Koneru Lakshmaiah Education Foundation
NAAC A++ Grade with 3.57/4, Category 1 University declared by UGC
Estd u/s 3 of UGC Act 1956

DEPARTMENT OF MECHANICAL ENGINEERING
MINUTES OF BOARD OF STUDIES MEETING

KLEF/ ME/ IQAC - ACAD/AQ.5/ DCMs **Date: 20-05-2021**

The department 19th Board of Studies meeting was conducted in virtual modefrom11:00 A.M.on 20/05/2021 in th following webex link:

https://kluniversity.webex.com/kluniversity/j.php?MTID=m1023b932f68da3f1cf66c8f7fcd66d84

Agenda Items:

1. To present the activities and achievements of the department during 2020-21 even semester.
2. To consider the feedback given by the stake holders on existing curriculum.
3. To consider and approve the B.Tech 2021-22 admitted batch curriculum as per th recommendations/proposals of DAC.
4. To consider the changes proposed by the course coordinators in syllabus, delivery mode, experiment evaluation pattern etc., for 2021-22 odd Semester courses as per the deliberations taken in SRP Meeting and as per the recommendations of DAC.
5. To consider the revised Pre Ph.D course syllabus
6. Any other point with the permission of chair

The following **External Members** were present:

1. Dr. R. Vijaya Kumar, Senior Manager, R & D, HAL, Bangalore (Alumni)
2. Dr. P. SrinivasaRao, Global Training Head, Cyient Technologies, Hyderabad
3. Dr. K. Raviteja, Deputy Manager, Hyundai R&D Division, Hyderabad (Alumni)

The following members were present from **Dean Academics team**

1. Dr. V.Divya, Associate Professor, Associate Dean-Academics

The following **Internal Members** were present:

1. Dr. D. V. A. Ramasastry, Associate Professor, HoD-ME, Chairman BOS
2. Dr. K.L. Narayana, Professor, Advisor(R&D)
3. Dr. A. Jagadeesh, Professor,CCO
4. Dr. A. Srinath, Professor, Dean Skill Development & Principal ASC.
5. Dr.Y.V. Hanumantha Rao, Group head Energy & CFD
6. Dr.S.N.Padhi, Group Head Design & Manufacturing
7. Dr.S.S.Rao, Professor, Group Head-Robotics & Mechatronics
8. Dr.G.Murali,Professor
9. Dr. G. Yedukondalu, Associate Professor
10. Dr.K.V.Durga Rajesh, Associate Professor
11. Dr. S.Sudhakar Babu, Associate Professor

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Head, Department of Mechanical Engineering
K L (Deemed to be University)

12. Mr. P. Ratna Prasad, Assistant Professor
13. Mr. K. Dileep, Assistant Professor
14. Mrs. T.Kanthimathi, Assistant Professor

Dr. D. V. A. Ramasastry, Chairman of BoS opened the meeting by welcoming all external & internal members. After due deliberations, the following resolutions have been adopted:

RESOLUTIONS:

1. Chairman BOS presented the activities and achievements of the department happened from December 2020 to till date to all the members (**Annexure-1: Significant Events of dept. from December 2020 to till date**).

2. It is resolved to consider the suggestions / feedback given by stake holders on curriculum and it is resolved to implement the suggestions as per the recommendations of DAC (**Annexure 2: DAC Minutes**)

3. After discussing on the identified QPs as mentioned by various skilling agencies, it is resolved to offer the following courses with skilling components to take care of the missing skillset for Y20 and Y21 admitted batches as per the recommendations of DAC. It is also resolved that the assessment for all skilling courses must be benchmarked with identified QPs of Skilling agencies.

   a. It is resolved to introduce the following new courses for Y20 and Y21 admitted batches
      - Production Technology(21ME3217) with L-T-P-S :3-0-0-0
      - Flexi core course entitled Heat Power Engineering(20ME3226) with L-T-P-S:2-0-0-0
      - Kinematics of Machines(21ME2211) with L-T-P-S :2-0-2-0
      - Dynamics of Machines (21ME3118) with L-T-P-S :2-0-0-0
      - Materials Technology (21PH2007) with L-T-P-S :2-0-0-0
      - Manufacturing processes (21ME2107) with L-T-P-S :2-0-2-0
      - Optimization Techniques (21ME3116) with L-T-P-S :2-0-0-0
      - Instrumentation & Control(21ME4120) with L-T-P-S :2-0-0-4
      - Problem Solving Skills-I(21UC3105) with L-T-P-S :0-0-2-2
      - Problem Solving Skills-II(21UC3206) with L-T-P-S :0-0-2-2
      - Chemistry (21CY1001) with L-T-P-S :3-0-2-0
      - Project Based learning-I(21IE2046) with L-T-P-S :0-0-0-6
      - Project Based learning-II(21IE2047) with L-T-P-S :0-0-0-6

   b. It is resolved to offer the following courses with skilling components for Y20 and Y21 admitted batches as per the recommendations of DAC
      - Mechanical Engineering Design & Innovation (20ME2208, L-T-P-S: 3-0-2-4)
      - Production Technology (20ME2212, L-T-P-S: 1-0-0-4)) introduced in place of Engineering in the physical world

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Prof. Department of Mechanical Engineering
& Chairman, Board of Studies

- Machine Design (20ME3113, L-T-P-S: 3-1-0-4)
- Analysis of Thermal Systems (20ME2210, L-T-P-S:3-1-0-4)

c. It is recommended to Academic council to consider for modification of the courses related to softskills, communication skills as per the needs of NSDC, Nasscom identified skillset.

The updated Y20 Curriculum is shown in **Annexure 3** and the proposed Y21 curriculum is shown in **Annexure 4(a)** and the new courses syllabus in **Annexure 4(b)**.

4. It is resolved to approve the minor revisions proposed by the course coordinators for the courses offered in 2021-22 odd semester as listed below:
   - Heat transfer (19ME3215) (**Annexure – 5(a)**)
   - Thermodynamics (20ME2105) (**Annexure – 5(b)**)

5. It is resolved to approve the revise list of Pre Ph.D courses and syllabus offered by the department(**Annexure-6**).

7. It is proposed to introduce Energy & CFD specialization for Y20 & Y21 admitted batch students. DAC and Energy & CFD Group head is instructed to prepare the list of courses and syllabus for approval in the next BOS.

8. It is resolved to offer Petroleum engineering as one of the specializations for 2019-20 admitted batch and the proposed flexi core and professional elective courses under this specialization is shown in **Annexure-7.**

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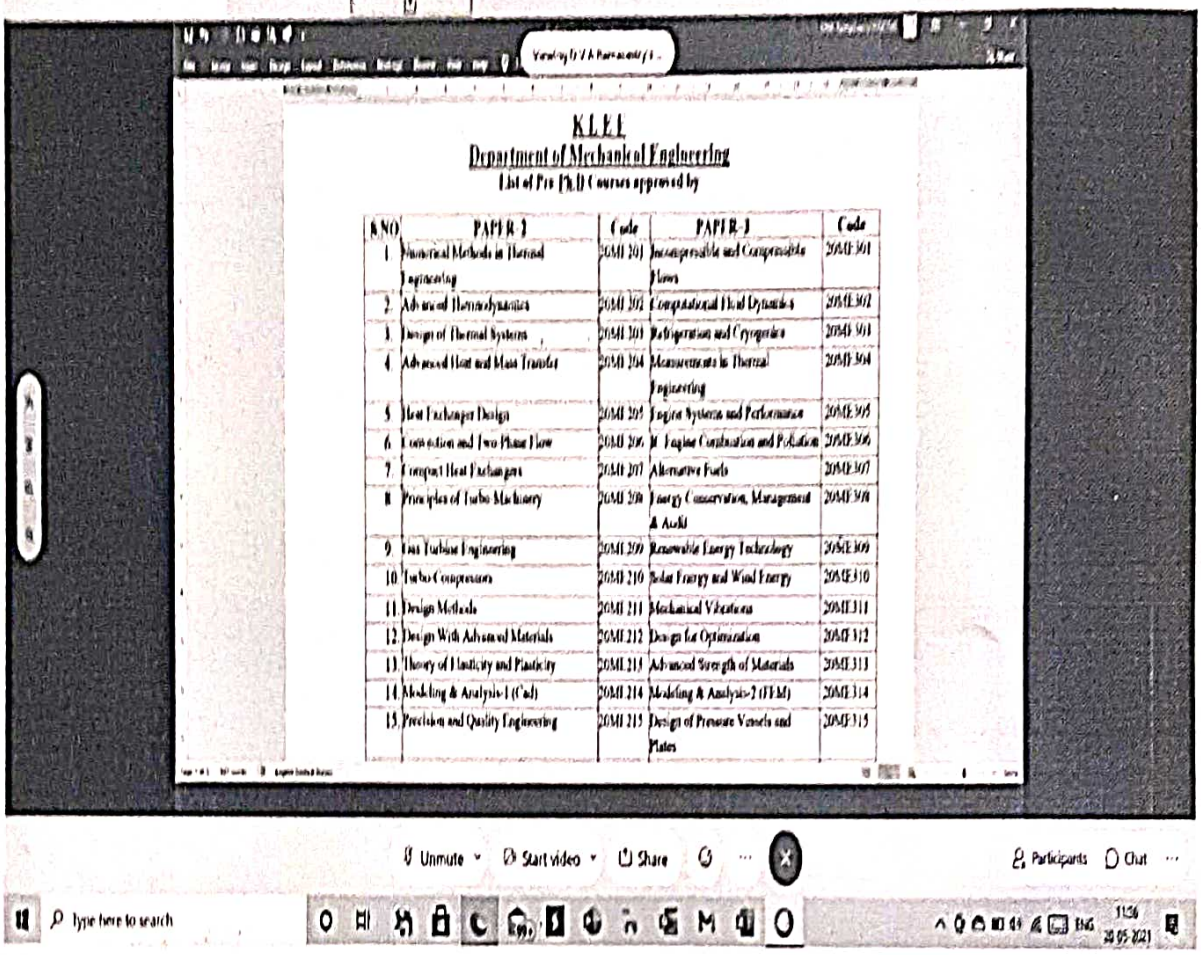

KLEI

Department of Mechanical Engineering

List of Pre Ph.D Courses approved by

S.NO	PAPER-1	Code	PAPER-2	Code
1	Numerical Methods in Thermal Engineering	20ME201	Incompressible and Compressible Flows	20ME301
2	Advanced Thermodynamics	20ME202	Computational Heat Dynamics	20ME302
3	Design of Thermal Systems	20ME203	Refrigeration and Cryogenics	20ME303
4	Advanced Heat and Mass Transfer	20ME204	Measurements in Thermal Engineering	20ME304
5	Heat Exchanger Design	20ME205	Engine Systems and Performance	20ME305
6	Convection and Two Phase Flow	20ME206	IC Engine Combustion and Pollution	20ME306
7	Compact Heat Exchangers	20ME207	Alternative Fuels	20ME307
8	Principles of Turbo Machinery	20ME208	Energy Conservation, Management & Audit	20ME308
9	Gas Turbine Engineering	20ME209	Renewable Energy Technology	20ME309
10	Turbo Compressors	20ME210	Solar Energy and Wind Energy	20ME310
11	Design Methods	20ME211	Mechanical Vibrations	20ME311
12	Design With Advanced Materials	20ME212	Design for Optimization	20ME312
13	Theory of Elasticity and Plasticity	20ME213	Advanced Strength of Materials	20ME313
14	Modeling & Analysis-1 (Cad)	20ME214	Modeling & Analysis-2 (FEM)	20ME314
15	Precision and Quality Engineering	20ME215	Design of Pressure Vessels and Plates	20ME315

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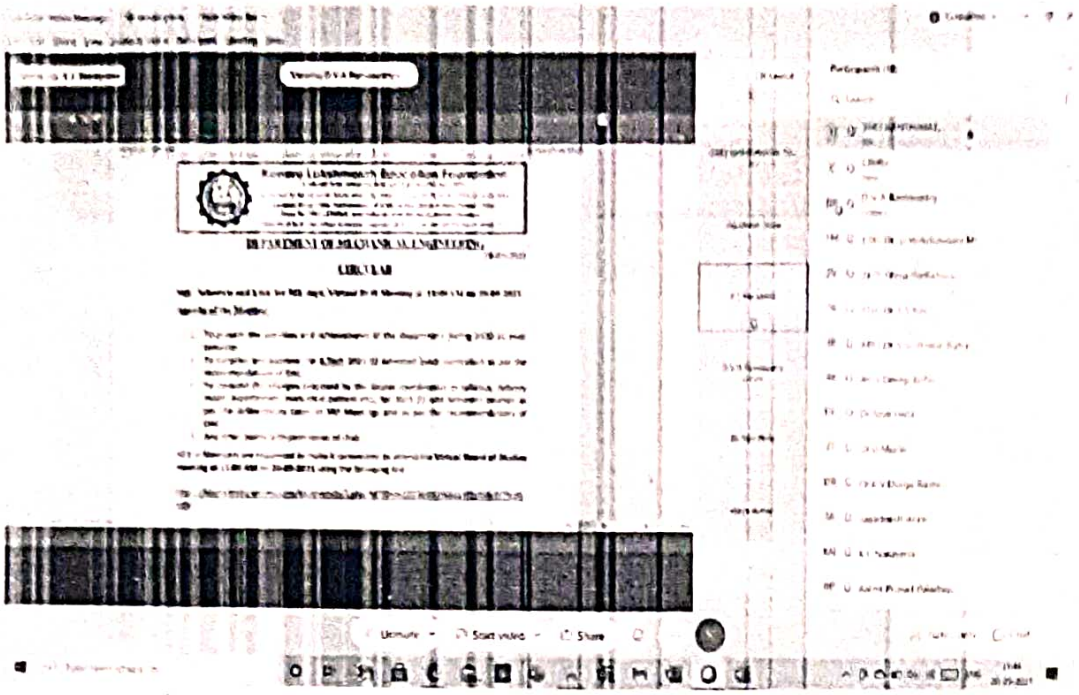

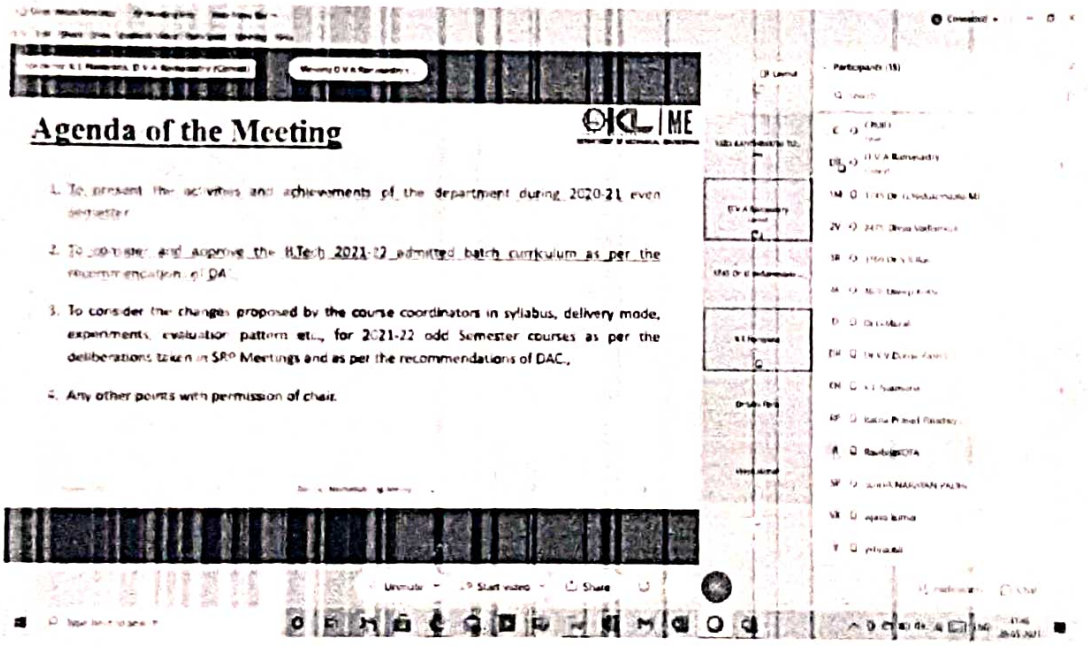

Prepared by
(Mrs.T.Kanthimathi)
Prof. I/C Academics

20/5/2021

Authorised by
(Dr. D.V.A.Ramasastry)
Chairman – BoS

20/5/21

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Head, Department of Mechanical Engineering
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BoS Annexure-1
Significant Events from December -2020 to April-2021

1.0 Honours Received

1.1 Honours received by Faculty

Dept.	Name of the Faculty	Details of Honours	By
ME	Dr. G. Murali	Best Teacher Award for A.Y 2019-2020	KLEF
ME	Dr. S.S. Rao	Best Teacher Award for A.Y 2019-2020	KLEF
ME	Dr. K. V. Durga Rajesh	Best Teacher Award for A.Y 2019-2020	KLEF
ME	Mr. K. Dileep	Best Teacher Award for A.Y 2019-2020	KLEF

1.2 Honours received by Students

Dept.	Name of the Student	Details of Honours	By
ME	Mr. P. Prudhvi Teja	Indian Record as "**First Indian to Register 13 Intellectual Property Rights in Just 24 Hours**" by Indian Book of Records on 09-03-2021	Indian Book of Records
ME	Mr. P. Prudhvi Teja	World Record of "**Youngest to Get Maximum Intellectual Property Rights in One Day**" is achieved by Prudhvi Teja Pagidimari on 9th March 2021	International Book of Records

1.3 Placements Details

Sl. No.	Company Name	No. of students selected	Package (in Lakhs)	Company profile
1	Amazon	1	5.00	Supply Chain management
2	infosys	10	4.00	IT
3	CTS	17	4.00	IT
4	TCS	9	3.60	IT
5	RAAM Group	3	2.40	BDE
6	Wipro	12	4.00	IT
7	PS Tobocco	1	3.50	Core
8	KJ Systems	2	2.50	IT
9	Signisent	3	2.40	Data Analysis
10	MNF	1	3.60	IT
11	Six Phrase	1	3.60	IT
12	Kwangjin	27	1.68	Core
13	Spray Engineering	8	1.80	Core
14	Thermal systems	4	1.80	Core
15	HealthPix	9	3.00	Core
16	Arihant Plast	19	1.80	Core
17	Tech Team	3	1.80	BDE

