------------------|-------------------------------|-----------------------|-----------------|----------------|-----------------------|--------------------------|---------------|------------------|-----------|-------------|------------------------|----------|---------------|---------------|-------------------|
| | | | | Theory Slot | | | Practical Slot | | | | Total Credits | Mode of Teaching | L | | T | P | | | |
| | | | | End Term Evaluation | | Continuous Evaluation | | End Sem. Exam. | Continuous Evaluation | | | | | | | | Total Credits | | |
| | | | | End Sem. Exam | Proficiency in subject course | Mid Sem. Exam. | Quiz/Assignment | | Lab Work & Sessional | Skill Based Mini Project | | | | | | | | | |
| 1. | 2100011 | BSC | Engineering Mathematics-I | 50 | 10 | 20 | 20 | - | - | - | - | 4 | Offline | PP | 2 Hrs | | | | |
| 2. | 2160122 | ESC | Computer Programming | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 20 | 4 | Blended | AO | 2 Hrs | | | | |
| 3. | 2100021 | ESC | Basic Mechanical Engineering | 50 | 10 | 20 | 20 | - | - | - | 3 | Blended | MCO | 1.5 Hrs | | | | | |
| 4. | 2100022 | ESC | Basic Electrical and Electronics Engineering | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 4 | Blended | MCO | 1.5 Hrs | | | | | |
| 5. | 2100020 | ESC | Basic Civil Engineering and Mechanics | 50 | 10 | 20 | 20 | - | - | - | 3 | Blended | PP | 2 Hrs | | | | | |
| 6. | 2120026 | ESC | Basic Mechanical Engineering Lab | - | - | - | - | 60 | 20 | 20 | 100 | 1 | Office | SO | - | | | | |
| Total | | | | 250 | 50 | 100 | 100 | 180 | 60 | 60 | 800 | 11 | 05 | 06 | 19 | - | | | |
| 7. | 3000003 | Natural Sciences & Skills | Environmental Engineering | 50 | 10 | 20 | 20 | 30 | 10 | 10 | 150 | 1 | - | 2 | GRADE | MCO | 1.5 Hrs | | |

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

Proficiency in course/subject – includes the weightage towards ability/skill/ competency /knowledge level /expertise attained etc. in that particular course/subject
 Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language
 Credits of Natural Sciences & Skills will be added in the VI Semester

MCO: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

DEAN (ACADEMICS)
M.I.T.S. Gwalior
G.WALIOR

| Mode of Teaching | | Mode of Examination | |
|------------------|--------|---------------------|---------|
| Theory | Lab | Theory | Lab |
| Offline | Online | Blended | Blended |
| 4 | - | 14 | 1 |
| 21% | - | 73.68% | 5% |
| | | 36.8% | 21% |
| | | 7 | 1 |
| | | MCO | SO |
| | | 36.8% | 5% |
| | | 19 | |
| | | Credits % | |

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Department of Mechanical Engineering
Scheme of Evaluation

B. Tech. II Semester (Automobile Engineering)

(for batch admitted in academic session 2022-23)

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | Total Marks | | | Contact Hours per week | | | Mode of Teaching | Mode of Exam. | Duration of Exam. | |
|--------------|--------------|---------------------------|----------------------------|------------------------|--------------------------------|----------------|----------------------|--------------------------|------------------|----------------|---------------|----|------------------------|----|-------|------------------|---------------|-------------------|---|
| | | | | Theory Slot | | | Practical Slot | | | End Sem. Exam. | Total Credits | L | T | P | | | | | |
| | | | | End Term Exam | Continuous Evaluation | | Lab Work & Sessional | Skill Based Mini Project | | | | | | | | | | | |
| | | | | | Proficiency in subject /course | Mid Sem. Exam. | | | Quiz/ Assignment | | | | | | | | | | |
| 1. | 2190221 | DC | Material Science | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended | PP | 2 Hrs | |
| 2. | 2190222 | DC | Manufacturing Processes | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended | PP | 2 Hrs | |
| 3. | 2190223 | DC | Engineering Thermodynamics | 50 | 10 | 20 | 20 | - | - | - | 100 | 3 | 1 | - | 4 | Blended | PP | 2 Hrs | |
| 4. | 2190014 | ESC | Engineering Graphics | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Offline | AO | 2 Hrs | |
| 5. | 2160222 | ESC | Python Programming | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended | AO | 2 Hrs | |
| 6. | 2190024 | ESC | Manufacturing Practices | - | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | Offline | SO | - | |
| 7. | 2190018 | ESC | Engineering Graphics Lab | - | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | Offline | SO | - | |
| Total | | | | 250 | 50 | 100 | 100 | 180 | 60 | 60 | 800 | 11 | 05 | 06 | 19 | - | - | - | - |
| 8. | 3000004 | Natural Sciences & Skills | Language | 50 | 10 | 20 | 20 | 30 | 10 | 10 | 150 | 1 | - | 2 | GRADE | Blended | MCQ | 1.5 Hrs | |

End section programme of three weeks (MCQ); Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept. Braach & Innovations.

*Proficiency in course/subject - includes the weightage towards ability/skill/competency/knowledge level (as per the attained etc. in that particular course/subject)

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language. Credits of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question AO: Assignment + Oral OBI: Open Book PP: Pen Paper SO: Submission + Oral

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Handwritten signatures and initials: *M, P, K, M, H, S, R, J, K*

DEAN (ACADEMICS) M.I.T.S. of G.S. P.S. GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

Basic Mechanical Engineering

| Category | Title | Code | Credit-3 | | | Theory Paper Max.Marks-50 Duration-2 hrs. |
|--------------------------------|------------------------------------|--|----------|---|---|---|
| | | | L | T | P | |
| Engineering Science- ESC | Basic Mechanical Engineering | 2100021/100204/CEL/ MEL/CSL/EEL/ ELL/ITL/CHL/ BTL114/2X24 | 2 | 1 | - | |

Course Objectives: To make the students:

1. Develop the fundamentals of Engineering materials, measurement and reciprocating machines.
2. Develop an ability to understand the Thermodynamic laws, steam generator and reciprocating machines for solving engineering problems.
3. Demonstrate Engines and Boiler fundamentals using models.

Syllabus

UNIT-I:

Materials: Classification of engineering material, composition of cast iron and carbon steels on iron-carbon diagram and their mechanical properties; Alloy steel and their applications; Stress-Strain diagram, Hooks law and Modulus of elasticity. Tensile, shear, hardness and fatigue testing of materials.

UNIT-II:

Measurement: Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainty analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lathe drilling, milling and shaping machines.

UNIT-III

Fluids: Fluid properties, pressure, density and viscosity; pressure variation with depth, static and kinetic energy; Bernoulli's equation for incompressible fluids, viscous and turbulent flow, working principle of fluid coupling, pumps, compressors, turbines, positive displacement machines and pneumatic machines. Hydraulic power & pumped storage plants for peak load management as compared to base load plants.

UNIT-IV

Thermodynamics: Zeroth, First, second and third law of thermodynamics; steam properties, steam processes at constant pressure, volume, enthalpy & entropy, classification and working of boilers, efficiency & performance analysis, natural and induced draught, calculation of chimney height. Refrigeration, vapour absorption and compression cycles, coefficient of performance (COP).