Dr. D.V.A. RAMA SASTRY
Head, Department of Mechanical Engg
K.L. (Deemed to be University)

Significant Events from December -2020 to April-2021

1.0 Honours Received

1.1 Honours received by Faculty

Dept.	Name of the Faculty	Details of Honours	By
ME	Dr G. Murali	Best Teacher Award for A.Y 2019-2020	KLEF
ME	Dr S.S. Rao	Best Teacher Award for A.Y 2019-2020	KLEF
ME	Dr L. V. Durga Rajesh	Best Teacher Award for A.Y 2019-2020	KLEF
ME	Mr K. Dileep	Best Teacher Award for A.Y 2019-2020	KLEF

1.2 Honours received by Students

Dept.	Name of the Student	Details of Honours	By
ME	Mr P. Pradhvi Teja	Indian Record as "**First Indian to Register 13 Intellectual Property Rights in Just 24 Hours**" by Indian Book of Records on 09-03-2021	Indian Book of Records
ME	Mr P. Pradhvi Teja	World Record of "**Youngest to Get Maximum Intellectual Property Rights in One Day**" is achieved by Pradhvi Teja Pagidimari on 9th March 2021	International Book of Records

1.3 Placements Details

Sl. No.	Company Name	No. of students selected	Package (in Lakhs)	Company profile
1	Amazon	1	5.00	Supply Chain management
2	Infosys	10	4.00	IT
3	CTS	17	4.00	IT
4	TCS	9	3.60	IT
5	RAAM Group	3	2.40	BDE
6	Wipro	12	4.00	IT
7	PS Lemaxo	1	3.50	Core
8	KJ Systems	2	2.50	IT
9	Sigmoid	3	2.40	Data Analytics
10	MNF	1	3.60	IT
11	Six Phrase	1	3.60	IT
12	Kwangyu	27	1.68	Core
13	Spray Engineering	8	1.80	Core
14	Thermal systems	4	1.80	Core
15	HealthPro	9	3.05	Core
16	Arihant Plast	19	1.96	Core
17	Tech Team	3	1.80	BDE

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Head, Department of Mechanical Engineering

18	Sutherland Global	2	2.25	Data Analysis
19	Accenture	2	4.50	IT

1.4 Ph.D. awarded

S. No.	Dept.	Name of the Faculty/Scholar	Name of the University/ Supervisor	Month and Year
1	ME	P. Suresh Babu	Dr. K. L. Narayana	December-2020
2	ME	Venkata deepthi .T	Dr. K. Ramakotaiah	December-2020
3	ME	J. Jagadesh Kumar	Dr. G. Diwakar	January-2021
4	ME	Gurram Narendra Santhosh Kumar	Dr. A. Srinath	March-2021

1.5 Ph.D. Thesis submitted

S. No.	Dept.	Name of the Faculty/Scholar	Name of the Supervisor	Submitted on	Submitted to
1	ME	Mr. K. Lokesh	NIT Warangal	January -2021	NIT Warangal

2.0 Research Publications

2.1 Number of Papers Published by Faculty

S. No	Dept.	National Journals	International Journals
1	ME	-	2020 Year – 138 2021 Year – 13 (till date)

2.2 Number of Papers Presented by Faculty

S. No	Dept.	National Conferences	International Conferences
1	ME	-	5

3.0 Consultancy , Patents And Citations

3.1 Consultancy

S. No.	Name of the Faculty	Sponsoring Agency	Work
1	Dr. A. Srinath	K K Comforts	Characterization of Metal Sheets
2	Dr. K.V. Ramana and Mr. D.V.A Rama Sastry	Faculty R&D work of other institutions	Material Testing
3	Dr. G. Murali	Genewin Biotech, Hosur	A PCM integrated Thermal Energy storage in solar water heating
4	Dr K V Narasimha Rao	Cleantech Consultants, Bangalore	Energy Saving Opportunities in Refrigeration & Air-Conditioning
5	Dr P Issac Prasad	Cleantech Consultants, Bangalore	Energy Saving Opportunities in Diesel Generating Sets
6	Dr N.Tamiloli	Vishvaa Rubber Products-Vellore	Die designing of

			pressure cooker gasket
7	Dr. A. Srinath	APSSDC	Future skill ready students of AP
8	Dr. Dama Kiran Kumar	KOPP 3D Innovation OPC Pvt Ltd	Mechanical characterization of additively manufacturing materials having lattice micro structure
9	Dr. S. Srinivas Rao	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Induction Sealing Integrity verification
10	Dr.Y.V.Hanumantha Rao	SIBAR Institute of Dental sciences, Takkellapadu, Guntur, Andhra Pradesh 522509	Comparision of Surface treatment on Flextural strength of Different CAD/CAM materials
11	Dr. K. Venkata Ramana	PVPSIT, Chalasani Nagar, Kanuru, Vijayawada, Andhra Pradesh 520007	Analysis of tensile and flexural properties with V.Sri Sai Harsha Vardhan
12	Dr. K. Rama Krishna	CLEANTECH Consultants,A308,Block2,KSSIDC complex,El. City,Ph-1,Bangalore-560100	Optimizing energy Requirements in Air Dehumidification
13	Dr. K. Lakshmi Narayana	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Bio ceramics
14	Dr.N.B.V.Prasad	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Holes and Thin walls inspections system
15	Dr. B. Nageswara Rao	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Bottle Inspections System
16	Dr. G. Diwakar	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Bottle Inspections System
17	Dr. B V Dharmendra	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Closer and Liner Inspection system
18	Dr.T.Srinivasan	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi	Desiccant Calisters Inspection system

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		Nagar,Hyderabad -72	
19	Dr.P.V.CHALAPATHI	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Closer and Liner Inspection system
20	Dr.Surya Narayana Padhi	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Bottle Inspections System
21	Dr. M. Nageswara Rao	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Desiccant Calisters Inspection system
22	Dr. Y. Kalyana Chakravarthy	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	OCR/OCV Inspection system
23	Dr. M. Bala Satya Sreekara Reddy	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Label Inspection System
24	Dr. G. Yedukondalu	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Closer and Liner Inspection system
25	Dr. S. Sudhakar Babu	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Label Inspection System
26	Dr. Anshuman Kumar	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Label Inspection System
27	Dr.Himanshu Mishra	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Induction Sealing Integrity verification
28	Dr.Sk Abdul Munaf	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Desiccant Calisters Inspection system
29	Dr.N.Rajesh	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Inspection on Black spots ,Material Inclusions ,Burn spots
30	Dr.Atul Bhattad	OPTOMECH Engineers PVt Ltd.	Inspection on Black

			selection"
		#3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	spots ,Material Inclusions ,Burn spots
31	Dr.K.Venkatesan	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	Inspection on Black spots ,Material Inclusions ,Burn spots
32	Dr.K.Kishore Kumar	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	OCR/OCV Inspection system
33	Dr. K. V. Durga Rajesh	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	OCR/OCV Inspection system
34	Dr. P. Kasi Visweswarao	OPTOMECH Engineers PVt Ltd. #3A,Type II,I.E,Kukatpalli,Prasanthi Nagar,Hyderabad -72	OCR/OCV Inspection system
35	Dr. A. Venkataramana	Petroleum Engineers Association,Bompass Town,Khoradah road,near Devsangh national School,Deoghar,Jharkhant-814112	Study of Formation Based drilling Fluids influencing Deep water Drilling Operations

3.2 Patents

From December 2020 to April 2021,

Design Patents		Utility Patents	
Filed	Granted and Published	Filed	Published
56	12	4	4

3.3 Citations

- Dr. B. Nageswara Rao, Professor in ME has 269 citations in 2020 and 116 citations in 2021 so far with total citations of 3110 with h-index 27.
- Dr. K. Rama Krishna, Professor in ME has 67 citations in 2020 with total citations of 312 in 2021 so far.
- Dr. A. Jagadeesh, Professor in ME has 106 citations in 2020 and 52 citations in 2021 so far with total citations of 217.
- Dr. K. L. Narayana, Professor in ME has 51 citations in 2020 with total citations of 156 in 2021 so far.
- Dr. G. Murali, Professor in ME has 63 citations in 2020 with total citations of 131 in 2021 so far.

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Vaddeswaram-522

- Dr. A. Srinath, Professor in ME has 27 citations in 2020 with total citations of 108 in 2021 so far.

4.0 Seminars / Workshops

4.1 Workshops / Seminars Attended by the Department through Virtual Mode

S. No.	Dept.	No. of Faculty	Seminar / Workshop / Short Term Course / Conference
1	ME	All Faculty	One day training programme on "Effective Mentoring Practices for Holistic Development of Students" by Academic Staff College, KLEF on 16-12-2020
2	ME	All Faculty	One week FDP on Effective Pedagogical Practices in Teaching Mechanical Engineering Courses organized by Dept. of ME and KL-ASC from 16th to 22nd December 2020
3	ME	All Faculty	2-Day National Virtual Conference on "Innovative Mechanisms and Standards for Assuring Quality in Higher Education Institutions" from 29th to 30th January-2021
4	ME	All Faculty	One day virtual workshop on 3-D Printing in Bio-Medical Applications on 13th March 2021
5	ME	All Faculty	One day virtual seminar on 4D printing & Biomedical Applications on 27th March 2021

4.2 Conferences/workshop/seminar Conducted by the Department through Virtual Mode

S. No.	Dept.	Conference
1	ME	International Conference on Recent Developments in Mechanical Engineering (ICRDME-2020) from 18th to 19th December-2020
2	ME	One day virtual workshop on 3-D Printing in Bio-Medical Applications on 13th March 2021
3	ME	One day virtual seminar on 4D printing & Biomedical Applications on 27th March 2021

5.0 Guest Lectures

5.1 Guest Lectures Arranged through Virtual Mode

S. No.	Dept.	Name of the Guest Faculty	Date	On Topic
1	ME	Mr. Vimal Ojha, Director and Founder at SOHA Technologies Pvt. Ltd., Industry-Academic Expert	27-01-2021	Applications of Hydraulics in Mechanical Engineering
2	ME	Mr. V. Karthik, Alumni Student working in Satvin Engineering	29-01-2021	Exhaust Gas Recirculation systems
3	ME	Mr. M. Sai Sunil, Alumni Student working as Robotic Programmer and Analyst at Cognizant - Chennai	24-02-2021	Robotic Process Automation
4	ME	Mr. K. Santosh Kumar, Associate SAP Consultant, Goldman Sachs	20-03-2021	Guest Lecture on " Career opportunities and

				selection"
5	ME	Mr. Ch. Sai Akhil, Associate SAP Consultant, Walmart Labs	20-03-2021	Guest Lecture on " Career opportunities for Mechanical Engineering Graduates"
6	ME	Dr. K. S. S. Harish, Assistant Professor, NIT Trichy	22-03-2021	Low Temperature Science and Engineering
7	ME	Ms. M. Geetha Prathyusha, Tech Manager, Syriqhub Pvt. Ltd	30-03-2021	Machine Learning and its applications

6.0 NSS Activities conducted through Virtual/Offline Mode

S. No.	Dept.	Details of NSS Activities	Conducted On
1	ME	Electricity Management	25-01-2021
2	ME	Farming Techniques	25-01-2021
3	ME	Daily essentials donation at Yuvatharam Orphanage (Offline)	26-01-2021
4	ME	NSS Special Camp	15th to 17th Feb 2021

HoD-ME

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K L E F
DEPARTMENT OF MECHANICAL ENGINEERING
MINUTES OF DEPARTMENT ACADEMIC COMMITTEE (DAC)

KLEF/ ME/ IQAC - ACAD/AQ.5/ DCMs **Date: 19-05-2021**

The Department Academic Committee (DAC) Meeting was conducted at 10:15 P.M. on 19/05/2021 in virtual mode using the following link.

https://kluniversity.webex.com/kluniversity/j.php?MTID=m1023b932f68da3f1cf66c8f7fcd66d84

Agenda of the Meeting:

1. To discuss on the feedback given by the stake holders on the curriculum of 2021-22 Odd Sem.
2. To discuss on the inputs given by the course coordinators of 2021-22 Odd Sem syllabus, to be put forth in BOS scheduled on 20-05-2021.
3. Any other points with the permission of the Chair.

The following members were present:

1. Dr. D. V. A. Rama Sastry, Associate Professor &HoD, Chairman-DAC
2. Dr. S. S. Rao, Professor & PG Coordinator & R&M Group Head, Member
3. Dr. Y.V.Hanumantha Rao, Associate Professor & CFD Group Head, Member
4. Dr. S. N. Padhi, Professor & D&M Group Head, Member
5. Dr. P. Kasi V. Rao, Associate Professor &Deputy HoD, Member
6. Dr. Himanshu Mishra, Associate Professor, Member
7. Dr. M. Nageswara Rao, Associate Professor & II Year Coordinator, Member
8. Mr. G. R. Sanjay Krishna, Associate Professor & III Year Coordinator, Member
9. Mr. K. M. V. Ravi Teja, Assistant Professor & IV Year Coordinator, Member
10. Mrs. T. Kanthimathi, Assistant Professor& Professor I/C Academics, Member

Minutes:

1. HOD welcomed all the members to the meeting and presented the agenda items before the members.

2. Upon discussing on the feedback given by Y18 students to incorporate GATE topics, it is resolved to include GATE topics in the syllabus of relevant courses.

3. Upon discussing on the feedback given by the alumni Gampa Srinath, to include a course on industrial engineering and production planning, it is proposed to introduce a new courseentitled "Production and Operations management" and also tointroduce "Production Technology" in place of Engineering in the Physical world.
4. After elaborate discussion and mapping with the identified QUALIFICATION PACKS (QPs) as mentioned by various skilling agencies of NASSCOM and NSDC SECTOR SKILL COUNCILS with academic/skilling courses of the B.Tech ME program offered by the department and also upon discussing with Industry peers, it

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is identified that all required skills are imparted through present courses and recommended to include the following courses to take care of the missing skill sets.

- Mechanical Engineering Design & Innovation (20ME2208, L-T-P-S: 3-0-2-4)
- Machine Design (20ME3113, L-T-P-S: 3-1-0-4)
- Analysis of Thermal Systems(20ME2210, L-T-P-S: 3-1-0-4)

5. Upon discussing on the feedback given by Faculty member, Mr.V.Nagaraju, Course Coordinator of "Thermodynamics (20ME2105)" minor changes in the syllabus are proposed for consideration in BOS(**Annexure 1a).**
6. Upon discussing on the feedback given by faculty member, Dr.S.Sudhakar Babu, Course Coordinator of "Heat Transfer (19ME3219)" minor changes in the syllabus are proposed for consideration in BOS(**Annexure 1b**).
7. Upon discussing on the feedback given by academic peer Dr.K.S.S.Harish, Assistant Professor, NITTiruchy, it is resolved to recommend to include the topics on introduction of Helmoltz and Gibbs function in Thermodynamics course, nozzles in Bernoulli's equation in Fluid Mechanics and Hydraulic Machines Course, external flow and flow over plate in Heat transfer course and introduction to cascade refrigeration in Analysis of thermal systems course.
8. The consolidated action taken report on the feedback given by the stake holders is shown in **Annexure 2.**
9. Upon discussion on the feedback and interest shown by some Y19 students, it is resolved to add petroleum engineering as one of the specialization for Y19 admitted batch students under professional elective courses(**Annexure 3**).

Prepared by
(T.Kanthimathi)
Prof. I/C Academics

Authorised by
(Dr. D.V.A. Ramasastry)
Chairman – DAC

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ANNEXURE-3

KLEF

Department of Mechanical Engineering

B.Tech 2020-21 Admitted Batch Course Structure

Course Structure

Sl No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre- requisite
1	20UC1101	Integrated Professional English	HSS	0	0	4	0	2	4	Nil
2	20UC1202	English Proficiency	HSS	0	0	4	0	2	4	Nil
3	20UC2103	Professional Communication Skills	HSS	0	0	4	0	2	4	Nil
4	20UC2204	Corporate Communication Skills	HSS	0	0	4	0	2	4	Nil
5	20UC3005	Aptitude Builder	HSS	0	0	4	0	2	4	Nil
6		Foreign Language Elective	HSS	2	0	0	0	2	2	Nil
7	20UC0007	Indian Heritage and Culture	HSS	2	0	0	0	0	2	Nil
8	20UC0008	Indian Constitution	HSS	2	0	0	0	0	2	Nil
9	20UC0009	Ecology & Environment	HSS	2	0	0	0	0	2	Nil
10	20UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	0	2	Nil
11	20UC0011	Entrepreneurship	HSS	2	0	0	0	0	2	Nil
12	20MT1101	Mathematics for Computing	BS	2	2	0	2	4.5	6	Nil
13	20SC1102	Introduction to Design	BS	1	0	0	4	2	5	Nil
14	19MT2102	Mathematics for Engineers	BS	2	1	0	0	3	3	Nil
15	20PH1010	Science Elective - 1 (Mechanics)	BS	3	1	0	0	4	4	Nil
16	20SC1203	User centric Design Techniques	BS	1	0	0	4	2	5	Nil
17	20SC2104	Design Thinking and Innovation	BS	1	0	0	4	2	5	Nil
18	20PH2007	Science Elective - 2 (Materials for Mechanical Engineering Applications)	BS	3	0	2	0	4	5	Nil
19	19BT1001	Biology for Engineers	BS	2	0	0	0	2	2	Nil
20	20SC1101	Computational Thinking for Design	ES	3	0	2	6	5.5	11	Nil
21	20ME1103	Design Tools Workshop – I	ES	0	0	4	0	2	4	Nil
22	19SC1202	Data Structures	ES	3	0	2	3	4.75	8	20SC1101
23	19SC1209	Design Tools Workshop – II	ES	0	0	4	0	2	4	Nil
24	20ME1203	Computational Thinking and Data Sciences	ES	3	0	2	3	4.75	8	20SC1101