UNIT-V

Reciprocating Machines: Steam engines, hypothetical and actual indicator diagram; Carnot cycle and ideal efficiency; Otto and diesel cycles; working of two stroke & four stroke petrol and diesel IC engines.

Course Outcomes: After successful completion of this course students will be able to:

- CO1. Define the essential concepts of thermal, design and production used in Mechanical Engineering.
- CO2. Summarize fundamental techniques and process used in power generating machines
- CO3. Solve the various problems based on basic concepts of Mechanical Engineering.

P.L. M. ✓
h. ✓
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R. ✓
S. ✓
T. ✓
U. ✓
V. ✓
W. ✓
X. ✓
Y. ✓
Z. ✓
95 ✓

CO4. Analyze the various gas, steam and air cycles.

CO5. Evaluate the problems of Steam Generator, Thermodynamics, Steam and I.C. engines

CO6. Generate the skills to demonstrate steam Generator and reciprocating machine in depth.

Reference Books:

1. Nanula; Material Science; TMH
2. Agrawal B & CM; Basic Mechanical Engineering; TMH
3. Nag PK, Tripathi et al; Basic Mechanical Engineering; TMH
4. Rajput; Basic Mechanical Engineering;
5. Sawhney GS; Fundamentals of Mechanical Engibneering; PHI
6. Nakra and Chaudhary; Instrumentation and Measurement; TMH
7. Nag PK; Engineering Thermodynamics; TMH
8. Ganesan; Combustion Engines; TMH.



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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

Basic Mechanical Engineering Lab

| Category | Title | Code | Credit-I | | | Practical End Sem Max.Marks-60 Min.Marks-19 |
|-------------------------|----------------------------------|---------|----------|---|---|---|
| | | | L | T | P | |
| Engineering Science-ESC | Basic Mechanical Engineering Lab | 2120026 | - | - | 2 | |

Lists of Experiments:

1. Study of vertical boilers.
2. Study of Locomotive boilers.
3. Study of Babcock and Wilcox boilers.
4. Study of Lancashire, Cornish and Cochran boilers.
5. Study of boiler mounting and accessories.
6. Study of 2 stroke diesel and petrol engines.
7. Study of 4 stroke diesel and petrol engines.
8. Study of steam engines.
9. Study of Lathe machine.
10. Study of Vernier and Micrometer.
11. Study of Internal Combustion Engine Parts.

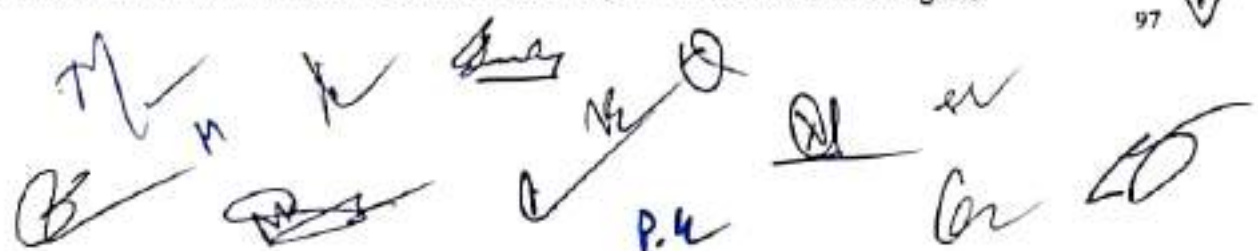
Skill Based Projects:

1. Measurement and calibration using slip gauges
2. Performing energy audit using stroboscope and lux meter
3. Make a Free energy Steam Engine at home
4. Make an Air Compressor at home
5. Mini Bench Tapping machine project
6. Make a Robotic Arm
7. Tornado in a bottle
8. Make a Hydraulic Lift
9. Thermal Expansion project
10. Make a positive displacement pump
11. Make a mini thermal power plant
12. Make a fire hydrant.
13. How an airplane wing creates lift and how wind turbine blades are spun by the wind. Make a model.
14. To make a model for measuring the pressure distribution in a convergent - divergent duct to confirm Bernoulli's equation.
15. Make a digital hydraulic bench.
16. To make a model for induced draught and natural draught

Course Outcomes: After successful completion of this course students will be able to:

- CO1. Define the essential concepts of thermal, design and production used in Mechanical Engineering.
- CO2. Summarize fundamental techniques and process used in power generating machines
- CO3. Solve the various problems based on basic concepts of Mechanical Engineering.
- CO4. Analyze the various gas, steam and air cycles.
- CO5. Evaluate the problems of Steam Generator, Thermodynamics, Steam and I.C. engines

97



CO6. Generate the skills to demonstrate steam Generator and reciprocating machine in depth.

Reference Books:

1. Narula; Material Science; TMH
2. Agrawal B & CM; Basic Mechanical Engineering; TMH
3. Nag PK, Tripathi et al; Basic Mechanical Engineering; TMH
4. Rajput; Basic Mechanical Engineering;
5. Sawhney GS; Fundamentals of Mechanical Engineering; PHI
6. Nakra and Chaudhary; Instrumentation and Measurement; TMH
7. Nag PK; Engineering Thermodynamics; TMH
8. Ganesan; Combustion Engines; TMH

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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

100014: Engineering Graphics

| Category | Title | Code | Credit-3 | | | Theory Slot |
|-------------------------|----------------------|---|----------|---|---|--|
| | | | L | T | P | |
| Engineering Science-ESC | Engineering Graphics | 2100014/100105/CEL/MEL/CSL/ EEL/ELL/TL/CHL/ BTL105/1X25/BEEL/BELL/ BETL/BCHL/BAUL105/ BCEL/BMEL/BCSL/ BITL/BBTL204 | 2 | 1 | - | Max.Marks-50 Min.Marks-16 Duration-2hrs. |

Course Objective:

1. To inculcate the imagination and mental visualization capabilities for interpreting the geometrical details of common engineering objects.
2. To impart knowledge about principles/methods related to projections of one,two and three dimensional objects.

Syllabus:

Unit - 1

Introduction and scale: Basics of instruments, Lettering and dimensioning, Plane geometrical constructions. Plain and diagonal scale - Representative fraction, Unit conversion and Exercises based on linear, area, volume and speed. Scale of chord.

Engineering curves: Cycloidal curves - cycloid, epicycloid and hypocycloid curve, tangent and normal. Spiral curves - Archimedean and logarithmic spiral curves. Tangent & normal on the curves. Involute curve.

Unit - 2

Projection of points: Introduction, types of projections, quadrant system, positions of points and Exercise.

Projection of straight line: Introduction, Orientation of a straight line, Traces of a line and Exercise.

Unit - 3

Projection of planes: Introduction, Types of planes, Traces of planes, Position of planes and Exercise.

Projection of solids: Introduction, Types of solids, Positions of solids and Exercise.

Unit - 4

Section of solids: introduction, Types of section planes and Anti-section and Exercise.

Development of surfaces of right solids: Introduction, Methods of development & anti-development and Exercise.

Intersection of cylinders: Introduction, methods of developments, intersection of cylinder by another cylinder and exercise.

Unit - 5

Isometric projections: Introduction, isometric scale, isometric axis, isometric view and isometric projections from orthographic views, orthographic views from pictorial view and exercise.

Computer Aided Drafting using Auto CAD: Introduction, software's basic commands, transformation and editing commands.