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Head, Department of
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Sl No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre- requisite
25	20ME1002	2D Modeling of Physical Systems using CAD tools	ES	1	0	2	0	2	3	Nil
26	20ME2104	3D Modeling and Physical Prototyping of Mechanical components	ES	0	0	4	0	2	4	20ME1002
27	20ME2209	Numerical Computation for Mechanical Engineers	ES	2	0	2	0	3	4	Nil
28	20EE2205	Circuits and Electronics	ES	3	0	2	0	4	5	Nil
29	20ME2105	Thermodynamics	ES	3	0	0	0	3	3	Nil
30	20ME2101	Mechanics of Solids	PC	3	0	2	0	4	5	20PH1010
31	20ME2106	Fluid Mechanics & Hydraulic Machines	PC	3	0	2	0	4	5	Nil
32	20ME2107	Manufacturing Techniques	PC	3	0	2	0	4	5	Nil
33	20ME2208	Mechanical Engineering Design	PC	3	0	2	4	5	9	20ME2101
34	20ME2210	Analysis of Thermal Systems	PC	3	1	0	4	5	8	20ME2105
35	20ME2211	Analysis of Mechanisms and Machines	PC	3	0	2	0	4	5	20PH1010
36	20ME2212	Engineering in the Physical World	PC	1	0	0	4	2	5	20ME2105
37	20ME3113	Machine Design & Innovation	PC	3	1	0	4	5	8	20ME2208
38	20ME3114	Industry 4.0 & Design of Cyber Physical Systems	PC	3	0	0	4	4	7	Nil
39	20ME3115	Heat Transfer	PC	3	0	2	0	4	5	Nil
40	20ME3216	Artificial Intelligence and Data Analytics	PC	3	0	2	0	4	5	Nil
41	PE-1	Professional Elective – 1	PE	2	0	2	0	3	4	-
42	PE-2	Professional Elective – 2	PE	2	0	2	0	3	4	-
43	PE-3	Professional Elective – 3	PE	2	0	2	0	3	4	-
44	PE-4	Professional Elective – 4	PE	2	0	2	0	3	4	-
45	PE-5	Professional Elective – 5	PE	2	0	2	0	3	4	-
46	FC-1	Flexi Core -1	FC	3	0	2	0	4	5	Nil

	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre- requisite
47	OE	Open Elective – 1	OE	3	0	0	0	3	3	Nil
48	OE	Open Elective – 2	OE	3	0	0	0	3	3	Nil
49	20MB4051	Open Elective - 3 (Modeling Business Systems)	OE	2	0	0	0	2	2	Nil
50	20MB4052	Open Elective - 4 (Entrepreneurship Essentials)	OE	2	0	0	0	2	2	Nil
51	20IE2050	Social internship	PR	0	0	0	8	2	8	Nil
52	20IE3050	Technical Internship	PR	0	0	0	8	2	8	Nil
53		Design Studio elective	PR	0	0	0	10	2.5	10	-
54	20IE3150	Mid Grad Capstone Project – I	PR	0	0	0	8	2	8	Nil
55	20IE3250	Mid Grad Capstone Project – II	PR	0	0	0	8	2	8	Nil
56	20IE4150	Capstone Project – I	PR	0	0	0	24	6	24	Nil
57	20IE4250	Capstone Project – II	PR	0	0	0	24	6	24	Nil
58	19IE4050	Practice School	PR	0	0	0	24	6	24	Nil
59	19IE4051	Internship	PR	0	0	0	24	6	24	Nil
60	20TS3101	Technical Proficiency - 1 / Entrepreneurial Incubation	PTA	0	0	0	12	3	12	Nil
61	20TS3202	Technical Proficiency - 2 / Technopreneurship	PTA	0	0	0	12	3	12	Nil
62	20TS4103	Technical Proficiency - 3 / Entrepreneural Skilling	PTA	0	0	0	12	0	12	Nil
63	20TS4204	Technical Proficiency - 4 / Entrepreneural Skilling	PTA	0	0	0	12	0	12	Nil
		Total Credits						**171**		

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ANNEXURE-U

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Department of Mechanical Engineering

B.Tech 2021-22 Admitted Batch Course-Structure

Sl No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-requisite	New /Revised/ Retained Course	Focussed on Employability/Entrepreneurship/Skill Development/Enironment & Sustainability
1	20UC1101	Integrated Professional English	HSS	0	0	4	0	2	4	Nil	Retained	Employability
2	20UC1202	English Proficiency	HSS	0	0	4	0	2	4	Nil	Retained	Employability
3	21UC2103	Essential Skills for Employability	HSS	0	0	4	0	2	4	Nil	Retained	Employability
4	21UC2204	Corporate Readiness Skills	HSS	0	0	4	0	2	4	Nil	Retained	Employability
5	21UC0010	Universal Human Values & Professional Ethics	HSS	0	0	4	0	2	4	Nil	Retained	Employability
6	20UC0007	Indian Heritage and Culture	HSS	2	0	0	0	2	2	Nil	Retained	Human Values
7	21UC0008	Indian Constitution	HSS	2	0	0	0	0	2	Nil	Retained	Enterpreneurship
8	20UC0009	Ecology & Environment	HSS	2	0	0	0	0	2	Nil	Retained	Environment & Sustainability
9	21UC0011	Gender Sensitization	HSS	2	0	0	0	0	2	Nil	Retained	Entrpreneurship
10	20MT1101	Mathematics for Computing	HSS	2	0	0	0	2	2	Nil	Retained	Entrpreneurship
11	21MT2102	Mathematics for Engineers	BS	2	2	0	2	4.5	6	Nil	Retained	Skilling
12	21ME2206	Numerical Computation for Mechanical Engineers	BS	2	1	0	0	3	3	Nil	Retained	Employability
13	21UC1203	Design Thinking and Innovation	BS	3	0	2	0	4	5	Nil	Retained	Employability
14	21PH1010	Mechanics (Science Elective - 1)	BS	0	0	4	0	2	4	Nil	Retained	Skilling
15	21CY1001	Chemistry (Science Elective - 2)	BS	3	1	0	0	4	4	Nil	Retained	Employability
16	21UC3105	Problem Solving Skills-I	BS	3	0	2	0	4	5	Nil	New Course	Employability
17	21UC3206	Problem Solving Skills-II	BS	0	0	2	2	1.5	4	Nil	New Course	Skilling
18	21SC1101	Computational Thinking for Structured Design	ES	0	0	2	2	1.5	4	Nil	New Course	Skilling
19	20ME1103	Design Tools Workshop – I	ES	3	0	2	6	5.5	11	Nil	Retained	Skilling
20	21SC1204	Design Tools Workshop – II	ES	0	0	4	0	2	4	Nil	Retained	Employability
21	21SC1202	Design of Data Structures	ES	0	0	4	0	2	4	Nil	Retained	Employability
22	21ME1002	Engineering Graphics & 2D Modelling	ES	3	0	2	4	5	9	21SC1101	Retained	Skilling
23	21ME2104	3D Modeling and Physical Prototyping (Workshop & 3D Modeling S/W)	ES	1	0	4	0	3	5	Nil	Retained	Employability
24	21EE2205	Circuits and Electronics	ES	0	0	4	0	2	4	Nil	Retained	Employability
25	21ME2105	Thermodynamics	PC	3	0	2	0	4	5	Nil	Retained	Employability
26	21ME2106	Fluid Mechanics & Hydraulic Machines	PC	3	0	0	0	3	3	Nil	Retained	Employability
27	21ME2210	Analysis of Thermal Systems (with CFD & (Linked to Project))	PC	3	0	2	0	4	5	Nil	Retained	Employability
28	21ME3115	Heat Transfer	PC	2	0	0	4	3	6	21ME2105	Retained	Skilling
29	21ME3119	Heat Power Engineering	PC	3	0	2	0	4	5	Nil	Retained	Employability
30	21ME2101	Mechanics of Solids	PC	2	0	0	0	2	2	Nil	New Course	Employability
31	21ME2208	Mechanical Engineering Design & Innovation (Analysis S/W)	PC	3	0	2	0	4	5	21PH1010	Retained	Employability
32	21ME2211	Kinematics of Machines (with Adams s/w)	PC	2	0	0	4	3	6	21ME2101	Retained	Skilling
33	21ME3118	Dynamics of Machines	PC	2	0	2	0	3	4	21PH1010	New Course	Employability
34	21ME3113	Machine Design (Linked to Project)	PC	2	0	0	0	2	2	21PH1010	New Course	Employability
35	21PH2007	Materials Technology	PC	3	1	0	4	5	8	21ME2208	Retained	Skilling
36	21ME2107	Manufacturing Processes	PC	2	0	0	0	2	2	Nil	New Course	Employability
37	21ME2212	Manufacturing Technology (Linked to Project)	PC	2	0	2	0	3	4	Nil	New Course	Employability
38	21ME3217	Production Technology	PC	2	0	0	0	3	3	Nil	Retained	Employability
				3	0	0	0	3	3	Nil	New Course	Skilling

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Sl No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-requisite	New /Revised/ Retained Course	Focused on Employability/Entrepreneurship/Skill Development/Enhancement & Sustainability
39	21ME3116	Optimisation Techniques	PC	2	0	0	0	2	2	Nil	New Course	Employability/
40	21ME4120	Instrumentation & Control	PC	2	0	0	4	3	6	Nil	New Course	Skilling
41	21ME3114	Industry 4.0 & Design of Cyber Physical Systems	PC	2	0	0	0	2	2	Nil	Retained	Employability/
42	PE-1	Professional Elective - 1	PE	2	0	2	0	3	4	Nil	Retained	Employability/
43	PE-2	Professional Elective - 2	PE	2	0	2	0	3	4	Nil	Retained	Employability/
44	PE-3	Professional Elective - 3	PE	2	0	2	0	3	4	Nil	Retained	Employability/
45	PE-4	Professional Elective - 4	PE	2	0	2	0	3	4	Nil	Retained	Employability/
46	PE-5	Professional Elective - 5	PE	2	0	2	0	3	4	Nil	Retained	Employability/
47	OE	Open Elective - 1	OE	3	0	0	0	3	3	Nil	Retained	Employability/
48	OE	Open Elective - 2	OE	3	0	0	0	3	3	Nil	Retained	Employability/
49	OE	Open Elective - 3	OE	3	0	0	0	3	3	Nil	Retained	Employability/
50	OE	Management Elective(OE-4)	OE	3	0	0	0	3	3	Nil	Retained	Employability/
51	OE	Foreign Language Elective(OE-5)	OE	2	0	0	0	2	2	Nil	Retained	Employability/
52	21IE2040	Social Internship	PR	0	0	0	4	1	4	Nil	Retained	Skilling
53	21IE3041	Technical Internship	PR	0	0	0	4	1	4	Nil	Retained	Skilling
54	21IE4042	Industry Internship	PR	0	0	0	4	1	4	Nil	Retained	Skilling
55	21IE2046	Project Based Learning -1	PR	0	0	0	6	1.5	6	Nil	New Course	Skilling
56	21IE2047	Project based learning -2	PR	0	0	0	6	1.5	6	Nil	New Course	Skilling
57	CC	Sports	CC	0	0	0	0	0	2	Nil	Retained	Skilling
58	21IE3043	Term paper	PR	0	0	0	4	1	4	Nil	Retained	Skilling
59	21IE3044	Mid Grad Capstone Project - I	PR	0	0	0	8	2	8	Nil	Retained	Skilling
60	21IE3045	Mid Grad Capstone Project - II	PR	0	0	0	8	2	8	Nil	Retained	Skilling
61	14051/21IE4050	Project / Internship -1/Practice School	PR	0	0	0	16	4	16	Nil	Retained	Skilling
62	14052/21IE4050	Project / Internship 2/Practice School	PR	0	0	0	16	4	16	Nil	Retained	Skilling
		Total Credits						159				
		No.of New Courses	13									
		Total No.of courses	92									
		% of Syllabus chnage	14.1304									

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List of Professional Electives for 2021-22 admitted batch of B.Tech

Sl No	Course Code	Course Title	Specialization	L	T	P	S	Cr	CH	Pre-requisite
1	20ME4051	THEORY OF ELASTICITY AND PLASTICITY	ENGINEERING DESIGN	3	0	0	0	3	3	20ME3208
2	20ME4052	FINITE ELEMENT METHOD		2	0	2	0	3	4	20ME4030
3	20ME4053	MODELING ANALYSIS & DESIGN OF ROBOTIC SYSTEMS		2	0	2	0	3	4	NIL
4	20ME4054	CREEP, FATIGUE AND FRACTURE MECHANICS		3	0	0	0	3	3	20ME3208
5	20ME4055	ADVANCED STRENGTH OF MATERIALS		2	0	2	0	3	4	20ME3208
6	20ME4056	MECHANICS OF COMPOSITE MATERIALS		2	0	2	0	3	4	20ME3208
7	20ME4057	SUSTAINABLE DESIGN & SOCIAL INNOVATION IN ENGINEERING DESIGN		1	0	4	0	3	5	20ME3208
8	20ME4061	MODERN MANUFACTURING PROCESSES	SMART MANUFACTURING	2	0	2	0	3	4	20ME2107
9	20ME4062	ADDITIVE MANUFACTURING		2	0	2	0	3	4	NIL
10	20ME4063	ADVANCED MATERIALS		3	0	0	0	3	3	NIL
11	20ME4064	FLEXIBLE MANUFACTURING SYSTEMS		2	0	2	0	3	4	NIL
12	20ME4065	ROBOTICS & INDUSTRIAL AUTOMATION		2	0	2	0	3	4	NIL
13	20ME4066	REVERSE ENGINEERING		3	0	0	0	3	3	NIL
14	20ME4067	SUSTAINABLE DESIGN & SOCIAL INNOVATION IN SMART MANUFACTURING		1	0	4	0	3	5	NIL
15	20ME4071	AUTOMOBILE ENGINEERING	AUTOMOBILE ENGINEER	2	0	2	0	3	4	NIL
16	20ME4072	HYBRID & ELECTRIC VEHICLE DESIGN		2	0	2	0	3	4	NIL
17	20ME4073	AUTOTRONICS & SAFETY		2	0	2	0	3	4	NIL
18	20ME4074	ROBOTICS & INDUSTRIAL AUTOMATION		2	0	2	0	3	4	NIL

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Sl No	Course Code	Course Title	Specialization	L	T	P	S	Cr	CH	Pre-requisite
19	20ME4075	AUTOMOTIVE ELECTRICAL AND ELECTRONICS SYSTEM	ING	2	0	2	0	3	4	NIL
20	20ME4076	AUTOMOBILE ENGINE SYSTEM AND PERFORMANCE		2	0	2	0	3	4	NIL
21	20ME4077	SUSTAINABLE DESIGN & SOCIAL INNOVATION IN AUTOMOBILE		1	0	4	0	3	5	NIL
22	20ME4081	AUTOTRONICS	AUTOTRONICS	2	0	2	0	3	4	NIL
23	20ME4082	AUTOMOTIVE SESNSOR AND APPLICATIONS		2	0	2	0	3	4	NIL
24	20ME4083	ELECTRONIC ENGINE MANAGEMENT SYSTEM		2	0	2	0	3	4	NIL
25	20ME4084	INSTRUMENTATION IN AUTOMOTIVE INDUSTRIES		2	0	2	0	3	4	NIL
26	20ME4085	AUTOTRONICS AND VEHICLE INTELLIGENCE		2	0	2	0	3	4	NIL
27	20ME4086	AUTONOMOUS VEHICLE DESIGN		2	0	2	0	3	4	NIL
28	20ME4087	SUSTAINABLE DESIGN & SOCIAL INNOVATION IN AUTOTRONICS		1	0	4	0	3	5	NIL
29	20ME4091	DESIGN FOR QUALITY AND RELIABILITY	PRODUCT DESIGN	3	0	0	0	3	3	NIL
30	20ME4092	DESIGN OF AGRICULTURAL PRODUCTS & MACHINERY		3	0	0	0	3	3	NIL
31	20ME4093	DESIGNING INTELLIGENCE SYSTEMS		3	0	0	0	3	3	NIL
32	20ME4094	SUSTAINABLE DESIGN		3	0	0	0	3	3	NIL
33	20ME4095	SYSTEMS THINKING FOR DESIGN		3	0	0	0	3	3	NIL
34	20ME4096	DESIGN WITH ADVANCED ENGINEERING MATERIALS		3	0	0	0	3	3	NIL
35	20ME4097	SUSTAINABLE DESIGN & SOCIAL INNOVATION IN PRODUCT DESIGN		1	0	4	0	3	5	NIL

List of OPEN Electives,Manegement Electives and Foreign Language Courses for 2021-22 admitted batch of B.TECH

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH	Pre-requisite
1	21BT40A1	IPR & Patent Laws	3	0	0	0	3	3	NIL
2	21BT40A9	Biomaterials	3	0	0	0	3	3	NIL
3	21BT40C5	Computer Aided Drug Design	3	0	0	0	3	3	NIL
4	21CE40A2	Environmental Pollution Control Methods	3	0	0	0	3	3	NIL
5	21CE40A3	Solid and Hazardous waste management	3	0	0	0	3	3	NIL
6	21CE40A4	Remote Sensing & GIS	3	0	0	0	3	3	NIL
7	21CE40A5	Disaster Management	3	0	0	0	3	3	NIL
8	21CS40A7	Fundamentals of Software Engineering	3	0	0	0	3	3	NIL
9	21CS40A6	Fundamentals of DBMS	3	0	0	0	3	3	NIL
10	21CS40A8	Fundamentals of IT	3	0	0	0	3	3	NIL
11	20ME40B4	Robotics	3	0	0	0	3	3	NIL
12	20ME40B5	Mechatronics	3	0	0	0	3	3	NIL
13	20ME40B6	Operations Research	3	0	0	0	3	3	NIL
14	20ME40B7	Hybrid Electric vehicles	3	0	0	0	3	3	NIL
15	20ME40B8	Industry 4.0	3	0	0	0	3	3	NIL
16	20ME40B9	Industrial Automation	3	0	0	0	3	3	NIL
17	20ME40C1	Logistics & Supply chain management	3	0	0	0	3	3	NIL
18	20ME40C2	Total Quality Management	3	0	0	0	3	3	NIL
19	20ME40C3	Smart Mobility	3	0	0	0	3	3	NIL
20	20ME40C4	Managerial Economics for Engineers	3	0	0	0	3	3	NIL
21	21EL40B1	Linux Programming	3	0	0	0	3	3	NIL
22	21EL40B2	E-Commerce	3	0	0	0	3	3	NIL
23	21GN40C1	Self Development	3	0	0	0	3	3	NIL
24	21GN40C3	Emotional Intelligence	3	0	0	0	3	3	NIL
25	21GN40C5	Behavioural Sciences	3	0	0	0	3	3	NIL
26	21GN40D1	National Caded Cops-1	2	0	2	0	3	4	NCC
27	21GN40D2	National Caded Cops-2	2	0	2	0	3	4	NCC
28	21GN40D3	National Caded Cops-3	2	0	2	0	3	4	NCC

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Sl No	Course Code	Course Title	L	T	P	S	Cr	CH	Pre-requisite
29	21GN40D4	National Service Scheme-1	2	0	2	0	3	4	NSS
30	21GN40D5	National Service Scheme-2	2	0	2	0	3	4	NSS
31	21GN40D6	National Service Scheme-3	2	0	2	0	3	4	NSS
32	21MB4056	Resources Safety and Quality Management	2	0	0	0	2	2	NIL
33	21MB4058	Construction project Management	2	0	0	0	2	2	NIL
34	21MB4051	Paradigms in Management Thought	3	0	0	0	3	3	NIL
35	21MB4052	Indian Economy	3	0	0	0	3	3	NIL
36	21MB4053	Managing Personal Finances	3	0	0	0	3	3	NIL
37	21MB4054	Basics of Marketing for Engineers	3	0	0	0	3	3	NIL
38	21MB4055	Organization Management	3	0	0	0	3	3	NIL
39	21MB4057	Economics for Engineers	3	0	0	0	3	3	NIL

Foreign Language Electives

1	21FL3051	ARABIC LANGUAGE	2	0	0	0	2	2	NIL
2	21FL3052	BENGALI LANGUAGE	2	0	0	0	2	2	NIL
3	21FL3053	CHINESE LANGUAGE	2	0	0	0	2	2	NIL
4	21FL3054	FRENCH LANGUAGE	2	0	0	0	2	2	NIL
5	21FL3055	GERMAN LANGUAGE	2	0	0	0	2	2	NIL
6	21FL3056	HINDI LANGUAGE	2	0	0	0	2	2	NIL
7	21FL3057	ITALIAN LANGUAGE	2	0	0	0	2	2	NIL
8	21FL3059	KANNADA LANGUAGE	2	0	0	0	2	2	NIL
9	21FL3060	RUSSIAN LANGUAGE	2	0	0	0	2	2	NIL
10	21FL3061	SIMHALI LANGUAGE	2	0	0	0	2	2	NIL
11	21FL3062	SPANISH LANGUAGE	2	0	0	0	2	2	NIL
12	21FL3058	JAPANESE LANGUAGE-1	2	0	0	0	2	2	NIL

ADDITIONAL OPEN ELECTIVES TO COMPLETE THREE LEVELS OF JAPANEESE LANGUAGE and 24 CREDITS OF NCC(as per UGC)

1	21FL3063	JAPANESE LANGUAGE-2	3	0	0	0	3	3	21FL3058
2	21FL3064	JAPANESE LANGUAGE-3	3	0	0	0	3	3	21FL3063
3	21GN40D7	NCC-4	2	0	6	0	5	8	NCC
4	21GN40D8	CAMP-1	0	0	4	0	2	4	NCC
5	21GN40D9	CAMP-2	0	0	4	0	2	4	NCC

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21CY1001 - ENGINEERING CHEMISTRY

L-T-P-S : 3-0-2-0
Credits : 4
Contact Hours : 5
Pre-requisite : Nil

Mapping of Course Outcomes with PO/PSO:

CO #	CO	PO/PSO	BTL
CO1	Predict potential complications from combining various chemicals or metals in an engineering setting	PO-1,PO-3,PO-7	2
CO2	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena	PO-1,PO-3	2
CO3	Examine water quality and select appropriate purification technique for intended problem	PO-1,PO-7	2
CO4	Explain the role of chemical kinetics in the formation and destruction of ozone in the atmosphere and predict the connection between molecular behavior and observable physical properties.	PO-1,PO-7	2
CO5	An ability to analyze and generate experimental skills	PO-1,PO-4	3

SYLLABUS:

Electrochemistry: Single electrode potential and its measurement, Electrochemical cells, EMF series, Nernst equation, Cell emf measurement, Reversible and irreversible cells, Concentration cells, Reference electrodes-Determination of pH using glass electrode. Gas Sensors: Capacitance Manometer and Mass Spectrometer. *Batteries:* Chemistry, construction and engineering aspects of Primary (mercury battery) and secondary (lead-Acid cell, Ni-Metal hydride cell, Lithium cells) and fuel cells– Hydrogen–Oxygen fuel cell, advantages of fuel cell; *Energy and Chemistry*: Energy Use and the World Economy, Defining Energy, Energy Transformation and Conservation of Energy, Heat Capacity and Calorimetry. Enthalpy, Hess's Law and Heats of Reaction, Energy and Stoichiometry.

CORROSION & ITS CONTROL: Causes and different types of corrosion and effects of corrosion. Theories of corrosion– Chemical, Electrochemical corrosion, Pitting corrosion, stress corrosion, Galvanic corrosion. Factors affecting corrosion– Nature of metal, galvanic series, over voltage, purity of metal, nature of oxide film, nature of corrosion product. Nature of environment-effect of temperature, effect of pH, Humidity, effect of oxidant. Cathodic protection, sacrificial anode, impressed current cathode, electroplating:

WATER Technology: Introduction, *Hardness:* Causes, expression of hardness – units – types of hardness, estimation of temporary and permanent hardness of water, numerical problems. Alkalinity and estimation of alkalinity of water, numerical problems. *Boiler troubles* – Scale & sludge formation, caustic embrittlement, Boiler corrosion, priming & foaming. Softening of water:

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Internal and external treatments -Lime soda, Ion exchange process. Desalination-reverse osmosis and electro dialysis:Chemical Kinetics: Ozone Depletion, Rates of Chemical Reactions, Rate Laws and the Concentration Dependence of Rates, Integrated Rate Laws, Temperature and Kinetics, Reaction Mechanisms, Catalysis, insight into Troposphere Ozone.

Molecules and Materials: polymers- Types of polymerization-Mechanisms, Plastics – Thermoplastic resins and thermosetting resins - Preparation, properties and engineering applications of: polyethylene, PVC, Teflon, Bakelite, Urea Formaldehyde. *Conducting Polymers:* Polyacetylene, polyaniline, conduction, doping and applications. Carbon nano tubes and Applications.

Text Books:

1. Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing Company. New Delhi.
2. Engineering Chemistry, O G Palanna, The Tata McGraw Hill, New Delhi.

Reference Books:

1. Chemistry in Engineering and Technology, Volume 2, J C Kuriacose & J Rajaram, Tata McGraw Hill, New Delhi.
2. Chemistry for Engineers Rajesh Agnihotri, Wiley, New Delhi.
3. Engineering Chemistry, B. Sivasankar, The Tata McGraw Hill, New Delhi.
4. A text book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co. New Delhi.
5. Engineering Chemistry, C Parameswara Murthy, C V Agarwal and Andra Naidu, B S Publications, Hyderabad.
6. Engineering Chemistry, Shikha Agarwal, Cambridge University Press.

Web References:

1. http://www.chem1.com/acad/webtext/elchem/
2. https://nptel.ac.in/downloads/122101001/

https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/polymers.htm

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21UC3105 - PROBLEM SOLVING SKILLS – 1

L-T-P-S: 0-0-2-2
Credits: 1.5
Prerequisite: Nil

Course Outcomes (Cos) – Program Outcomes (Pos) – Blooms Taxonomy Levels (BTL) Mapping Table:

CO#	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand the concepts of mathematical principles and number relativity in line with the logic, ameliorate the ability of quick calculations and solve problems in the stipulated time allotted for each question.	PO1	2
CO2	Apply the concepts of converting data from word problems to equations, to identify standard and variable data and apply percentage concepts to calculate commercial values , bridge components of ratios, averages, percentages, Interest to solve the problems that contain the data related to real life situations that requires basic logic to analyze the given details and to find the solutions.	PO1	2
CO3	Apply Venn diagrams and other applicable diagrams to solve questions in Syllogism, Logical Venn Diagrams, Cubes & Dice. Understand the principles used in forming Number& letter series, Number, letter & word Analogy, Odd man out, coding & decoding.	PO1	2
CO4	Understand the underlying assumptions in the arguments presented in the topics: Statements & conclusions, statements & Arguments (Critical Reasoning), statements & Assumptions, logical connectives, Binary logic.	PO1	2

Syllabus :

Numbers, Divisibility, Decimal Fractions, LCM & HCF, Simplification, Sequence, Remainder theorems, Linear Algebra, Quadratic Equations & Inequalities, Theory of Equations. Sets, Relations & Functions, Surds & Indices, Logarithms.

Simple Equations, Problem on Ages, Ratio & Proportion, Variation& Partnership, Percentages, Profit, Loss& Discounts, Simple & Compound Interest, Averages & Allegations or Mixtures.

Syllogism, Number & letter series, Number, letter & word Analogy, Odd man out, coding & decoding, Cubes & Dice, Logical Venn Diagrams.

Statements & conclusions, statements & Arguments (Critical Reasoning), statements & Assumptions, logical connectives, Binary logic.

Reference Books:

1. Quantitative Aptitude by R.S. Agarwal, SCHAND Publications.
2. A Modern Approach to Verbal Reasoning by R.S. Agarwal, SCHAND Publications.

Web Links:

www.indiabix.com
www.freshersworld.com

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21UC3206 - PROBLEM SOLVING SKILLS - II

L-T-P-S: 0-0-2-2
Credits: 1.5
Prerequisite: Nil

Course Outcomes (Cos) – Program Outcomes (Pos) – Blooms Taxonomy Levels (BTL) Mapping Table:

CO#	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand the concept of speed, distance, time & work and to develop the problem-solving ability through analysing the given data related to real world situations and critical issues that requires basic logic to manipulate and find the solutions.	PO1	2
CO2	Apply the fundamental concepts of areas, volumes, derive solutions using simple mathematical principles. Understand, interpret the data given and calculate with smart tricks, check the number analytics to fit the alphabets and derive solutions based on given conditions.	PO1	2
CO3	Understand the fundamental relationships and principles in solving questions with lengthy data and synchronize them to fit the outcomes. Apply inductive reasoning to find the rule-set from a given list of observations and use it to predict the conclusions with ideas on solving techniques accordingly.	PO1	2
CO4	Understand the techniques and logic behind the given arrangement and select the strategy with given conditions and to bring out possible outcomes of an event.	PO1	2

Syllabus :

Time & Work, Chain Rule, Pipes & Cisterns, Time, Speed &Distance, Problems on Trains, Boats & Streams, Races & games, Permutations & Combinations, Combinatorics, Probability.

Areas & Perimeters, Mensuration, Trigonometry, Heights & Distances, Geometry, Coordinate Geometry, Data Interpretation, Data Sufficiency, Statistics, Simplification, Crypt arithmetic.

Blood Relations, Directions, clocks, calendars, Alphabet Test, Number, ranking & Time sequence test, Seating Arrangements, Mathematical Operations, Data Sufficiency, Nonverbal - series, analogy, classification.

Input & Output, Assertion and reason , dot situation. embedded figures, figure matrix, mirror and water images, paper cutting, paper folding pattern completion, rule detection, flowcharts, Puzzles, Sudoku.

Reference Books:

1. Quantitative Aptitude by R.S. Agarwal, SCHAND Publications.
2. A Modern Approach to Verbal Reasoning by R.S. Agarwal, SCHAND Publications.

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21ME3119-HEAT POWER ENGINEERING

L-T-P-S : 2-0-0-0 Credits: 2 Contact Hours : 2 Pre-requisite : Nil

Course Outcomes(Cos)-Program Outcomes (Pos)-Blooms Taxonomy Levels(BTL) Mapping table::

CO#	Course Outcome	PO/PSO	BTL
CO1	Estimate dimensional parameters of various steam nozzles including convergent and divergent nozzles and efficiency of condensers	PO1	3
CO2	Apply the principles of thermodynamics to various Steam turbines to determine their performance	PO1	3
CO3	Understand and analyze the performance of gas turbines	PO1	4
CO4	Apply the principles of thermodynamics to various rotary machines to determine their performance	PO1/PSO1	3

Syllabus:

Steam Nozzles & Condensers: Types of nozzles, isentropic flow through nozzles, effect of friction, nozzle efficiency, critical pressure ratio and maximum discharge, throat and exit areas using Mollier diagram, Condensers - Jet and surface condensers, condenser vacuum and vacuum efficiency, condenser efficiency, thermodynamic analysis.

Steam turbines: Overview of Steam turbines, Types, Pressure and velocity compounding, velocity diagrams, work output, power, blade efficiency and stage efficiency, degree of reaction, Governing of turbines, overall efficiency and reheat factor.

Gas turbines: Overview of Gas turbines, Closed and open Brayton cycle gas turbines, Analysis of closed cycle gas turbine, turbine Efficiencies, Gas turbine cycle with intercooling, reheat and regeneration.

Fans, Blowers and Compressors: Fans – types, principle and working, Blowers – Roots & vane type, working, Compressors-principle of operation, Velocity diagrams and energy transfer per stage, degree of reaction, isentropic efficiency, polytropic efficiency, Surging, Choking and Stalling, Centrifugal compressor versus axial flow compressor.

Text Books:

1. Applied Thermodynamics - T. D. Eastop, 6th Edition, Longman Scientific and Technical & John Wiley, New York.
2. Steam Turbines Theory & Practice - Kearton, ELBS

Reference Books:

1. Engineering Thermodynamics, Yunus A. Cengel & Boles
2. Engineering Thermodynamics, 5th Edition, P. K. Nag, TMH, New Delhi
3. Applied Thermodynamics, R. Yadav, CBH, Allahabad
4. Power Plant Engineering (Steam & Nuclear), P. K. Nag, TMH.

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21ME2211-KINEMATICS OF MACHINES (With Adams s/w)

L-T-P-S : 2-0-2-0
Credits : 4
Contact Hours : 4
Pre-requisite : Nil

Mapping of Course Outcomes with PO/PSO:

CO No	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Synthesize and analyze kinematically suitable mechanisms for required motion of machinery	PO4	4
CO2	Analyze velocity and acceleration diagrams and interpret the data	PO4	4
CO3	Construct cam profiles and Analyze gears and gear trains kinematically	PO4	4
CO4	Analyze gears and gear trains kinematically Analyze mechanisms dynamically	PO2	4
CO5	Apply the theoretical concepts to analyse different mechanisms by using the simulation software for data analysis.	PO4	4

SYLLABUS:

CO-1

Mechanisms and Machines: Introduction to Plane and Space Mechanisms, Kinematic Pairs, Kinematic Chains and their Inversions, Mobility and range of movement - Kutzbach and Grubler's criterion, Grashof's criterion.

CO-2

Velocity analysis: Velocity analysis using IC and relative velocity method. Acceleration analysis.

CO-3

Cams: cam profiles of knife edge, roller and offset followers of reciprocating motion.

CO-4

Gears and Gear trains: Gears – terminology, fundamental law of gearing, involute profile. Interference and undercutting. Gear Trains – simple, compound and epicyclic gear trains.

Text Books:

1. David H. Myszka —Machines and Mechanisms-Applied Kinematic Analysisl, 4thEdition, Prentice Hall
2. Robert Norton —Kinematics and Dynamics of Machineryl 1st Edition, Tata McGraw - Hill Education, (2009)

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1. Shigley J.E., and Uicker J.J —Theory of Machines and Mechanismsl, McGraw Hill, (1995).
2. S.S.Ratan, Theory of machines 3rd edition, McGraw Hill,

Reference Books:

1. Thomas Bevan —Theory of Machinel CBS Publications.
2. Rao, J. S —The Theory of Machines through Solved Problemsl, New Age International.
3. A.Ghosh and A.K.Mallik —Mechanisms and Machine Theoryl, 3rdedition, EWP Pvt.Ltd

21ME3118-DYNAMICS OF MACHINES

L-T-P-S : 2-0-0-0
Credits : 2
Contact Hours : 2
Pre-requisite : Nil

Mapping of Course Outcomes with PO/PSO:

CO No	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Analyze the effect of the Gyroscpic couple in vehicles	PO4	4
CO2	Determine the unbalance in rotating and reciprocating machines	PO4	4
CO3	Analyze the forces in linkages	PO4	4
CO4	Determine the frequencies in damped and undamped vibarating system	PO2	4
CO5	Apply the theoretical concepts to analyse different mechanisms by using the simulation software for data analysis.	PO4	4

Syllabus

CO-1

Gyroscopes: Gyroscopic Effect on Naval Ships, Stability of an Automobile, Stability of a Two-Wheel vehicle, Four-Wheeler

CO-2

Balancing: Introduction, Static balancing, dynamic balancing, Balancing of Several Masses in Different planes, Balancing of Reciprocating Mass, Secondary Balancing.

CO-3

Dynamic force analysis: Dynamic analysis of linkages;Transferring of a Force from one plane to another,Force analysis of Slider crank mechanism.

CO-4

Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.

TEXT BOOKS:

1. Robert Norton —Kinematics and Dynamics of Machineryl 1st Edition, Tata McGraw - Hill Education, (2009)
2. A.Ghosh and A.K.Mallik —Mechanisms and Machine Theoryl, 3rdedition, EWP Pvt.Ltd
3. Mechanical Vibrations,S.S.Rao,Pearson Education Inc. (4th Ed.), 2007

REFERENCE BOOKS:

1. Shigley J.E., and Uicker J.J —Theory of Machines and Mechanismsl, McGraw Hill, (1995).
2. S.S.Ratan, Theory of machines 3rd edition, McGraw Hill,
3. Mechanical Vibrations,S.Tamadonni& Graham S.Kelly, Schaum'sOut line Series, Mc-Graw Hill Inc, 1998
4. Mechanical Vibrations by G. K. Groover. Nem Chand & Bros.

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21PH2007 – MATERIALS TECHNOLOGY

L-T-P-S : 2-0-0-0
Credits : 2
Contact Hours : 2
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO No	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Understand crystallography and various material testing methods	PO1,PO2	2
CO2	Understand and distinguish various types of materials based on their engineering applications	PO1,PO2	2
CO3	Apply the concepts of cooling curves and phase diagrams	PO1,PO2	3
CO4	Analyse various heat treatment processand their strengthening mechanisms.	PO1,PO2	3
CO5	Gain hands on experience to conduct various experiments of metallography and heat treatment process practically.	PO1,PO2	3

SYLLABUS:

Introduction-Testing
Introduction to Engineering materials, Properties: stress-strain diagrams for engineering materials; Crystallography, Crystal systems and Bravi's lattices, Crystal imperfections, Material testing Methods-Destructive and Non Destructive methods-Dye penetrate test, Magnetic flux test, Radiography and Ultrasonic test.

Materials
Ferrous and Non-Ferrous Materials, Ceramics, Composites and Nano-materials- Introduction, classification and applications

Smart Materials
Introduction, shape memory effect, classification of shape memory alloys, compositions, properties applications of shape memory alloys.