Course Outcomes: After successful completion of this course students will be able to:

- CO1. Visualize the geometric details of engineering objects.
- CO2. Translate the geometric information of engineering objects into engineering drawings.
- CO3. Draw orthographic projections and sections.
- CO4. Develop knowledge to read, understand and explain drawing.
- CO5. Improve their skills so that they can apply these skills in developing new products.
- CO6. Prepare simple layout of factory, machine and buildings.

Text books:

1. Engineering Drawing by N. D. Bhatt, Charotar Publication Pvt. Ltd.
2. Engineering Drawing by P.S. Gill, S. K. kataria & sons, Delhi
3. Engineering Drawing by BasantAgrawal & C. M. Agrawal, Tata McGraw Hill Education Pvt. Ltd.
4. Engineering Graphics by K. Venugopal, New Age International Publication, India

NPTEL Link for Engineering Graphics:

<http://nptel.ac.in/courses/112103019/>



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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

Engineering Graphics Lab

| Category | Title | Code | Credit-1 | | | Practical End Sem Max.Marks-60 Min.Marks-19 |
|----------|--------------------------|---------|----------|---|---|---|
| | | | L | T | P | |
| ESC | Engineering Graphics Lab | 2100018 | - | - | 2 | |
| | | | | | | |

Laboratory Work

List of Experiments:

- 1.To prepare sheet of Plain scale, diagonal scale and Scale of chord.
- 2.To prepare sheet of Cycloidal curves.
- 3.To prepare sheet of Projection of points and lines.
- 4.To prepare sheet of Projection of Planes.
- 5.To prepare sheet of Projection of Solids.
- 6.To prepare sheet of Section of Solids.
- 7.To prepare sheet of Development of Surfaces.
- 8.To prepare sheet of Isometric and Intersection of Solids

Skill Based Projects:

1. To prepare the 3D view of any object.
2. To Prepare scale for your home and make a map using this scale.
3. To prepare cut section models drawing of any object.
4. To make paper object, cut and show the development of surfaces.

Course Outcomes: After successful completion of this course students will be able to:

- CO1. Visualize the geometric details of engineering objects.
- CO2. Translate the geometric information of engineering objects into engineering drawings.
- CO3. Draw orthographic projections and sections.
- CO4. Develop knowledge to read, understand and explain drawing.
- CO5. Improve their skills so that they can apply these skills in developing new products.
- CO6. Prepare simple layout of factory, machine and buildings.

Text books:

- 1.Engineering Drawing by N. D. Bhatt, Charotar Publication Pvt. Ltd.
- 2.Engineering Drawing by P.S. Gill, S. K. kataria& sons, Delhi
- 3.Engineering Drawing by BasantAgrawal& C. M. Agrawal, Tata McGraw Hill Education Pvt. Ltd.
- 4.Engineering Graphics by K. Venugopal, New Age International Publication, India

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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

100024: Manufacturing Practices

| Category | Title | Code | Credit-I | | | Practical End Sem |
|-------------------------|-------------------------|---------|----------|---|---|------------------------------|
| | | | L | T | P | |
| Engineering Science-ESC | Manufacturing Practices | 2100024 | - | - | 2 | Max.Marks-60 Min.Marks-19 |
| | | | - | - | 2 | |

Course Objectives:

1. To familiarize with the basics of tools and equipment used in fitting, carpentry, sheet metal, welding and smithy.
2. To with the production of simple models in the above trades.
3. To develop general machining skills in the students.

Syllabus

UNIT I

Introduction: Manufacturing Processes and its Classification, Casting, Machining, Plastic deformation and Metal forming, Joining Processes, Heat treatment process, Assembly process.

Black Smithy Shop

Use of various smithy tools. Forging operations; Upsetting, Drawing down, Fullering, swaging, Cutting down, Forge welding, Punching and drafting.

Suggested Jobs: Forging of chisel, forging of Screw Driver.

UNIT-II Carpentry Shop

Timber: Type, Qualities of timber disease, Timber grains, Structure of timber, Timber seasoning, Timber preservation. **Wood Working Tools:** Wood Working Machinery, joints and joinery, various operations of planing using various carpentry planes sawing & marking of various carpentry joints.

Suggested Jobs: Name Plate, Any of the carpentry joint like mortise or tennon Joint.

UNIT-III Fitting Shop:

Study and use of measuring instruments, Engineer steel rule, Surface gauges caliper, Height gauges, feeler gauges, Micrometer. Different types of files, File cuts, File grades, Use of surface plate, Surface gauges drilling tapping Fitting Operations: Chipping filing, Drilling and Tapping.

Suggested Jobs: Preparation of job piece by making use of filing, sawing and chipping, drilling and tapping operation.

UNIT-IV Foundry:

Pattern Making: Study of pattern materials, pattern allowances and types of patterns. Core box and core print, Use and care of tool used for making wooden patterns.

Moulding: Properties of good mould& Core sand, Composition of Green, Dry and Loam sand. Methods used to prepare simple green and bench and pit mould dry sand bench mould using single piece and split pattern.

UNIT-V Welding: Study and use of tools used for Brazing, Soldering, Gas& Arc welding. Preparing Lap & Butt joints using Gas and Arc welding methods, study of TIG and MIG welding processes. Safety

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precautions.

Course Outcome: After successful completion of this course students will be able to:

CO1. Discuss the hand tools, machine tools and power tools.

CO2. Utilize appropriate tools required for specific operation.

CO3. Apply safety measures required to be taken while using the tools in floor shops, Machine shops and carpentry shop.

CO4. Use the techniques, skills, and modern engineering tools necessary for manufacturing and production engineering.

CO5. Conduct experiments in the field of Production engineering.

CO6. Design a system, components, or process to meet desired needs, ethical, health and safety, manufacturability and sustainability.

Text & References Books:

1. Bawa HS; Workshop Practice, TMH
2. Rae PN; Manufacturing Technology-Vol.1 & 2, TMH
3. John KC; Mechanical Workshop Practice; PHI
4. HazraChoudhry; workshop Practice-Vol.1 & 2.
5. Jain R. K.; Production Technology

NPTEL Link for Manufacturing Practices

<http://nptel.ac.in/courses/112107145/>

Laboratory Work:

Relevant shop floor exercises involving practice in forging, Carpentry, fitting, pattern making, Sand casting, Moulding, Welding, Sheet metal fabrication techniques.

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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

120221/190221: Material Science

| Category | Title | Code | Credit-3 | | | Theory Paper |
|-------------------------|---------------------|--------------------------------|----------|---|---|--------------------------------|
| | | | L | T | P | Max Marks-50 Duration-2hrs. |
| Departmental Core-DC | Material Science | 2120221/2190221/ 190211/120211 | 2 | 1 | | |

Course Objectives: To make the students to understand:

1. The basic fundamentals of materials science and engineering.
2. The different classes of materials, their properties, structures and imperfections present in them.
3. The functional properties of materials and the roles of microstructure, heat treatment defects and environment play in typical engineering applications.

Syllabus

Unit-I Structure of materials

Fundamentals of crystal structures and crystal system, crystallographic planes and directions, linear and planar density, single crystal, polycrystalline material and non-crystalline materials, Homogeneous and heterogeneous solidifications, Crystal imperfections: point, line, surface and volume defects.

Unit-II Material testing and mechanical properties

Mechanical properties in static tensile, compression and bending tests, Hardness: Rockwell, Brinell, Vicker's, Impact toughness and fracture toughness.

Role of dislocations in plastic deformation, slip and twinning processes, Mechanism of ductile and brittle fracture. Fatigue: Cyclic stresses, S-N curve, crack initiation and propagation, factors affecting fatigue life; Creep: Generalized creep behavior, stress and temperature effects.

Unit-III Engineering Materials

Ferrous (Steels and Cast irons with role of different alloying elements) and non-ferrous metals and alloys (Aluminum, Magnesium, Titanium, Copper, Nickel alloys), Nano-materials, Ceramic material, Composite material with their properties and applications, Smart materials, Bio-materials

Unit-IV Phase diagrams and phase transformation of metal alloys

Concept of phases, Gibb's phase rule, Lever-rule, binary isomorphous and eutectic phase diagrams, Eutectoid, Peritectic and Peritectoid systems, allotropy in iron, Fe-Fe₃C phase diagram; Isothermal transformation of austenite, continuous cooling transformation of austenite, Objectives of heat treatments, Annealing, Normalizing, Hardening (bulk and surface)

Unit-V Environmental consideration and some case studies

Corrosion: Introduction, types & its prevention; generalized material selection process, material selection for torsionally-stressed cylindrical shaft, Automotive valve spring, orthopedic implants, Integrated circuit and etc.

Course Outcomes: After successful completion of this course students will be able to:

CO1. State fundamental relationship between structure and properties of materials.

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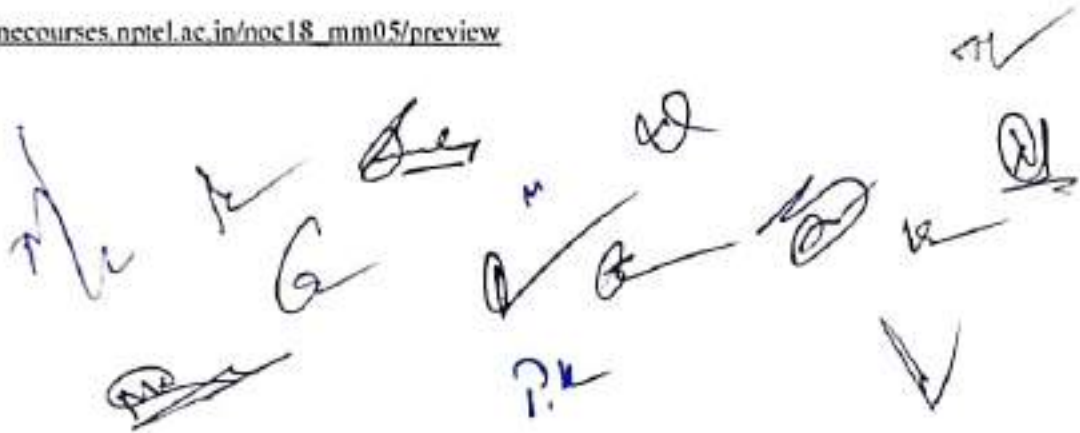
- CO2. Discuss mechanical properties of materials
- CO3. Compare the different processes to alter the material properties.
- CO4. Determine the effect of different phases, impurities on the behavior of materials.
- CO5. Analyze crystal structure and composition of different materials.
- CO6. Create the different engineering materials and alloys.

Text & Reference Books

- 1. Material Science and Engineering: An Introduction, William D. Callister, John Willey & Sons Inc., 7th edition
- 2. Elements of Material Science and Engineering by Lawrence, H. Vanvackdison; Wesley. Mention the Year or the Edition and Publisher and Place of Publication
- 3. Material Science and Engineering by Raghvan, V; Prentice Hall of India.
- 4. Introduction to Engineering Materials by Agrawal, B.K; Tata McGraw Hill, N. Delhi.

NPTEL Link for Material Science

https://onlinecourses.nptel.ac.in/noc18_mm05/preview



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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

120222/190222: Manufacturing Processes

| Category | Title | Code | Credit-3 | | | Theory Paper |
|-------------------------|----------------------------|---------------|----------|---|---|--------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Manufacturing Processes | 2120222/21902 | 2 | 1 | - | Max.Marks-50 Duration-2hrs. |
| | | 22/120311/190 | | | | |
| | | 319/190414/12 | | | | |
| | | 0403/190404 | | | | |

Course Objectives: To make students:

1. Able to learn the various methods and types of castings, welding processes, sheet metal forming, powder metallurgy
2. Able to examine the principles associated with basic operations involving the forming, machining and welding of engineering materials;
3. Aware of the necessity to manage manufacturing processes and systems for the best use of material and human resources.

Course Pre-Requisites: Manufacturing Practice

Syllabus

Unit-I Casting: Brief History, Basic principle & survey of casting processes. Sand casting, pattern materials, and allowances. Green and dry moulding, moulding methods, moulding sand properties and testing, Elements of mould and design considerations. Cores use, core materials and core making practice. Die, investment and centrifugal casting processes. Melting practice and concepts in solidification. Inspection and defects analysis.

Unit-II Forming: Elastic and plastic deformation, Concept of strain hardening. Rolling, forging, extrusion, spinning, wire and tube drawing processes, machines and equipment's, parameters and force calculations.

Unit-III Sheet Metal Working: Role of sheet metal components. Cutting mechanism. Description of cutting processes like blanking, Piercing, lancing etc. Description of forming processes like bending cup drawing, coining, embossing etc. Basic elements of presses for sheet metal working. Punch and Die clearances and die elements.

Unit-IV Welding: Principle of welding, soldering, brazing and adhesive bonding. Survey of welding and allied processes. Arc welding: power sources and consumables. MMAW, TIG & MIG processes and their parameter selection. Resistance Welding: principle and equipment. Spot, projection and Seam welding processes, Gas welding and cutting: Processes and equipment.

Unit-V Powder Metallurgy: Powder manufacturing, compaction and sintering processes. Advantages and applications of P/M. Manufacturing of Powder metallurgy components.

Course Outcomes: After successful completion of this course students will be able to:

CO1- Describe the different types of manufacturing processes and their applications.

CO2- Identify suitable manufacturing process to achieve the required product shape with the aim of avoid defects, material and time wastage.

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CO3-Illustrate the advantage and limitations of various manufacturing processes with regard to shape formation and surface quality.

CO4-Analyse the manufacturing processes for given problem and able to select an appropriate process according to a specific requirement.

CO5-Evaluate the procedures and techniques involved for the manufacturing of components for its optimization.

CO6-Propose a simplified manufacturing processes with the aim of reduction of cost and manpower.

Text & Reference Books

1. Jain R.K., Production Technology, Khanna Publishers, 2001.
2. Hajra Choudhry, Elements of Workshop Technology, Vol - II Media Promoters & Publishers, 1994.
3. Production Technology by HMT, Tata McGraw-Hill.
4. Chapman, W.A.J., Workshop Technology, Vol - II, Oxford & IBH Publishing Co. Ltd.,
5. Manufacturing Processes by Amstead, B.H., P.F. Oswald and M.L. Begeman, John Wiley and Sons Inc., New York.
6. Manufacturing Technology Vol. 1 by P.N. Rao.
7. Modern Manufacturing Process Engineering by Neibel, B.W., Alan B. Draper and R.A. Wysk, McGraw-Hill Publishing Co., New York.
8. Manufacturing Engineering and Technology by Kalpakjian, S, Addison-Wesley Publishing Co., New York.
9. Materials and Processes in Manufacturing by E. Paul DeGarmo, J. Temple Black, and Ronald Kohser, Macmillan Publishing Co., New York.
10. Introduction to Manufacturing Processes John A. Schey, McGraw-Hill Book Co., New York.