Alloys and Transformation
Constitution of alloys, Necessity of alloying, Solid solutions, Gibb's Phase rule, Cooling Curves, Phase diagrams-Introduction, classification based on components and transformations, construction, reactions involved in Fe-C, Cu-Ni and Al-Cu type.

Heat treatment
Strengthening mechanisms-Introduction, classification, Heat Treatment of steels-Introduction, stages, classification, Annealing, Normalising, Tempering, Hardening, Harden ability test by Jominy end quench apparatus, Isothermal transformation diagrams-TTT diagram &CCT diagram, special heat treatment techniques-Introduction, classification, surface hardening and case hardening methods such as carburising, nitriding, cyaniding and carbonitriding .

Text Books:

1. Material Science and Metallurgy - Dr.V.D.Kodgirie.
2.Material Science and Metallurgy – Daniel Yesudian, DG Harris Samuel.
3. Introduction to Physical Metallurgy – Sidney.H.Avener.

Reference Books:

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1. Engineering Metallurgy by R.A.Higgins, Part I, App. Physical Met, ELBS.
2. Materials science and Engineering by V.Raghavan, PHI, Fifth Edition.
3. Physical Metallurgy by Lakhtin.

WEB REFERNCES/MOOCS:

1. https://nptel.ac.in/courses/113/104/113104014/
2. https://nptel.ac.in/courses/112/104/112104229/
3. https://freevideolectures.com/course/3104/principles-of-physical-metallurgy/23
4. https://nptel.ac.in/courses/112/108/112108150/

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21ME2107 – MANUFACTURING PROCESSES

L-T-P-S : 3-0-2-0
Credits : 4
Contact Hours : 5
Pre-requisite : Nil

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand and apply the casting processes	PO1, PSO2	2
CO2	Apply the welding processes and identify the faults in welding processes	PO3, PSO1	2
CO3	Apply principles of cold/hot forming processes	PO3, PSO2	4
CO4	Apply sheet metal processes and design sheet metal dies.	PO3, PSO1	3
CO5	Fabricate the parts using manufacturing processses	PO2, PSO2	3

Course Objective:

The objective of this course is to make the learner able to identify manufacturing processes in mechanical industries to prepare the physical product and apply manufacturing processes to produce a product used in industries, houses, automobiles, and agriculture purposes.

Syllabus:

Casting - Patterns and Pattern making, Allowances, Moulding methods and processes, Design considerations in casting, Riser and gating design, Different castings - Sand castings, pressure die casting, permanent mould casting, centrifugal casting, precision investment casting, shell Moulding, continuous casting-squeeze casting, electro slag casting, casting defects and Inspection of castings.

Joining Processes - Types of welding - Arc welding, Shielded metal arc welding, GTAW, GMAW, SAW, Resistance welding, Thermit welding, Gas welding, Soldering, brazing, Electron beam and Laser welding, weld stress-calculations, design of weld size, estimation of weld dilution, heat input, effect of welding parameters, Inspection of welds, Defects in welding, causes and remedies.

Metal Forming - Hot/Cold forming processes, Metallurgical aspects of metal forming, Forging and rolling processes: Forging principle, parameters and calculation of forces and power requirements during forging, Rolling processes, calculation of forces and geometrical relationship in rolling, analysis of rolling load, torque and power. Rolling and forging defects, causes and remedies. Types of Extrusion processes and drawing processes, Problems on extrusion and drawing.

Sheet metal forming processes - Sheet metal / Press working operations, Types of presses and selection of presses, HERF processes - Electro hydraulic forming, Magnetic pulse forming.

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Text books:

1. Lindberg,"Processes and Materials of Manufacture", Prentice hall India (p) Ltd.
2. SeropeKalpakjian, Steven R. Schmid "Manufacturing Engineering and Technology" (4th Edition) Prentice Hall 2000-06-15 ISBN: 0201361310
3. P.N.Rao "Manufacturing Technology", TMH Ltd 1998(Revised edition)
4. Dieter "Mechanical Metallurgy", Revised edition 1992, McGrawhill
5. AmitabhaGhosh and Asok Kumar Mallik " Manufacturing science TMH publisher

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21ME3217-PRODUCTION TECHNOLOGY

L-T-P-S : 3-0-0-0
Credits : 3
Contact Hours : 3
Pre-requisite : Nil

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand the concepts of Computer aided design & Manufacturing	PO2, PSO1	2
CO2	Apply concept of linear and angular measurements in metrology	PO1, PSO2	3
CO3	Understand about forecasting models and predict future demand	PO1, PSO2	2
CO4	Apply various production scheduling techniques to optimize productivity.	PO4, PSO1	3

Syllabus:

Computer Integrated Manufacturing: Basic concepts of CAD/CAM and their integration tools; additive manufacturing.

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements;comparators; interferometry; form and finish measurement; alignment and testing methods;tolerance analysis in manufacturing and assembly; concepts of coordinate-measuring machine(CMM).

Forecasting models: Definition, Approaches, and Types, Qualitative Approach: Judgmental Methods, Quantitative Approach: Time Series, Regression, Multiple Regression, Forecasting Error Estimation Techniques aggregate production planning

Scheduling: Introduction, Concept of Assembly line balancing, Scheduling of Batch Production, Scheduling of Job Order, Loading, **Sequencing**: Definition, Sequencing of n jobs through one machine, n jobs through 2 machines (Johnsons' algorithm), n jobs through 3 machines, n jobs through m machines materials requirement planning; lean manufacturing.

Text Books:

1. Groover, M.P. and Zimmers, JR E.R.,"CAD/CAM: Computer-Aided Design and Manufacturing", Prentice Hall 1983
2. Bewoor, A.K. and Kulkarni,V.A.,"Metrology and Measurement", Tata Mc Graw-Hill, 2009
3. R. Pannerselvam, Production and Operations Management, PHI Learning Pvt. Ltd., 3rd Edition, 2012.

Reference Books:

1. Mahapatra, P.B.," Computer-Aided Production Management", Prentice-Hall Of India Pvt. Limited, 2004

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2. Gupta, I.C., "A Text Book of engineering metrology", Dhanpat Rai and Sons, 1996.
3. S.N. Chari, Production and Operations Management, Tata McGraw Hill, 3rd Edition, 2007.

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21ME3116-OPTIMIZATION TECHNIQUES

L-T-P-S : 2-0-0-0
Credits : 2
Contact Hours : 2
Pre-requisite : Nil

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Identify Optimum solutions for various single objective problems using Linear Programming models	PO1.PO5	2
CO2	Identify Optimum Solutions through Transportation and Assignment models	PO3	2
CO3	Identify Optimum Solutions through Game theory, DPP, Queuing theory & Simulation models	PO3,PSO2	2
CO4	Solve project management problems using CPM, PERT and inventory	PO3,PSO2	2

Syllabus:

Linear Programming Problem: Introduction to Operations Research, Models, Scope, limitations, applications of OR. Introduction, Graphical method, Simplex method, Big M method, Two phase method, multiple solutions, infeasible solutions, unbounded solution, degeneracy, Dual Simplex method.

Transportation: Introduction, methods of feasible solution, optimality test, Degeneracy in transportation problem, unbalanced transportation problem. Assignment Problem: Introduction, Hungarian method, travelling salesman problem.

Queueing Theory: Introduction, single channel, Poisson arrival, exponential service time with finite population and infinite population. Dynamic Programming – Introduction, Bellman's principle of optimality, application to shortest route problem.

Project Management by CPM/PERT: Introduction, simple network techniques, construction rules of drawing, Fulkerson's rule, Critical path method (CPM) – floats, critical path, project duration. **PERT** – Introduction, different time estimates, expected time, variance, expected project duration and probability of completion. Inventory Control: Deterministic models; safety stock inventory control systems

Text Books:

1. F.S.Hiller, G.J.Liberman, Introduction to Operations Research, 2005, Tata Mc-Graw Hill.
2. H.A.Taha, Operations Research, 2008, Pearson Education.

Reference Books:

1. S.D. Sharma, Operations Research, 11th Edition, 2002, KedarNath Ram Nath& Co.
2. R.Paneerselvam, Operations Research, 2nd Edition, 2006, PHI

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21ME4120-INSTRUMENTATION & CONTROL

L-T-P-S :2-0-0-4
Credits :3
ContactHours :6
Pre-requisite :NIL

CO#	Course Outcome	PO/PSO	BTL
CO1	To identify various measurement systems and their purpose in typical instruments	PO3, PSO1	2
CO2	Understand how to measure temperatures, flow and different level indicators	PO3, PSO1	2
CO3	To identify various instruments to measure stress-strain and Humidity parameters	PO3, PSO1	2
CO4	Understand elements of control systems	PO3, PSO1	2

UNIT – I

Definition – Basic principles of measurement – Measurement systems, Measurement of Displacement: Theory and construction of various transducers to measure displacement – Using Piezo electric, Inductive, capacitance, resistance, Measurement of Speed: Mechanical Tachometers, Electrical tachometers, Non- contact type Stroboscope;

UNIT – II

Measurement of Temperature: Various Principles of measurement-Classification: Expansion Type: Bimetallic Strip- Liquid in glass Thermometer; Electrical Resistance Type: Thermistor, Thermocouple, RTD; Radiation Pyrometry: Optical Pyrometer; Measurement of Level: Direct methods – Indirect methods – Capacitive, Radioactive, Ultrasonic, Magnetic, Cryogenic Fuel level indicators –Bubbler level indicators.Flow measurement: Rotameter, magnetic, Ultrasonic, Turbine flowmeter, Hot – wire anemometer, Laser Doppler Anemometer (LDA).

UNIT – III

Stress-Strain measurements: Various types of stress and strain measurements –Selection and installation of metallic strain gauges; electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending, compressive and tensile strains Measurement of Humidity: Moisture content of gases, Sling Psychrometer, Absorption Psychrometer, Dew point meter. Measurement of Force, Torque and Power- Elastic force meters, load cells, Torsion meters, Dynamometers.

UNIT – V

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Elements of Control Systems: Introduction, Importance – Classification – Open and closed systems- Servomechanisms – Examples with block diagrams – Temperature, speed and position control systems- Transfer functions- First and Second order mechanical systems

TEXT BOOKS:

1. Principles of Industrial Instrumentation & Control Systems, - Alavala, - Cengage Learning
2. Basic Principles – Measurements (Instrumentation) & Control Systems – S. Bhaskar – Anuradha Publications.

REFERENCE BOOKS:

1. Measurement Systems: Applications & design, E. O. Doebelin, TMH
2. Instrumentation, Measurement & Analysis, B.C. Nakra & K.K. Choudhary, TMH
3. Experimental Methods for Engineers / Holman
4. Mechanical and Industrial Measurements / R. K. Jain/ Khanna Publishers.
5. Mechanical Measurements / Sirohi and Radhakrishna / New Age International.

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ANNEXURE-5(b)

DEPARTMENT OF MECHANICAL ENGINEERING

PROPOSED REVISIONS for DAC &BOS APPROVAL

Program: B.Tech Year/semester of study:II/IV Academic year:2020-2021

Course Title: Course Code:

CO No	Topics added (if any, specify)	Topics removed (if any, specify)	Justification for the proposed modifications
CO1			
CO2			
CO3			
CO4	Understand and apply the principles of thermodynamics, heat transfer, and fluid mechanics to the design and analysis of engineering systems.	Apply principles of combustion for gravimetric and volumetric analysis of fuels.	It is desirable to include air standard cycles in thermo dynamics course in place of fuels and combustion after completing laws of thermo dynamics and entropy concept. This fuels and combustion will be incorporated in the course applied thermodynamics in the next semester.
CO5			

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Existing Syllabus	Proposed Syllabus
Fundamental Concepts and Definitions: Thermodynamic system and control volume, macroscopic and microscopic points of view, thermodynamic properties, processes, state, path, cycle, thermodynamic equilibrium and quasi-static process. Reversible and irreversible processes, zeroth law, concept of temperature. **Work and Heat:** Definition of work, units, work done at the moving boundary of system, work done in various non-flow processes, definition of heat, units, comparison of heat and work. **First Law of Thermodynamics for Non-Flow Systems:** First law of thermodynamics for a closed system undergoing a cycle and for a change of state; energy - a property of system, internal energy and enthalpy. Specific heat at constant volume and constant pressure. **First Law of Thermodynamics for Flow Systems:** Control mass, control volume, first law of thermodynamics for a control volume, steady flow energy equation and applications to engineering equipment andPMM-1. **Second Law of Thermodynamics:** Thermal reservoirs, Kelvin-Plank and Clausius statements of second law of thermodynamics; Equivalence of Kelvin-Plank and Clausius statements, PMM-2; Carnot cycle, Carnot engine, corollary of Carnot_s theorem, absolute thermodynamic temperature scale. **Entropy:** Definition of entropy, Clausius theorem, entropy change in reversible process temperature-entropy plot, inequality of Clausius, entropy change in an irreversible process, principle of increase of entropy, applications of entropy principle, entropy change of an ideal gas; availability and irreversibility. **Fuels and Combustion:** Types of fuels, exothermic and endothermic combustion equations, stoichiometry Conversion of gravimetric to volumetric analysis and vice versa; excess air, [illegible] analysis	**Fundamental Concepts and Definitions:** Thermodynamic system and control volume, macroscopic and microscopic points of view, thermodynamic properties, processes, state, path, cycle, thermodynamic equilibrium and quasi-static process. Reversible and irreversible processes, zeroth law, concept of temperature. **Work and Heat:** Definition of work, units, work done at the moving boundary of system, work done in various non-flow processes, definition of heat, units, comparison of heat and work. **First Law of Thermodynamics for Non-Flow Systems:** First law of thermodynamics for a closed system undergoing a cycle and for a change of state; energy - a property of system, internal energy and enthalpy. Specific heat at constant volume and constant pressure. **First Law of Thermodynamics for Flow Systems:** Control mass, control volume, first law of thermodynamics for a control volume, steady flow energy equation and applications to engineering equipment andPMM-1. **Second Law of Thermodynamics:** Thermal reservoirs, Kelvin-Plank and Clausius statements of second law of thermodynamics; Equivalence of Kelvin-Plank and Clausius statements, PMM-2; Carnot cycle, Carnot engine, corollary of Carnot_s theorem, absolute thermodynamic temperature scale. **Entropy:** Definition of entropy, Clausius theorem, entropy change in reversible process temperature-entropy plot, inequality of Clausius, entropy change in an irreversible process, principle of increase of entropy, applications of entropy principle, entropy change of an ideal gas; availability and irreversibility. **Air standard cycles:** Focus on the application of the principles of thermodynamics, heat transfer and components of thermodynamic plant

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ANNEXURE 5(a)

KLEF

DEPARTMENT OF MECHANICAL ENGINEERING

PROPOSED REVISIONS for DAC &BOS APPROVAL

Program: B.Tech

Course Title: Heat Transfer

Year/semester of study: III/Odd

Course Code:19ME3219

Academic year:2021-2022

Item	CO No	Existing	Proposed Modification	Justification for the proposed modifications
Course Outcome	CO2	Analyze heat transfer using extended surfaces, unsteady state heat transfer and 2-D conduction mode of heat transfer	Analyze heat transfer through extended surfaces and Apply unsteady state heat transfer to various systems.	The syllabus is limited to only 1-D conduction, hence the topic 2-D conduction is proposed to remove.
	CO4	Apply the principles of heat transfer to analyze and design different heat exchangers	Apply principles of radiation to simple systemsand analyze various types of heat exchangers.	Radiation term is not included in the existing CO though it is main topic, hence the same is proposed to include and modified the statement accordingly.
	CO5	Experimental verification of various heat transfer parameters	Analyze various parameters of heat transfer in different thermal systems physically/numerically.	It is modified to validate the statement to perform both physical and numerical (software) experiments.
Reference Books	1	A Heat Transfer Text Book, Lienhard, J. H., Prentice Hall Inc	Heat Transfer – A Conceptual Approach, P. K. Sarma and K Ramakrishna, New Age International Publishers, 2006.	Replacing of 1st Reference book with the proposed one
	4	Not included	Heat and Mass Transfer by R. K. Rajput, S. Chand & Company Limited	Addition of 4th Reference Book

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Existing Syllabus	Proposed Syllabus
Introduces fundamental processes of heat transfer. Fourier's law, Heat conduction processes including thermal resistance, lumped capacitance, fins. Elementary convection, including laminar and turbulent boundary layers, internal flow, and natural convection. Heat transfer in boiling and condensation. Thermal radiation, including Stefan-Boltzmann law, Small object in large enclosure, and parallel plates. Basic concepts of heat exchangers, shape factors	Introduction to fundamental processes of heat transfer and their governing laws. 1-D steady state heat conduction in single and multi-layered plane walls, cylinders and spheres along with concepts of thermal contact resistance and critical thickness of insulation. Fins-applications and performance analysis; Transient conduction-lumped capacitance, semi-infinite body and application of Heisler and Grober charts. Elementary convection including laminar and turbulent boundary layers in external flows and internal flows of forced convection, natural convection. Heat transfer in boiling and condensation. Basic concepts of heat exchangers; Thermal radiation-Stefan-Boltzmann law, small object in a large enclosure, parallel plates and shape factor.

Reasons for Changes in Existing Syllabus: The existing syllabus is written very brief. Hence, the syllabus is expanded to understand and limit the topics to be delivered.