NPTEL Link for Manufacturing Process

<http://nptel.ac.in/courses/112107145/>

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Department of Mechanical Engineering

For batches admitted in Academic Session 2022-23

120223/190223: Engineering Thermodynamics

| Category | Title | Code | Credit-4 | | | Theory Paper |
|-------------------------|-------------------------------|---------------------|----------|---|---|---------------------------------|
| | | | L | T | P | |
| Departmental Core-DC | Engineering Thermodynamics | 2120223/ 2190223 | | | | Max.Marks-50 Duration-2 hrs. |
| | | 120414/ 190413 | 3 | 1 | - | |

Course Objective: To make students able to:

1. Understand the nature and role of the various thermodynamic properties of matter.
2. Represent a thermodynamic system by a control mass or control volume and identify work and/or heat interactions between the system and surroundings.
3. Recognize the different forms of energy and restrictions imposed by the laws of thermodynamics on conversion from one form to another.

Course Prerequisites: Basic Mechanical Engineering

Syllabus

Unit-I Basic Concepts: Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, Statement and significance, Concept of an Ideal gas, Gas Laws, Avogadro's Hypothesis, Heat and work transfer. First law of thermodynamics –Statement of first law of thermodynamics, first law applied to closed system undergoing a cycle, Process analysis of closed system flow process, Flow energy, Steady flow process analysis of closed system processes, Limitations of first law of thermodynamics.

Unit –II Properties of pure substances: - P-V-T surfaces, h-s, T-S, P-V, P-h, T-V diagrams of pure substance, saturated and sub-cooled liquid, superheated vapour, quality of steam, Mollier diagram, steam table, different processes, measurement of quality of steam

Unit –III Second law of thermodynamics: Heat engine, Heat reservoir, Refrigerator, Heat pump, COP, Carnot's theorem, Carnot's cycle, Efficiency of Carnot's cycle, Statement of second law, Reversible and Irreversible processes, Consequences of Second law.

Unit –IV Availability and Irreversibility: Entropy, Entropy changes of Ideal gas, Available energy, T-S diagram, Availability and Irreversibility.

Unit- V Thermodynamics Relations: Thermodynamics relations, e.g Maxwell relations and their applications.

Air Standard Cycles: Carnot, Sterling, Ericsson, Otto, Diesel, Dual cycles and determination of their air standard efficiencies and their comparison. Brayton cycle, Atkinson cycle. PVT relationship, Mixture of ideal gases Properties of mixture of gases.

Course Outcomes: After successful completion of this course students will be able to:

CO1: Define energy interactions between system and surroundings.

CO2: Correlate the law of thermodynamics to real life applications

CO3: Apply the laws of thermodynamics to analyze boilers, heat pumps, refrigerators, heat engines, compressors and nozzles

? 

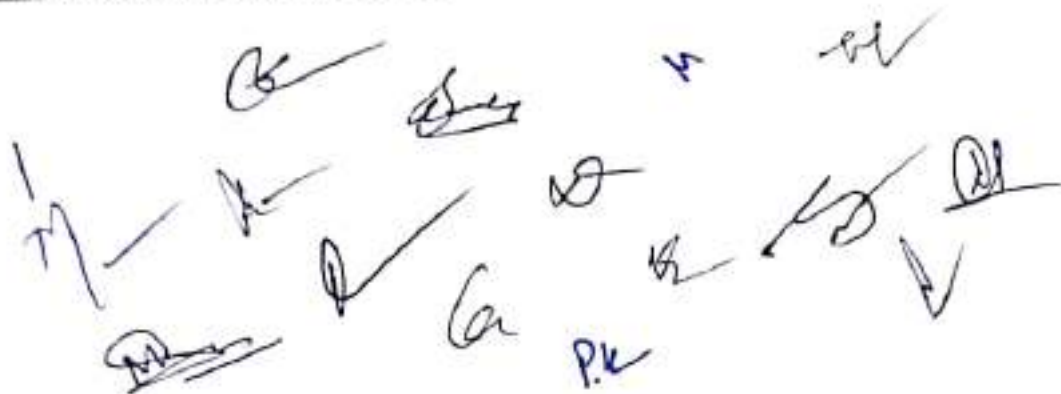
- CO4: Analyze the thermal efficiency of air standard cycles
CO5: Analyze the entropy concept in thermodynamic systems.
CO6: Describe benefits of improvements to thermodynamic systems.

Text & Reference Books:

1. Engineering thermodynamics by P.K. Nag
2. Thermal engineering by R.K. Rajput
3. Thermal engineering by P.L. Ballaney
4. P L Dhar Thermal Engineering

NPTEL Link for Engineering Thermodynamics

https://onlinecourses.nptel.ac.in/noc18_ch03/preview




Mechanical CO Attainment Jan-June 2022

| 4th Semester Mechanical Engg. (B. Tech) Coordinator: Mr. V. Chaturvedi | | Target Level | COs not attained | Action Taken |
|--|---------------------------------|-------------------------|------------------|---|
| Subject Code | Subject Name | Faculty I/C | | |
| 120411 | Theory of Machines -II | Prof.Utkarsh Srivastava | CO6 | More focus on the assignments |
| 120412 | Design of Machine Elements | Prof.R.P.Kori | CO1,CO5 | Skill based projects are introduced |
| 120413 | Metal cutting and machine tools | Prof.V.Chaturvedi | CO6 | Practical exposure is needed to increase. |
| 120414 | Engineering Thermodynamics | Dr.M.K.gaur | CO5,CO6 | more focus on Practical exposure |
| 120411(P) | Theory of Machines -II lab | Prof.Utkarsh Srivastava | NIL | |
| 120412(P) | Design of Machine Elements lab | Prof.R.P.Kori | CO5,CO6 | Labs needed to be upgrade |
| 120415 | Production Lab | Dr.Amit Aherwar | NIL | |
| 100004 | Cyber Security | Dr Jyoti Vimal(Mentor) | NIL | |

| 6th Semester Mechanical Engg. (B. Tech) Coordinator: Dr. S. K Chourasiya | | Target Level | COs not attained | Action Taken |
|--|--|----------------------|------------------|---|
| Subject Code | Subject Name | Faculty I/C | | |
| 100005 | Ethics, Economics, Entrepreneurship & Management | Dr. R.K Ranjan | | |
| 120601 | Advance Production Technology | Dr. G. Norkey | CO4,CO5 | Basics needed to be improved |
| 120611 | Vibration & Noise Engineering | Mr. Vaibhav Shivhare | CO4,CO6 | Prior knowledge on production is missing |
| 120612 | Statistical & Quality Control | Mr. Ajay Rajput | NIL | |
| 120613 | Work Study & Ergonomics | Mr. SC Pal | CO5 | Needed to include practical session on scientific tools |
| 120614 | Turbo Machinery | Dr.Ashish Agarwal | NIL | |
| 120601(P) | Advance Production Technology lab | Dr.G. Norkey | CO5 | More practice of numerical required |
| 100007 | Disaster Management | Dr. R.K Ranjan | CO5 | Prior knowledge on production is missing |
| 120605 | Minor Project-II | | NIL | |
| | | | CO5 | Innovative ideas are required to develop projects |

| 8th Semester Mechanical Engg. (B. Tech) Coordinator: Dr. Jyoti Vimal | | Target Level | COs not attained | Action Taken |
|--|--------------------------|----------------|------------------|---|
| Subject Code | Subject Name | Faculty I/C | | |
| 120801 | Internship/Project | | CO6 | Lack of options available in core field needed to address |
| 120802 | Professional Development | Dr Jyoti Vimal | CO5,CO6 | Improvement in soft skills required |



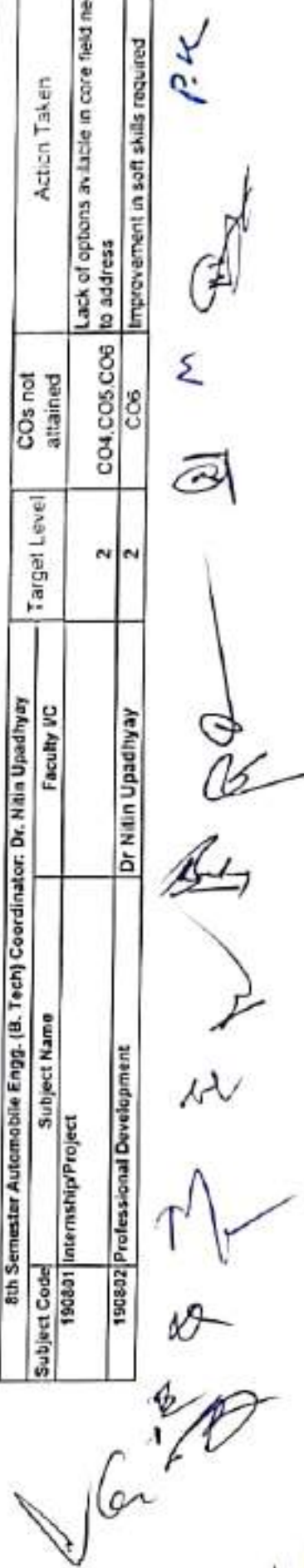
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Automobile CO Attainment Jan-June 2022

| 4th Semester Automobile Engg. (B. Tech) Coordinator: Mr. Sharad Agarwal | | | Target Level | COs not attained | Action Taken |
|---|--|------------------------|--------------|------------------|--|
| Subject Code | Subject Name | Faculty /IC | | | |
| 190411 | Theory of Machines -I | Dr Nilin Upadhyay | 2 | CO5, CO6 | more focus on Practical exposure |
| 190412 | Automotive Electrical and Electronics System | Dr Neeraj Mishra | 2 | CO3, CO5 | Labs needed to be upgrade |
| 190413 | Engineering Thermodynamics | Prof B.K Pandey | 2 | CO5, CO6 | more focus on Practical exposure |
| 190414 | Manufacturing Process | Dr Amit Aherwar | 2 | CO5 | Skill based projects are introduced |
| 190411(P) | Theory of Machines -I Lab | Dr Nilin Upadhyay | 2 | CO4, CO5 | Labs needed to be upgrade |
| 190412(P) | Automotive Electrical and Electronics System lab | Dr Neeraj Mishra | 2 | CO6 | Labs needed to be upgrade |
| 190415 | Production Lab | Dr S. Chaurasiya | 2 | CO5 | Prior knowledge on production is missing |
| 100004 | Cyber Security | Dr Jyoti Vimal(Mentor) | 2 | NIL | |

| 6th Semester Automobile Engg. (B. Tech) Coordinator: Prof. V. Shivhare | | | Target Level | COs not attained | Action Taken |
|--|--|-------------------|--------------|------------------|---|
| Subject Code | Subject Name | Faculty /IC | | | |
| 100005 | Ethics, Economics, Entrepreneurship & Management | Dr. R.K Ranjan | 2 | CO4, CO6 | Basics needed to be improved |
| 190601 | Automotive Transmission | Mr. Ajay Rajput | 2 | CO5, CO6 | Labs needed to be upgrade |
| 190611 | Automotive Materials | Dr DK Rathore | 2 | CO4, CO5 | more focus on Practical exposure |
| 190612 | Automotive Pollution and Control | Dr DK Rathore | 2 | CO5 | needed automobile testing labs for better exposure |
| 190613 | Work Study & Ergonomics | Mr. SC Pal | 2 | CO6 | more assignments on time management |
| 190614 | Automotive Component Design | Mr Sharad Agarwal | 2 | CO4, CO5, CO6 | Needed to include practical session on scientific tools |
| 190601(P) | Automotive Transmission lab | Mr. Ajay Rajput | 2 | CO6 | Labs needed to be upgrade |
| 100007 | Disaster Management | Dr. R.K Ranjan | 2 | NIL | |
| 150605 | Minor Project-II | | 2 | CO5 | Inovative ideas are required to develop projects |

| 8th Semester Automobile Engg. (B. Tech) Coordinator: Dr. Nilin Upadhyay | | | Target Level | COs not attained | Action Taken |
|---|--------------------------|-------------------|--------------|------------------|---|
| Subject Code | Subject Name | Faculty /IC | | | |
| 190801 | Internship/Project | | 2 | CO4, CO5, CO6 | Lack of options available in core field needed to address |
| 190802 | Professional Development | Dr Nilin Upadhyay | 2 | CO6 | Improvement in soft skills required |



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Student's Feedback on Curriculum
Action Taken on Student's Feedback

| S. No. | Subject | Feedback | Action Taken |
|--------|------------------------------------|--|--|
| 1 | Manufacturing Processes | Industrial correlation with the syllabus needed Industrial related work is required in the subject | Will be introduced with skill based project and industrial visit Skill based project is introduced in the curriculum. |
| 2 | Mechanics of Materials | Syllabus is too lengthy | It will be modify in upcoming BoS |
| 3 | Metrology, Measurement and control | Syllabus required modification as per current industrial requirements Old content is available in syllabus and required practical relevance | It will be modify in upcoming BoS Teaching learning methods has been improved with visual and hands on experience |

Students feedback on course content_Curriculum



- The course is well designed
- The learning material was available to you
- The course was relevant and updated for present needs
- The course will be useful to meet your higher studies/future aspirations.
- The syllabus units are balanced
- The content was clear and easy to understand
- The course meets your career expectations