Course Coordinator

BOS Chairman
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ANNEXURE-6

KLEF

Department of Mechanical Engineering

List of Pre-Ph.D Courses approved byBoS

S.NO	PAPER–2	Code	PAPER–3	Code
1.	Numerical Methods in Thermal Engineering	20ME201	Incompressible and Compressible Flows	20ME301
2.	Advanced Thermodynamics	20ME202	Computational Fluid Dynamics	20ME302
3.	Design of Thermal Systems	20ME203	Refrigeration and Cryogenics	20ME303
4.	Advanced Heat and Mass Transfer	20ME204	Measurements in Thermal Engineering	20ME304
5.	Heat Exchanger Design	20ME205	Engine Systems and Performance	20ME305
6.	Convection and Two-Phase Flow	20ME206	IC Engine Combustion and Pollution	20ME306
7.	Compact Heat Exchangers	20ME207	Alternative Fuels	20ME307
8.	Principles of Turbo-Machinery	20ME208	Energy Conservation, Management & Audit	20ME308
9.	Gas Turbine Engineering	20ME209	Renewable Energy Technology	20ME309
10.	Turbo-Compressors	20ME210	Solar Energy and Wind Energy	20ME310
11.	Design Methods	20ME211	Mechanical Vibrations	20ME311
12.	Design With Advanced Materials	20ME212	Design for Optimization	20ME312
13.	Theory of Elasticity and Plasticity	20ME213	Advanced Strength of Materials	20ME313
14.	Modeling & Analysis-1 (Cad)	20ME214	Modeling & Analysis-2 (FEM)	20ME314
15.	Precision and Quality Engineering	20ME215	Design of Pressure Vessels and Plates	20ME315
16.	Advanced Mechanisms	20ME216	Tribological SystemDesign	20ME316
17.	Concurrent Engineering	20ME217	Product Design and Development	20ME317
18.	Mechanics of Composite Materials	20ME218	Engineering Noise & Control	20ME318
19.	Machine Tool Design	20ME219	Engineering Failure Analysis and Prevention	20ME319
20.	Fracture Mechanics	20ME220	Design for Manufacturing, Assembly and Environment	20ME320
21.	Advanced Composites	20ME221	Experimental Stress Analysis	20ME321
22.	Quality Engineering and Reliability	20ME222	Micro and Nano Manufacturing	20ME322
23.	Intelligent Manufacturing Systems	20ME223	Additive Manufacturing for Medical Applications	20ME323
24.	Quality Engineering in Manufacturing	20ME224	Computer integrated Manufacturing	20ME324
25.	Operational Planning and Control	20ME225	Supply Chain Management	20ME325
26.	Condition Monitoring and Fault Diagnosis	20ME226	Advanced Optimization Techniques	20ME326
27.	Energy Systems Modelling and Analysis	20ME227	Materials Management	20ME327

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28.	Fundamentals ofMechatronics	20ME228	Fuels and Combustion Technology	20ME328
29	Advanced Engineering Mathematics	20ME229	Control ofMechatronic Systems	20ME329
30.	Robotic Modeling Analysis and Control	20ME230	Robotics: Advanced Concepts and Analysis	20ME330
31.	Modeling and Simulation of Mechatronic Systems	20ME231	Mechatronics Product Design	20ME331
32.	Signal Processing in Mechatronic Systems	20ME232	Vehicle Dynamics and Multi-Body Systems	20ME332
33.	MEMS and NEMS	20ME233	AI for Robotics	20ME333
34.	Intelligent Visual Surveillance	20ME234	Sensors and Actuators	20ME334
35.	Microprocessors and Embedded Systems	20ME235	Industrial Automation and Control	20ME335
36.	Fuzzy Sets and Artificial intelligence			
37.	Emerging Smart Materials for Mechatronics Applications			

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ANNEXURE - 7

KLEF

DEPARTMENT OF MECHANICAL ENGINEERING

2019-20 admitted batch

Petroleum Engineering Specialization

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH	Pre-requisite	Flexi core/Professional Elective
1	19ME3227	PETROLEUM GEOLOGY AND EXPLORATION METHODS	3	0	2	0	4	5	NIL	Flexi core
2	19ME3228	PETROLEUM DRILLING ENGINEERING	3	0	2	0	4	5	NIL	Flexi core
3	19ME4110	PETROLEUM PRODUCTION ENGINEERING – I	3	0	0	0	3	3	NIL	Professional Elective
4	19ME4111	PETROLEUM FORMATION EVALUATION	3	0	0	0	3	3	NIL	Professional Elective
5	19ME4112	PETROLEUM RESERVOIR ENGINEERING	2	0	2	0	3	4	NIL	Professional Elective
6	19ME4113	PETROLEUM PRODUCTION ENGINEERING – II	3	0	0	0	3	3	19ME4111	Professional Elective
7	19ME4114	OFFSHORE PETROLEUM OPERATIONS	3	0	0	0	3	3	NIL	Professional Elective

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Annexure-7

Petroleum Specialization Syllabus

PETROLEUM GEOLOGY AND EXPLORATION METHODS

Course code: 19ME4110 **L-T-P: 3-0-0**

Pre-Requisite: NIL **Credits: 3**

Mapping of the course outcomes with student's outcomes:

CO	Course outcome's	PO / PSO	BTL
CO 1	Able to Understand the origin and formation of petroleum	1, PSO1	2
CO 2	Able to Understand the sedimentary basins of India	1, PSO1	2
CO 3	Able to Understand surveys of hydrocarbon exploration	1,2, PSO1	2
CO 4	Able to Understand seismic survey and modern survey methods	2, PSO1	2

Syllabus:

- **Origin and Formation of Petroleum:** Composition of Crude Oil and Natural Gas, the Physical and Chemical Properties of Crude Oil and Natural Gas, Origin of Petroleum– Inorganic and Inorganic Theories. Source Rocks – Definition and types, Formation and Evolution of Source Rock, Reservoir Rocks –Type of Reservoir Rocks, Properties of Reservoir Rocks, Migration of oil and gas, Traps and Seals.
- **Sedimentary Basins of India:** Sedimentary Basins and Classification Classification of Sedimentary Basins of India, Geology and Petroleum System of Category-I and II Sedimentary Basins - Cambay, Assam Shelf, Mumbai Offshore, Krishna-Godavari, Cauvery, Assam Arakan Fold Belt and Rajasthan.
- **Hydrocarbon Exploration:** Remote Sensing and High Resolution Satellite Imagery studies, Geological surveys, Geochemical Surveys. Gravity Survey- Basic theory, units of gravity, measurement of gravity, gravity survey, gravity anomalies. Gravity reduction - drift, latitude, elevation, tidal, Eotvos and Free-air & Bouguer anomalies. Magnetic Survey- Basic concepts, rock magnetism, the geomagnetic field. Magnetic survey, survey instruments, magnetic. Magnetic data reduction – diurnal, geomagnetic, elevation and terrain corrections. Concepts of Airborne magnetic survey.
- **Seismic Survey:** Seismic waves, Seismic waves reflection and refraction, Geometry of Seismic waves, wave theory, diffractions and velocities. Seismic data acquisition in land and marine- recording instruments & energy sources. Seismic Refraction Surveys, Seismic Reflection Surveys, Processing of 2D & 3D-Seismic Data, Interpretation of Seismic Data, Modern Survey Methods: Field operations, limitations and applications of Electrical Surveying, Electomagnetic Surveying, Telluric and Magnetotelluric Surveying and Radiometric Surveying

Text Books:

1. A.I. Levorsen "Geology of petroleum" hardback edition, (1967)
2. Applied geophysics, WMW Telford, L.P Geldart, R.E sherief, Cambridge university press, (1990)
3. Philip Kearey, et.al., "An Introduction to Geophysical Exploration", Wiley publications, (2002)

Reference Books:

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1. G. D. Hobson "Developments in Petroleum Geology", Vol. 1 & 2, Elsevier Science Ltd, (1977).
2. J. Guillemot, "Elements of Geology: Oil and Gas Exploration Techniques", Technip, (1991)
3. John Milsom and Asger Eriksen, "Field Geophysics" 4th Ed., John Wiley, 2011.

PETROLEUM DRILLING ENGINEERING

Course code: 19ME4111 **L-T-P: 2-0-2**
Pre-Requisite: NIL **Credits: 3**

Mapping of the course outcomes with student's outcomes:

CO	Course outcome's	PO / PSO	BTL
CO 1	Able to understand various drilling methods and drilling operations	PO1	2
CO 2	Able to apply drilling fluids characteristics and well problems	PO2	3
CO 3	Able to apply rotary drilling hydraulics and casing operations	PO1	3
CO 4	Able to apply fishing and cementing operations	PO2	3
CO 5	Able to apply the theoretical concepts to analyze drilling fluid characteristics	PO1	4

Syllabus:

- Well Planning: Introduction to oil well drilling, Drilling planning approaches.
- Rotary Drilling Method: Rig parts, selection and general layout.
- Drilling Operations & Practices: Hoisting, circulation, Rotation, power plants and Power transmission, Rig wire line system handling & storage. Casing and completions.
- Drill String: Parts, and function.
- Drill Bits: Classification and design criteria of drag, rotary, roller, diamond and PDC bits.
- Overview of Drilling Fluids, Clay chemistry and its application to drilling fluids, types of clays, hydration, flocculation, aggregation and dispersion. Classification, Types and applications of Drilling Fluids: Water based, oil based, emulsion based, polymer based, Surfactant based, Foam based and Aerated drilling fluids. Drilling fluid calculations.
- Coring: Different methods of core drilling.
- Well Problems and Solutions: Fatigue failure, Pipe sticking, Lost circulation, Sloughing shales, Swabbing, surge, gas cap drilling, Blow out and kick control
- Rotary Drilling Hydraulics: Rheology of drilling fluids, Pressure loss calculations and Rig hydraulics.
- Casing Design: Design of casing string, Liner Design and Setting, Casing landing practices, Buckling criteria and Calculation of well head loads. Casing while drilling.
- Drill String: Parts, function and design.
- Wire Lines: Classification, service life evaluation & precautions in handling.
- Oil Well Fishing: Fish classification, tools and techniques.
- Fundamental of directional drilling

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- Cementing, Cements & cement slurry: Objectives of cementing, oil well cements, Classification of cement, Slurry design, Slurry additives, Factors influencing cement slurry design, Cementing equipments.
- Cementing Methods: Primary cementing, Stage cementing, Liner cementing, Plugging, Squeeze Cementing techniques in practice. Deep well cementing, Characteristics of good quality cementation. Cementing calculations.

Text Books

1. Neal Adams and Tommie Charrier, "Drilling Engineering: A Complete Well Planning Approach" PennWell Pub. Co., (1985)
2. Formulas and Calculation for Drilling, Production and workover, Norton J. Lapeyrouse, 2nd Edition, Gulf Publishing, (2002).

Reference Books

3. Heriot Watt, "Drilling Engineering Handbook".
4. Economides, M. J., "Petroleum Well Construction" John Wiley & Sons, (1998).

PETROLEUM PRODUCTION ENGINEERING – I

Course code: 19ME4112 **L-T-P: 3-0-0**

Pre-Requisite: NIL **Credits: 3**

Mapping of the course outcomes with student's outcomes.

CO	Course outcome's	PO / PSO	BTL
CO1	Able to understand well head and completion equipment	PO1, PO2	2
CO2	Able to apply well activate and stimulate methods for improving oil and gas production	PO1, PO2	3
CO3	Able to apply gravel pack operations for sand control	PO1, PO2	3
CO4	Able to apply the work over and servicing techniques to mitigate well production problems	PO1, PO2	3

Syllabus:

- **Well Equipment:** Well Head Equipment's, Christmas tree, valves, hangers, flow control devices, packers, tubular and flow lines.
- **Well Completion Design:** Perforating Oil & Gas Wells - Conventional and Unconventional techniques viz. through tubing and tubing conveyed underbalanced perforating techniques, type size and orientation of perforation holes.
- **Well activation and Stimulation Techniques:** use of compressed air & liquid Nitrogen. Type & description, design of matrix acidization and acid fracturing. Design of hydraulic fracturing (mini, massive & high energy frac.). Wave technology & microbial stimulation.
- **Well Production Problems and mitigation:** Scale formation, paraffin deposition, formation damage, water production, gas production, sand deposition etc.
- **Designing Gravel Pack for Sand Control:** Sand control techniques, Formation Sand Size

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analysis, optimum gravel - sand ratio, gravel pack thickness, gravel selection, gravel packing fluid & gravel pack techniques.

- **Well Servicing & Workover:** Workover system, workover rigs and selection, rig less workover including Endless/ Coiled tubing unit, minor & major workover jobs-diagnosis & remedial measures water shut off and gas shut off-Chemical treatment and conformance control. Workover & completion fluids - types & selection, Formation damage, Workover planning & economics, asphaltine wax.

Text Books:

1. Thomas O Allen, Alan P. Roberts, "Production Operations: Well Completions, Workover, and Stimulation", (Volume 1 and 2), Oil & Gas Consultants International, (1978).

Reference Books:

2. Daniel Hill, Christine Ehlig-Economides, Ding Zhu, Michael J. Economides, "Petroleum Production Systems", 2nd Ed., Prentice Hall, (2012).
3. Boyun Guo, William C. Lyons, Ali Ghalambor, "Petroleum Production Engineering: A computer assisted approach" Elsevier Science and Technology Books, (2007).

PETROLEUM FORMATION EVALUATION

Course code: 19ME4113 **L-T-P: 3-0-0**

Pre-Requisite: NIL **Credits: 3**

Mapping of the course outcomes with student's outcomes:

CO	Course outcome's	PO/PSO	BTL
CO 1	Able to understand fundamentals of well logging and data acquisition	PO1, PO2, PO5	2
CO 2	Able to apply open hole logging methods	PO1, PO2, PO5	3
CO 3	Able to apply cased hole and production logging methods	PO1, PO2, PO5	3
CO 4	Able to apply direct methods of formation evaluation	PO1, PO2, PO5	3

Syllabus:

- Introduction to Well Logging: Classifications of well logging methods, major components of well logging unit and logging setup. Log presentations, log header, log quality control and applications of well logs. Borehole environment and the factors affecting the log data acquisition.
- Open-Hole Logging: Tool physics, measurement principles and applications of Caliper Log, Gamma Ray Logs, Natural Spectral Gamma Ray Log, SP Log, Resistivity Logs (Conventional, Focused, Induction and Micro Devices), Density Log, and Sonic Log.
- Cased-Hole Logging: Tool physics, measurement principles and applications of Gamma ray spectral log, Neutron decay time log, CBL/VDL logs, casing collar locator tool and Casing inspection log. Determination of fluid saturation behind casing. Depth control and

Perforation technique. Advances in Well logging: Tool physics, measurement principles and applications of Formation testers, Dip Meter Tool, Formation, Nuclear Magnetic Resonance Tool, and Cased-hole Resistivity Tool. Production logging: Tool physics, measurement principles and applications of production logging tool.

- Direct Methods of Formation Evaluation: Mud logging- Methods, measuring parameters, gas detection drill cutting analysis, hydrocarbon detection. Conventional and sidewall coring methods and applications. Information obtained from cores- Geological information, Petrophysical information and Advanced Rock Properties.
- Formation Evaluation: Integration of direct and indirect data and understand the geology of the formation - mineralogy, depositional environment, structure, stratigraphy, establishing possible marker horizons, hydrocarbon bearing zones of interest, occurrence of water bearing zones, type of fluids and lithology. Log interpretation methods, Quick look log interpretation, Cross plots: Neutron- Density, Sonic- Density, Sonic- Neutron cross plots, Hingle plot, Mid plot. Quantitative Formation Evaluation: Lithology, Porosity, formation water resistivity, fluid saturation determination, Identification of interesting zones for well testing and hydrocarbon production.

Text Books:

1. Edward J. Lynch, Harper & Row, "Formation evaluation", (1962).
2. Toby Darling, "Well logging and formation evaluation", Elsevier, New York, (2005).

Reference Book:

1. Hydrocarbon well logging recommended practice, Soc. of professional well log analysts, (1983).
2. Oberto Serra, "Fundamentals of Well Log Interpretation: The Acquisition of Data", Elsevier, (1984).
3. Oberto Serra, "Well Logging Handbook", Editions Technip, (2008).

PETROLEUM RESERVOIR ENGINEERING

Course code: 19ME4114 **L-T-P: 2-0-2**

Pre-Requisite: NIL **Credits: 3**

Mapping of the course outcomes with student's outcomes:

CO	Course outcome's	PO / PSO	BTL
CO 1	Able to understand the rock and fluid properties	PO1, PO2, PO4	2
CO 2	Able to apply the fluid flow equation to the porous media for different conditions	PO1, PO2, PO4	3
CO 3	Able to apply the reservoir potential through use of different tools such as volumetric and material balance methods	PO1, PO2, PO4	3
CO 4	Able to apply the reservoir performance through decline cure analysis and effects of foreign fluids on reservoir performance	PO1, PO2, PO4	3

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CO 5	Perform the experiments to estimate the reservoir rock and fluid properties.	PO1, PO2, PO4	4

Syllabus:

- **Introduction to reservoir engineering & Reservoir fluid properties:** Characteristics of crude oil and natural gas, classification of crude and its physicochemical properties.
- **PVT analysis:** Phase behaviour of hydrocarbon system, reservoir fluid sampling, PVT properties determination, different correlations and laboratory measurements, data reduction, evaluation and application.
- **Reservoir Rock Properties:** Porosity and permeability determination, combination of permeability in parallel & series beds, porosity permeability relationship, fluid saturation determination and significance, effective and relative permeability, wettability, capillary pressure characteristics, measurements and uses. Coring and Core Analysis
- **Flow of Fluids through Porous Media:** Darcy's law, single and multiphase flow, linear, radial & spherical geometries and composite geometries in series and parallel, steady state & unsteady state flow.
- **Reservoir Driving mechanisms & estimation:** Reservoir drive mechanics. Resource & Reserve concept. Different reserve estimation techniques: Volumetric, MBE. Generalized Oil & Gas MBE and its modification for performance prediction of depletion drive, gas cap drive, water drive and combination drives. Water and gas coning.
- **Decline curve analysis & Immiscible Displacement processes:** Theory & practices-fractional flow of water, Buckley Leverette treatment of fractional flow and frontal advance equations, water flood performance. Reservoir pressure maintenance techniques, their advantages and limitations.
- **EOR Methods:** Screening criteria, water flooding in reservoir, chemical flooding, thermal flooding and microbiological flooding.

Text Books:

1. J.W. Amyx, D.M.Bass, Jr., and R.L.Whiting, "Petroleum Reservoir Engineering-Physical Properties" McGraw Hill Education (India) Edition 2014.
2. B.C. Craft, M.F.Hawkins, and R.E. Terry, "Applied Petroleum Reservoir Engineering" by Prentice Hall, (1991).

Reference Books

3. LP Dake, "Fundamentals of Reservoir Engineering" shell learning and development, (1998).
4. Tarek Ahmed, "Reservoir Engineering Handbook", Gulf Professional Publishing, 4th ed, (2010).
5. Abhijit Y. Dandekar, "Petroleum Reservoir Rock and Fluid Properties", CRC Press, (2013).

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PETROLEUM PRODUCTION ENGINEERING – II

Course code: 19ME4115 **L-T-P: 3-0-0**

Pre-Requisite: 19ME4112 **Credits: 3**

Mapping of the course outcomes with student's outcomes.