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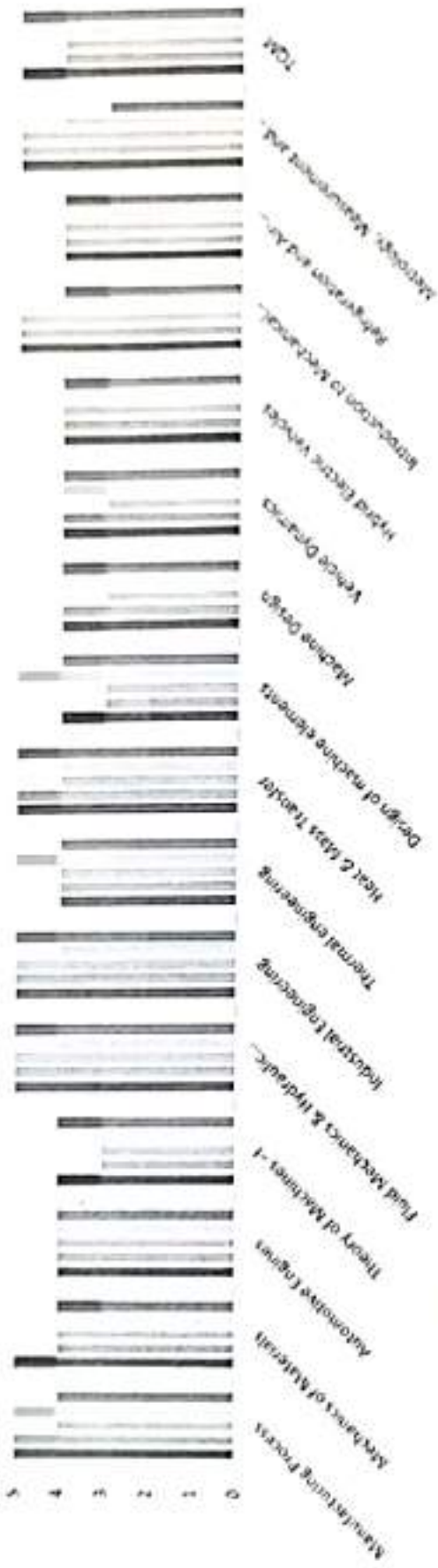
| Parameters | Average Feedback (Out of 5) | | | | | | | | | |
|---|--------------------------------|--------|--------|---------|--------|---------|--------|---------|--------|--------|
| | 120314 | 100008 | 120515 | 1000005 | 190313 | 1000005 | 190313 | 1000005 | 120311 | 900215 |
| The course is well designed | 3.6 | 4.0 | 4.3 | 3.8 | 4.8 | 3.8 | 4.8 | 3.75 | 3.0 | 4 |
| The syllabus units are balanced | 3.5 | 3.8 | 4.2 | 3.9 | 4.4 | 3.9 | 4.4 | 3.87 | 3.0 | 4.5 |
| The learning material was available to you | 3.7 | 4.0 | 4.6 | 4.0 | 4.8 | 4.0 | 4.8 | 4.02 | 2.7 | 3.75 |
| The content was clear and easy to understand | 3.5 | 4.1 | 4.6 | 4.0 | 4.2 | 4.0 | 4.2 | 3.98 | 2.8 | 3.5 |
| The course was relevant and updated for present needs | 3.5 | 3.8 | 4.6 | 3.9 | 4.8 | 3.9 | 4.8 | 3.87 | 3.3 | 3.5 |
| The course meets your career expectations | 3.6 | 3.6 | 4.4 | 3.9 | 4.4 | 3.9 | 4.4 | 3.87 | 3.5 | 3.5 |
| The course will be useful to meet your higher studies/future aspirations. | 3.5 | 3.7 | 4.5 | 4.0 | 4.8 | 4.0 | 4.8 | 3.98 | 2.8 | 3.5 |

| Parameters | Average Feedback (Out of 5) | | | | | | | | | |
|---|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | 120713 | 120513 | 190711 | 120711 | 120511 | 120711 | 120511 | 120312 | 120313 | |
| The course is well designed | 4.0 | 3.9 | 3.9 | 4.2 | 3.92 | 4.2 | 3.92 | 4 | 4.2 | |
| The syllabus units are balanced | 3.9 | 3.6 | 4.2 | 4 | 3.92 | 4 | 3.92 | 4.1 | 4 | |
| The learning material was available to you | 4.0 | 4.2 | 4.2 | 3.6 | 4.03 | 3.6 | 4.03 | 4.4 | 4 | |
| The content was clear and easy to understand | 4.4 | 4.5 | 4 | 3.8 | 3.82 | 4 | 3.82 | 4.25 | 4.2 | |
| The course was relevant and updated for present needs | 4.0 | 4 | 4.2 | 4 | 3.89 | 4 | 3.89 | 4.4 | 4 | |
| The course meets your career expectations | 3.9 | 4.1 | 3.8 | 4 | 4.05 | 4 | 4.05 | 4.6 | 4.3 | |
| The course will be useful to meet your higher studies/future aspirations. | 3.9 | 4.1 | 4 | 4.2 | 4.05 | 4.2 | 4.05 | 4.2 | 4.2 | |

13K



Teacher Feedback (on a scale of 1-5)



- The availability of books & e-learning material in the institute is good
- The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?
- The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.
- The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.
- The curriculum is capable of inculcating life-long learning abilities in students.

(Handwritten signatures and initials)



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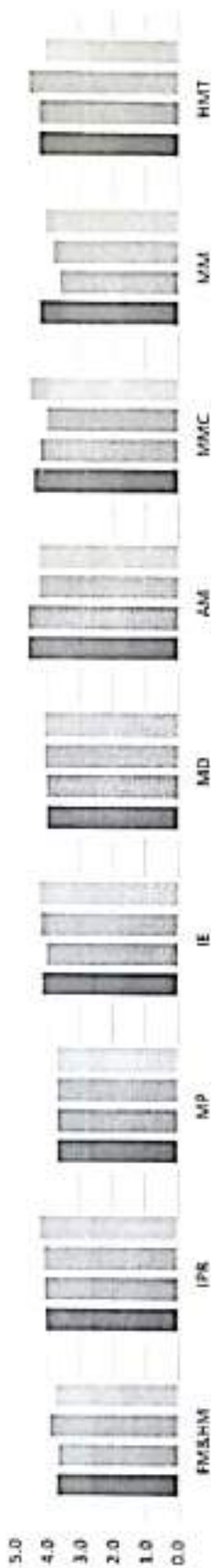
| Subject Name | The availability of books & E-learning material in the institute is good | The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes? | The course curriculum/Habi are helpful in meeting the higher studies/placement requirements according to present global trends. | The course/ contents in your domain/area are well designed and frequently updated, hence need no changes at present. | The curriculum is capable of inculcating life-long learning abilities in students. | Overall Rating |
|--------------------------------------|--|---|---|--|--|----------------|
| Manufacturing Process | 5 | 5 | 4 | 5 | 4 | 4.6 |
| Mechanics of Materials | 5 | 4 | 4 | 3 | 4 | 4.0 |
| Automotive Engines | 4 | 4 | 4 | 4 | 4 | 4.0 |
| Theory of Machines -I | 4 | 3 | 3 | 3 | 4 | 3.4 |
| Fluid Mechanics & Hydraulic Machines | 5 | 5 | 5 | 4 | 5 | 4.8 |
| Industrial Engineering | 5 | 5 | 5 | 4 | 5 | 4.8 |
| Thermal engineering | 4 | 4 | 4 | 5 | 4 | 4.2 |
| Heat & Mass Transfer | 5 | 5 | 4 | 4 | 5 | 4.6 |
| Design of machine elements | 4 | 3 | 3 | 5 | 4 | 3.8 |
| Machine Design | 4 | 4 | 3 | 3 | 4 | 3.6 |
| Vehicle Dynamics | 4 | 4 | 3 | 4 | 4 | 3.8 |
| Hybrid Electric Vehicles | 4 | 4 | 4 | 3 | 4 | 3.8 |
| Introduction to Mechanical Vibration | 5 | 5 | 5 | 3 | 4 | 4.4 |
| Refrigeration and Air-Conditioning | 4 | 4 | 4 | 3 | 4 | 3.8 |
| Metrology, Measurement and Control | 5 | 5 | 5 | 4 | 3 | 4.4 |
| TQM | 5 | 4 | 4 | 4 | 5 | 4.4 |



Department of Mechanical Engineering

Parents Satisfaction Feedback

Parents Satisfaction Feedback



- How do you rate the programme in terms of the load of the courses in different semesters?
- How do you rate the availability of books & E-learning material in the institute library / website?
- Is any new course to be introduced- to meet current needs & technological changes?
- How do you rate the quality and relevance of the courses included in the programme of study.

| | FMS&HM | IPR | MP | IE | MD | AM | MMC | MM | HMT |
|---|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| How do you rate the programme in terms of the load of the courses in different semesters? | 3.7 | 4.0 | 3.7 | 4.1 | 4.0 | 4.6 | 4.4 | 4.2 | 4.2 |
| How do you rate the availability of books & E-learning material in the institute library / website? | 3.7 | 4.1 | 3.7 | 4.0 | 4.0 | 4.6 | 4.2 | 3.6 | 4.2 |
| Is any new course to be introduced- to meet current needs & technological changes? | 3.9 | 4.1 | 3.7 | 4.2 | 4.1 | 4.2 | 4 | 3.8 | 4.5 |
| How do you rate the quality and relevance of the courses included in the programme of study. | 3.8 | 4.2 | 3.7 | 4.2 | 4.1 | 4.2 | 4.5 | 4 | 4 |

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Alumni's Feedback on Curriculum

Action Taken on Alumni's Feedback

The feedback responses from alumni and action taken is illustrated in the following table:

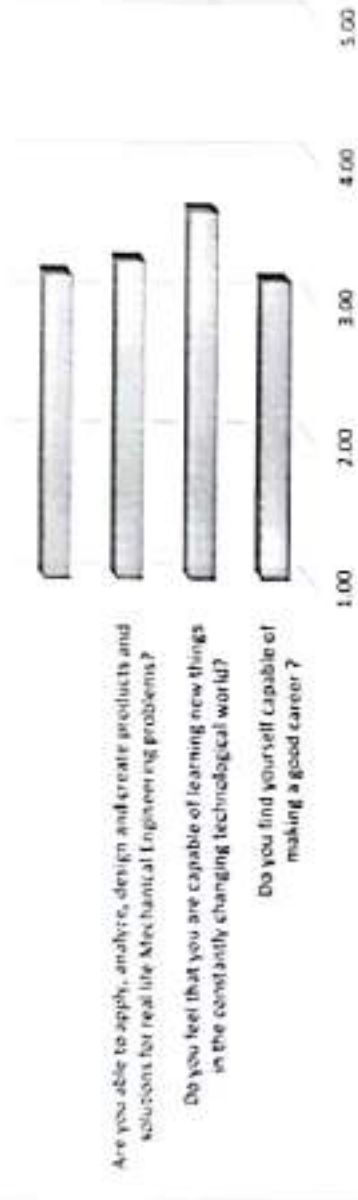
| S.No | Feedback | Action Taken |
|------|--|---|
| 1 | Need to touch the industrial and research aspects | Internship in industry is offered in Mechanical VIII sem, also ethical classes conducted under NSS. |
| 2 | Practical classes for core mechanical branches like: MATLAB, Ansys, Coding's and advance simulation tool required | Curriculum updated, DE and OC's subjects are available for such courses. |
| 3 | Current industries are working under digital phase so new courses like data science and ML should be the part of curriculum. | Data science and ML subject has been implemented in V semester 2020-21 batch. |
| 4 | Students must be more flexible in co-curricular activities along with curriculum | New clubs has been started in different domain of interest to develop students personalities.. |
| 5 | Practical exposure is very less. Collage not provide any campus recruitment or internship opportunity. | 6 month Internship opportunity is providing in VIII sem . |

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Average Feedback out of 5



| Criteria | Excellent | Very Good | Good | Fair | Poor |
|---|-----------|-----------|------|------|------|
| Do you find yourself capable of making a good career? | 8 | 5 | 10 | 4 | 2 |
| Do you feel that you are capable of learning new things in the constantly changing technological world? | 9 | 8 | 10 | 1 | 1 |
| Are you able to apply, analyze, design and create products and solutions for real life Mechanical Engineering problems? | 13 | 8 | 6 | 2 | 0 |
| Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member/leader of multidisciplinary teams? | 7 | 8 | 9 | 3 | 2 |

(Handwritten signatures and initials)

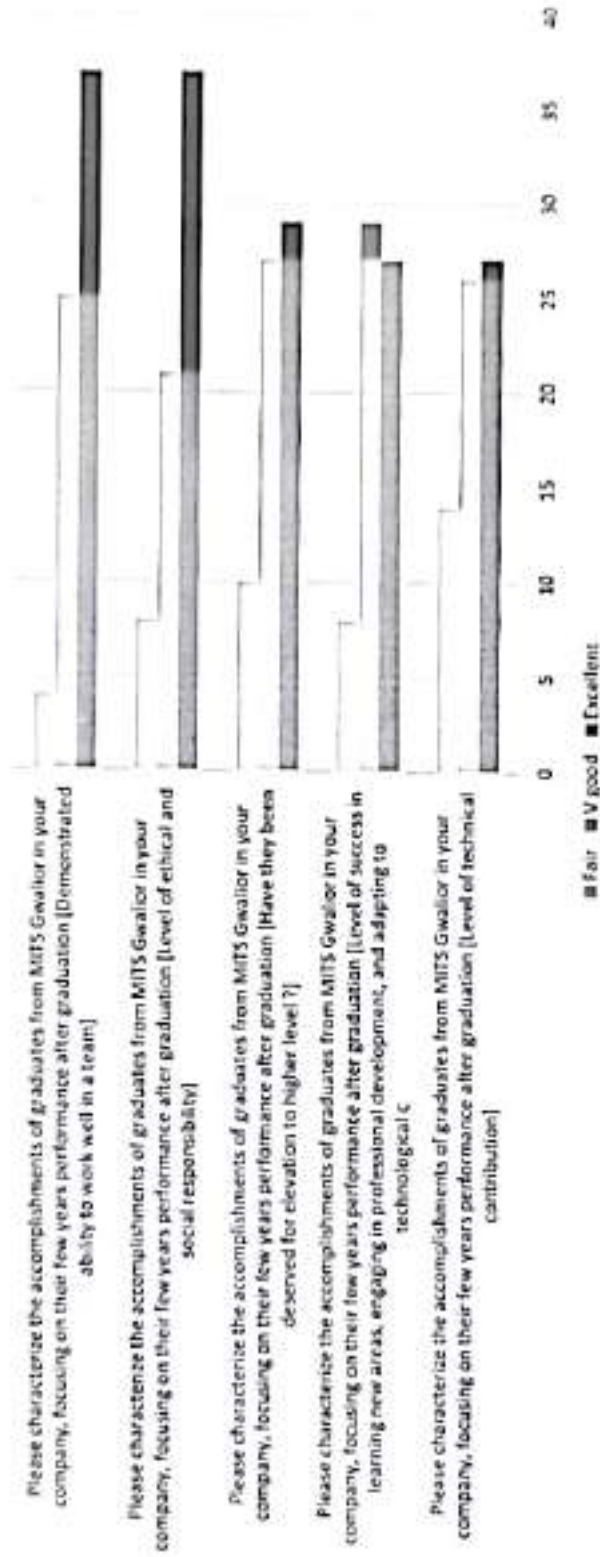
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Employer Feedback

Employer Feedback



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