CO	Course outcome's	PO/PSO	BTL
CO 1	Able to understand production operation surface facilities	PO1, PO2, PO4	2
CO 2	Able to apply oil and gas processing and treatment methods	PO1, PO2, PO4	3
CO 3	Able to apply oil and gas storage and metering operations	PO1, PO2, PO4	3
CO 4	Able to apply production operations and optimization	PO1, PO2, PO4	3

Syllabus:

- **Gathering and collection of oil and gas:** GGS, CTF and GCS - layout, sequential treatment,and safety features on installations for onshore and off-shore production. EPS - Early Production Storage.
- **Field Processing of Oil & Gas:** Flash and stage separation of oil & gas; oil & gas separators, mist extractor, fluid level and pressure control system. Control valve sizing, Vertical and horizontal separators, metering separators. Scrubbers and wash tank. Demulsification and desalting.
- **Production fluids treatment:** Dehydration, crude oil treating, crude desalting, acid gas treating and produced water treatment and disposal.
- **Storage of Petroleum and Petroleum Products:** Different types of storage system, Types & features of storage tanks, fixed roof and floating roof tanks. Design of storage tanks with introduction to API codes, Specification. Vapour recovery system. LPG & LNG storage.
- **Metering and Measurements:** Metering of oil & gas, Sampling and Testing of crude oil. Gauging equipment and methods. Water and sediment determination. Orifice and other metering devices and their characteristics.
- **Production System Analysis & Optimization:** Self flow wells - PI & IPR of self flowing and artificial lift wells & production testing. Production characteristics of Horizontal and multilateral wells - coning, IPR & skin factor. Multiphase flow in tubing and flow-lines. Sizing, selection and performance of Tubing, chokes and surface pipes. Production Optimization – Nodal System analysis. **Introduction to Artificial Lift Techniques.**

Text Books:

1. Boyun Guo, William C. Lyons, Ali Ghalambor, "Petroleum Production Engineering: A computer assisted approach" Elsevier Science and Technology Books, (2007).
2. Ken Arnold, Maurice Stewart, Butterworth Heinemann, "Surface Production Operations", Vol 1 & 2, (1989).

Reference Books:

3. Daniel Hill, Christine Ehlig-Economides, Ding Zhu, Michael J. Economides, "Petroleum Production Systems", 2nd Edn, Prentice Hall, (2012).

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OFFSHORE PETROLEUM OPERATIONS

Course code: 19 ME 4116 **L-T-P: 3-0-0**

Pre-Requisite: NIL **Credits: 3**

Mapping of the course outcomes with student's outcomes.

CO	Course outcome's	PO / PSO	BTL
CO 1	Able to understand offshore environment for exploration & drilling operations	PO1,PO2,PO5	2
CO 2	Able analyze various offshore structures	PO1,PO2,PO5	3
CO 3	Able analyze the offshore drilling operations	PO1,PO2,PO5	3
CO 4	Able to analyze the offshore production operations	PO1,PO2,PO5	3

Syllabus:

- **Sea states and weather:** Meteorology, oceanography. Sea-bed soil condition. wave condition. Wave- structure interaction.
- **Off-shore structures:** Fixed platform, jack-up rig: design and operational features mobile units; semi-submersible, floating structures, description and installation, station keeping, mooring and dynamic positioning system.
- **Off-shore drilling:** Well head and sea floor connection; conductor and riser. Off-shore well completion: Platform and subsea completion system, well control and work-over system.
- Sub-sea technology in deep water – use of divers and robots.
- **Off-shore production:** Platform oil and gas processing, water and gas injection system. Storage for oil; SPM & SBM system.
- **Deep water technology:** use of remote operating vehicle (ROV).

Text Books:

1. "The Technology of Offshore 'Drilling, Completion and Production", ETA Offshore Seminars, Inc. Penn WellPublishing Company.
2. S. Chakrabarti, "Handbook of Offshore Engineering", Volume 1 & 2, Elsevier, (2005)

Reference Books:

1. Bill Mitchill, "Advanced oil well drilling engineering, hand book and computer programs" SPE.

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Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 -2577715, Fax: +91-866-2577717

DEPARTMENT OF MECHANICAL ENGINEERING

MINUTES OF BOARD OF STUDIES MEETING

KLEF/ ME/ IQAC - ACAD/AQ.5/ DCMs **Date: 28-10-2021**

The department Board of Studies meeting was conducted in virtual mode at 11:00 A.M on 28/10/2021 in the following webex link:

https://kluniversity.webex.com/kluniversity/j.php?MTID=m1c54e597c21958bbd6fe2085b119fd57

Agenda of the Meeting:

1. To present the activities and achievements of the department during 2021-22 odd semester till date.
2. To consider and approve Energy & CFD Specialization courses under B.Tech Professional electives w.e.f Y20 batch
3. To consider the proposal of minor degree and honor degree courses for B.Tech Program.
4. Any other points with permission of chair.
   - Addition of some more electives courses for M.Tech Machine Design Program.
   - To propose list of certification courses for A.Y. 2021-22

Members Present:

1. Dr. D. V. A. Ramasastry, Associate Professor, HoD-ME & Chairman BOS

The following **External Members** were present:

1. Dr. A. Venu Gopal, Professor & Dean Academics, NIT Warangal
2. Dr. R. Vijaya Kumar, Senior Manager, R & D, HAL, Bangalore
3. Dr. P. Srinivasa Rao, Global Training Head, Cyient Technologies, Hyderabad
4. Dr. K. Raviteja, Manager, Hyundai R&D Division, Hyderabad

The following members were present from **KLEF - Dean Academics Team**

1. Dr. K. Thirupathi Rao, Additional Dean-Academics

The following **Internal Members** were present:

1. Dr. A. Jagadeesh, Professor, CCO
2. Dr. K. V. Ramana, Professor

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PRINCIPAL
College of Engineering
Koneru Lakshmaiah Education Foundation
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3. Dr. K. Rama Krishna, Professor, Dean Quality
4. Dr. A. Srinath, Professor, Dean Skill Development & Principal ASC
5. Dr. Y.V. Hanumantha Rao, Group Head Energy & CFD
6. Dr. B. Nageswara Rao, Professor, Head-Research Faculty
7. Dr. S. N. Padhi, Group Head Design & Manufacturing
8. Dr. S. S. Rao, Professor, RPAC & Group Head-Robotics & Mechatronics
9. Dr. K.V. Narasimha Rao, Professor
10. Dr. P. Issac Prasad, Professor
11. Dr. G. Yedukondalu, Associate Professor
12. Dr. P. Kasi Visweswara Rao, Associate Professor
13. Dr. K. V. Durga Rajesh, Associate Professor
14. Mr. P. Ratna Prasad, Assistant Professor
15. Mr. K. Dileep, Assistant Professor
16. Mrs. T.Kanthimathi, Assistant Professor

Dr. D. V. A. Ramasastry, Chairman of BoS opened the meeting by welcoming all external & internal members.
After due deliberations, the following resolutions have been adopted:

RESOLUTIONS:

1. Chairman BOS presented the activities and achievements of the department during 2021-22 odd semester (till date) to all the members (**Annexure-1: Activities and Achievements of dept. from 2021-22 odd semester**).
2. Chairman BOS presented the proposed Energy & CFD elective courses to all the members. Dr. R. Vijaya Kumar, Senior Manager, R & D, HAL, External Member, suggested minor changes for the course titled **"CFD for compressible and *incompressible flows – FVM approach".*** Chairman BOS instructed Dr.Y.V.Hanumantha Rao, Group Head to revise the syllabus as per the suggestion given by Dr. R. Vijaya Kumar. The updated curriculum is shown in **Annexure 2: Energy & CFD Specialization courses and syllabus.**
3. Chairman BOS presented the proposed minor degree courses (CFD & Robotics & Mechatronics) to all the members. The external members gave the following remarks on the courses:
   - Dr. P. Srinivasa Rao, Global Training Head, Cyient Technologies, suggested to put Machine Learning course earlier to Artificial Intelligence course in the sequence of offering.
   - Dr. K. Raviteja, Manager, Hyundai R&D Division, Hyderabad, suggested to rename the course title Fuzzy sets & Artificial Intelligence as "AI & IoT for Industrial Automation".

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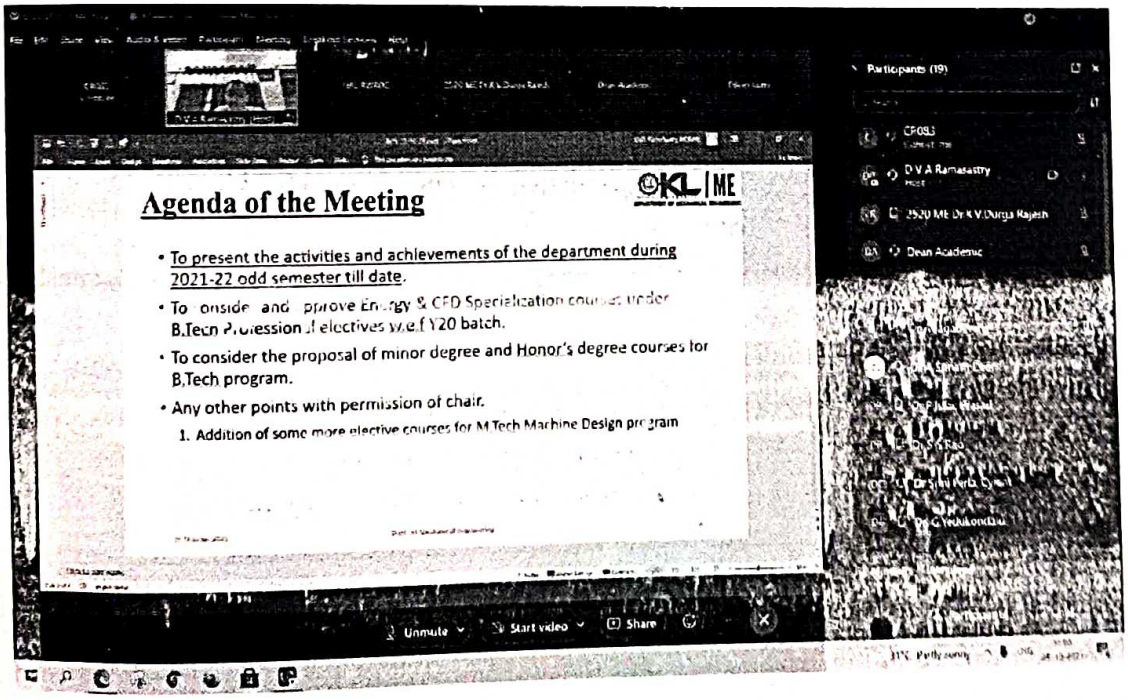
It is resolved to consider the suggestions / remarks given by External members. The revised minor degree courses are shown in **Annexure 3: Minor Degree courses and syllabus.**

4. Chairman BOS presented the proposed Honor degree courses to all the members. Dr.A.Srinath, Professor, Dean Skill Development & Principal ASC, Internal member gave a proposal to add some more courses in the list of Honor courses and give choice to students to select set of 5 courses as per their interest. Dr. A. Venu Gopal, Professor & Dean Academics, NIT Warangal, External member suggested to restrict 3 courses as common and give choice for remaining 2 courses for honors degree. All the members agreed the suggestion given by Dr. A. Venu Gopal. Chairman BOS instructed Group Heads to revise the list of honor courses accordingly and send to all members for their approval. The revised courses and syllabus was shown **in Annexure 4: Honor Degree courses and syllabus.**

5. Chairman BOS presented the proposed new elective courses to be added in M.Tech Machine Design Program. Dr. K. Raviteja, Manager, Hyundai R&D Division, Hyderabad, suggested to add real time applications in the course titled "Modeling and Simulation of Mechatronic Systems". Chairman BOS instructed Dr. S.S.Rao, Group Head to include the relevant applications in the syllabus as per the remarks given by external member. **(Annexure 5: New Elective courses under M.Tech Machine Design Program).**

6. Chairman Bos presented the proposed list of Certification courses as value addition for students pursuing B.Tech program during AY 2021-22. The list of courses is accepted. **(Annexure 6: List of Certification courses for AY 2021-22).**



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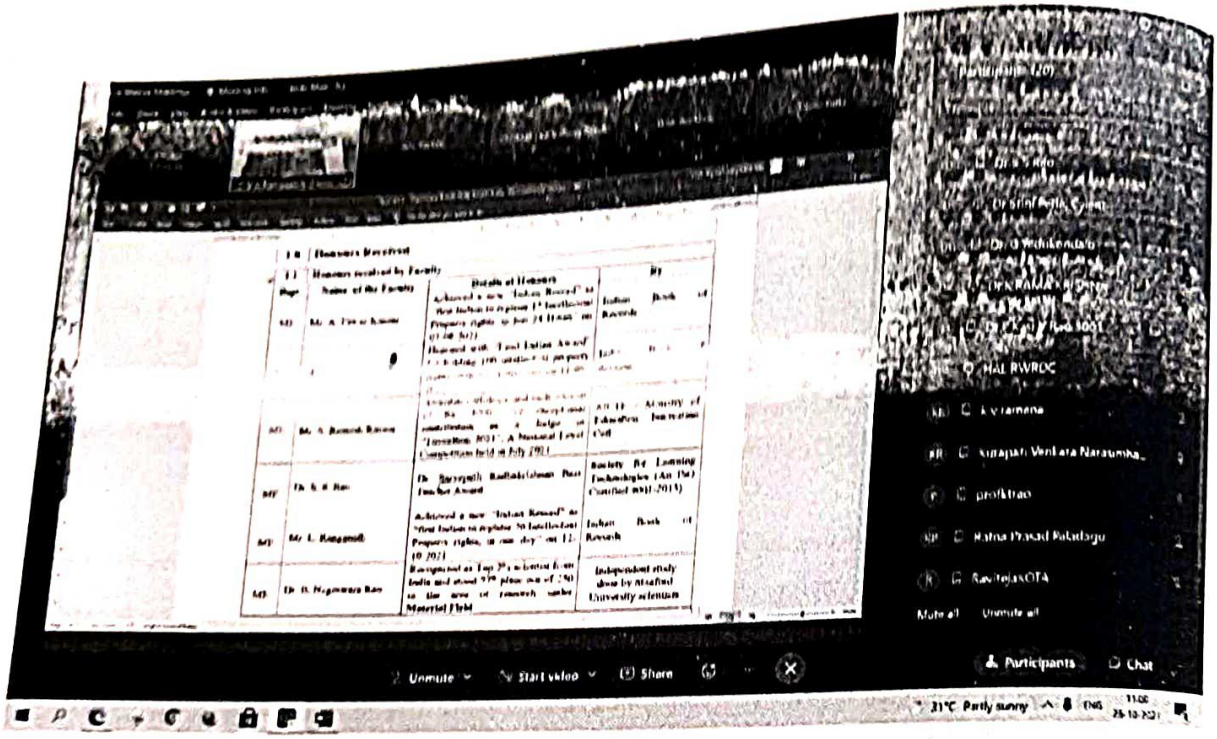

Prepared by
(Mrs.T.Kanthimathi)
Prof. I/C Academics

03/11/21

Authorised by
(Dr. D.V.A.Ramasastry)
Chairman – BoS

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Annexure-1

Significant Events happened in the Department from July-2021 to October-2021

1.0 Honours Received

1.1 Honours received by Faculty

Dept.	Name of the Faculty	Details of Honours	By
ME	Mr. A. Eswar Kumar	Achieved a new "Indian Record" as "first Indian to register 15 Intellectual Property rights, in just 24 Hours" on 07-08-2021	Indian Book of Records
ME	Mr. A. Eswar Kumar	Honored with "Lead Indian Award" for holding 100 intellectual property rights from K L University on 11-08-2021	Indian Book of Records
ME	Mr. S. Ramesh Kumar	Awarded certificate and cash amount of Rs.3000/- for exceptional contribution as a Judge in "Toycathon 2021", A National Level Competition held in July 2021	AICTE - Ministry of Education Innovation Cell
ME	Dr. S. S. Rao	Dr. Sarvepalli Radhakrishnan Best Teacher Award	Society for Learning Technologies (An ISO Certified 9001-2015)
ME	Mr. L. Ranganath	Achieved a new "Indian Record" as "first Indian to register 20 Intellectual Property rights, in one day" on 12-10-2021	Indian Book of Records
ME	Dr. B. Nageswara Rao	Recognized as Top 2% scientist from India and stood 77th place out of 250 in the area of research under **Material Field**	Independent study done by Stanford University scientists

1.2 Honours received by Students

Dept.	Name of the Student	Details of Honours	By
ME	Mr. D. Lokesh Chavan (180070111)	Awarded First prize in "Mobile Robotics" trade conducted in State Skills Competetion 2021 held at KLEF on 24th and 25th August-2021 and awarded Cash Prize of Rs.30000/-	APSSDC
ME	Mr. K. Vamsi (180079048)	Awarded First prize in "Prototype Modeling" trade conducted in State Skills Competetion 2021 held at KLEF on 24th and 25th August-2021 and awarded Cash Prize of Rs.30000/-	APSSDC
ME	Mr. P. Srimannarayana Raju (150070323)	Awarded First prize in "Additive Manufacturing" trade conducted in State Skills Competetion 2021 held at KLEF on 24th and 25th August-2021 and awarded Cash Prize of Rs.30000/-	APSSDC

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ME	Mr. Kolligura Babu Lakshmi Narasimha Srinivas (170070098)	Awarded Second prize (Runner Up) in "Additive Manufacturing" trade conducted in State Skills Competetion 2021 held at KLEF on 24th and 25th August-2021 and awarded Cash Prize of Rs.15000/-		APSSDC
ME	Mr. Sharmila Madhav (190079003)	Achieved a new "Indian Record" as "First Indian to register 18 Intellectual Property Rights in one day" on 01-09-2021	Indian Records	Book
ME	Mr. Rejeti Sriram Swaroop (190079022)	Achieved a new "Indian Record" as "First Indian to register 18 Intellectual Property Rights in one day" on 01-09-2021	Indian Records	Book
ME	Mr. Chiguruvada Yashwanth Sai (190079023)	Achieved a new "Indian Record" as "First Indian to register 18 Intellectual Property Rights in one day" on 01-09-2021	Indian Records	Book

1.3 Placements Details

Sl. No.	Company Name	No. of students selected	Package (in Lakhs)	Company prof
1	Infosys through infytq	1	3.36 LPA	
2	Deloitte USI Consulting	8	7.76 LPA	
3	TCS Ninja	10	3.36 LPA plus 50000 per annum HRA	
4	TCS Digital	1	7 LPA	
5	Cognizant Digital Nurture Phase-1 GenC	11	4 LPA	
6	Cognizant Digital Nurture Phase-1 GenC Elevate	6	4.5 LPA	
7	Capgemini in Analyst job role	15	4.0 LPA	
8	HCL Technologies	11	4.75 LPA	
9	WIPRO	31	3.6 LPA	
10	KPIT	1	3.6 LPA	
11	EPAM	1	6.0 LPA	
12	Hyundai MOBIS	2	5.0 LPA	
13	EY Global Delivery Services	3	4.5 LPA	

	(GDS)			
14	TCS Ninja Phase-1	4	3.36 LPA	

Placements

- 180070039 - GARIMELLA VENKATA SAI SASANKH – Selected in Infosys through infytq with a pay package of 3.36 lakhs per annum package.
- 180070004, 180070017, 180070024, 180070038, 180070046, 180070047, 180070050, 180070151 – 8 ME Students of Y18 Batch selected in Deloitte USI Consulting with a pay package of 7.76 Lakhs per annum.
- 180070017, 180070024, 180070033, 180070074, 180070082, 180070097, 180070109, 180070143, 180070178, 180070229 – 10 Students of Y18 Batch Placed in TCS Ninja with 3.36 LPA plus 50000 per annum HRA.
- 180070151 – Ms. M. Sowmya – selected in TCS Digital with 7 Lakhs per Annum.
- 180070204, 180070074, 180079027, 180079043, 180070030, 180070181, 180070095, 180079014, 180070097, 180070009, 180070207 – 11 ME Students of Y18 Batch selected in Cognizant Digital Nurture Phase-1 GenC with 4 Lakhs per Annum.
- 180070055, 180070194, 180070080, 180070143, 180079029, 180070033 – 6 ME Students of Y18 Batch selected in Cognizant Digital Nurture Phase-1 GenC Elevate with 4.5 Lakhs per Annum.
- 180070033, 180070194, 180070057, 180070100, 180070030, 180070078, 180070080, 180070034, 180070207, 180070204, 180070171, 180070143, 180079016, 180070009, 180070176 – 15 ME students of Y18 Batch selected in Capgemini in Analyst job role with 4.0 Lakhs per Annum.
- 180070016, 180070030, 180070031, 180070033, 180070055, 180070056, 180070123, 180070177, 180070198, 180070204, 180070207 – 11 ME students of Y18 Batch selected in HCL Technologies with 4.75 Lakhs per Annum.
- 180070003, 180070009, 180070010, 180070018, 180070027, 180070031, 180070035, 180070042, 180070055, 180070057, 180070067, 180070078, 180070080, 180070081, 180070082, 180070095, 180070097, 180070100, 180070124, 180070150, 180070165, 180070166, 180070177, 180070178, 180070181, 180070207, 180070220, 180079016, 180079018, 180079037, 180079047 – 31 ME students of Y18 Batch selected in WIPRO with 3.6 Lakhs per Annum.
- 180070029 – B.Tech student of Y18 batch selected in KPIT with 3.6 Lakhs per Annum.
- 180070123 – B.Tech student of Y18 batch selected in EPAM with 6.0 Lakhs per Annum.
- 195072001, 195071003 – 2 M.Tech students of Y19 batch selected in Hyundai MOBIS with 5.0 Lakhs per Annum.
- 180079048, 180070005, 180070056 - 3 ME students of Y18 Batch selected in EY Global Delivery Services (GDS) for Tax Analyst Role with 4.5 Lakhs per Annum.
- 180070035, 180070042, 180070105, 180079011 - 4 ME students of Y18 Batch selected in TCS Ninja Phase-1 with 3.36 Lakhs per Annum.

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2.0 Research Publications

2.1 Number of Papers Published by Faculty

S. No	Dept.	National Journals	International Journ
1	ME	-	47 till date

2.2 Number of Conference Papers Published by Faculty

S. No	Dept.	National Conferences	International Confere
1	ME	-	14 till date

3.0 Consultancy , Patents And Citations

3.1 Consultancy

S. No.	Name of the Faculty	Sponsoring Agency	Work
1	Dr. K. V. Ramana	KLEF-ME	Investigatio Mechanical Pr (Metals and Metals) using KN UTM
2	Dr. S.N.Padhi	AICTE-SLA PROJECT	AICTE-Stu Learning Asse
3	Dr. S.S. Rao	AICTE-SLA PROJECT	AICTE-Stu Learning Asse

3.2 Patents

Design Patents		Utility Patents	
Filed	Published	Filed	Granted
51	25	-	-

4.2 Conferences/workshop/seminar Conducted by the Department through Virtual

S. No.	Dept.	Conference/Workshop
1	ME	1 day workshop on "Experimental and numerical analysis of combusti how it is necessary in the current scenario when the world is looking for vehicles" by Prof. Vanteru Mahendra Reddy, Mechanical Engi Department, IIT, Kharagpur on 30-09-2021

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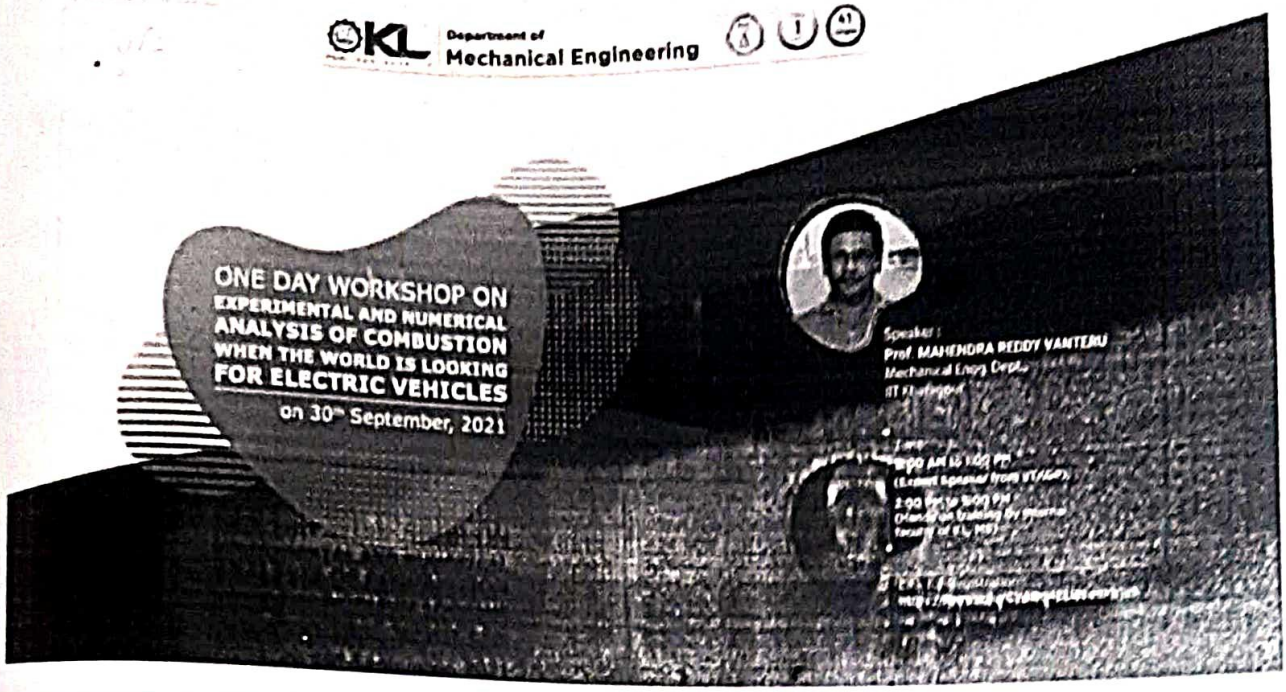

5.0 Guest Lectures/Webinar

5.1 Guest Lectures/Webinar Arranged through Virtual Mode

S. No.	Dept.	Name of the Guest Faculty	Date	On Topic
1	ME	Dr. P. Anusha, Assistant Professor, PVP Siddhartha Institute of Technology, ISHRAE Vijayawada Sub-chapter Women Chair	23-08-2021	Webinar on **"Role of Gas and Liquid Pipe line insulations in VCR Systems"**
2	ME	M. N. Lakshmi Narasimhan - Industries Director, India, Dassault Systems	25-08-2021	Webinar on **"Applications of 3D Experience in various industries"** in collaboration with APSSDC
3	ME	Dr. M. Saravanan – Director and Senior Professor, Ponjesly College of University, Nagarcoil, Tamilnadu	31-08-2021	Guest Lecture on **"Scheduling for Manufacturing Systems – with a case study"**
4	ME	Dr. Paran Gowda Adjunct Professor at Patanjali University - Haridwar, President-Karuna Trust, Mysore	15-09-2021	Guest Lecture on **"Role of Engineers in Social Up-liftment"** on the occasion of Engineers day
5	ME	Er. Balaji Sahu, Chairman & CEO - 21st Century Preparation & Chief Technical Advisor - NAMO SAMAJIK SAROKAR ASSOCIATION	02-10-2021	Guest Lecture on **"Design problems in Manufacturing-Case studies"**
6	ME	Shri. D. Uma Maheshwar, (1987-1991 ME Batch) Alumnus, Chief Consulting Engineer, GE Aviation, Bangalore	03-10-2021	Alumnus Guest Lecture on **"Future of Engineering: Perspectives from Aviation"**
7	ME	Dr. Sirisha Kasinadhuni, CEO, Empiezo IT Solutions, Hyderabad	26-10-2021	Guest Lecture on **"AI & Manufacturing- Industry Applications - Role of Mechanical Engineers**

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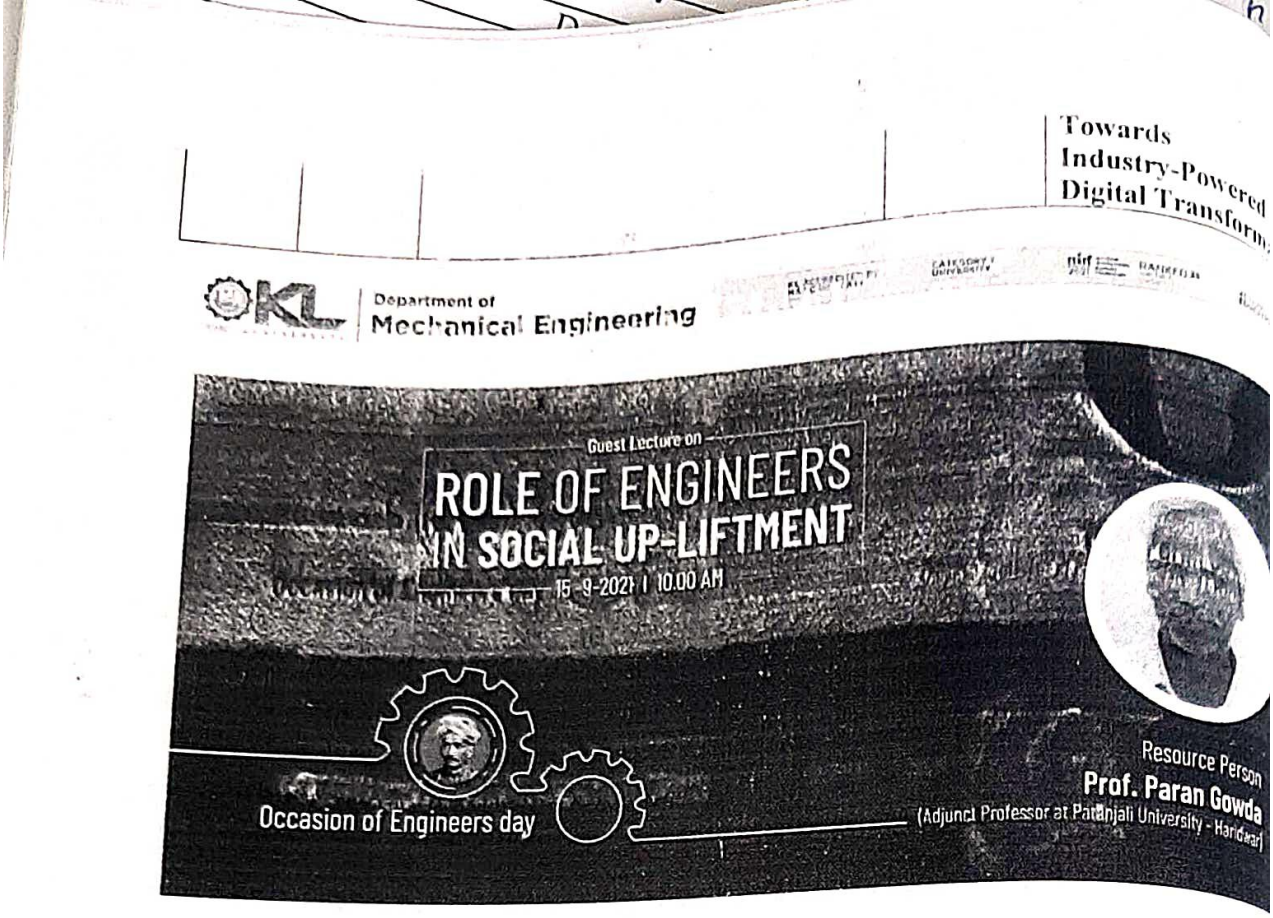

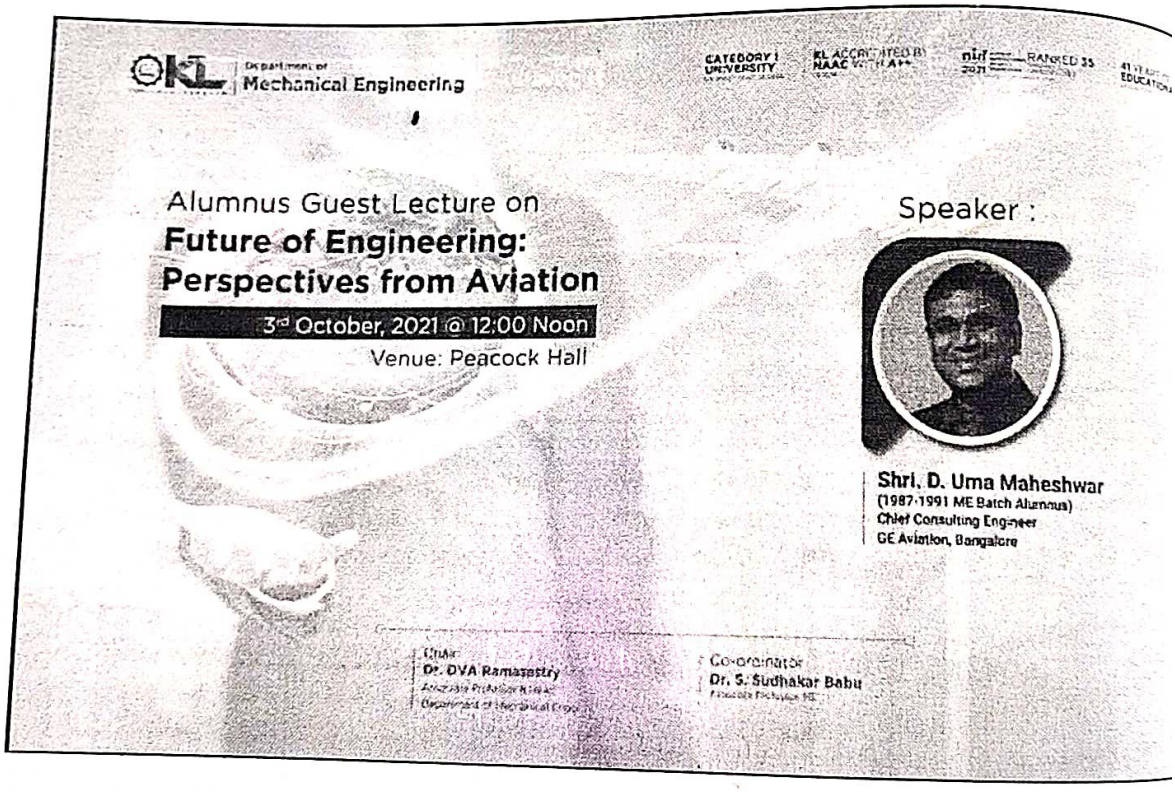

6.0	NSS Activities conducted through Virtual Mode	
S. No.	**Dept.**	**Details of NSS Activities**	**Condu**
1	ME	Plantation Programme conducted in Revendrapadu village on the eve of Gandhi Jayanthi	02-1

HOD-ME

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Annexure 2: Energy & CFD Specialization Courses

S. No	Course Name	L-T-P-S	Credits	Contact hours
1	Hydrogen and Fuel cell Technologies	2-0-2-0	3	4
2	Solar Energy Technologies	2-0-2-0	3	4
3	Advanced Energy Storage Systems	2-0-2-0	3	4
4	Energy audit and Management	3-0-0-0	3	3
5	Computational Fluid Flow and Heat Transfer – FDM Approach	2-0-2-0	3	4
6	CFD for Compressible and Incompressible Flows	2-0-2-0	3	4

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HYDROGEN AND FUEL CELL TECHNOLOGIES

L-T-P-S : 2-0-2-0

Credits: 3

CO#	Course Outcome	PO/PSO
CO1	Understand various properties of hydrogen and various production methods	PO1
CO2	Understand hydrogen storage methods and employing hydrogen as fuel for IC engine	PO1
CO3	Understand fuel cell basics and Fuel cell thermodynamics	PO1
CO4	Understand fuel cell reaction kinetics	PO1
CO5	Analyze various hydrogen systems and fuel cells using Trnsys and COMSOL Multiphysics	PO5

Syllabus:

Hydrogen basics and Production methods: Hydrogen – physical and chemic properties, salient characteristics. Production of hydrogen – steam reforming wat electrolysis – gasification and woody biomass conversion – biological hydroge production –photo dissociation – direct thermal or catalytic splitting of water

Hydrogen storage methods: Hydrogen storage options – compressed gas – liqu hydrogen – Hydride – chemical Storage – comparisons. Safety and management hydrogen, Transportation of hydrogen. Applications of Hydrogen.

Hydrogen as a fuel for automobiles – Combustive properties of Hydrogen, Proble caused by hydrogen by employing fuel for automobiles, Design modifications required the engine, Performance parameters of hydrogen fuelled IC engines.

Fuel cell: Overview of Fuel Cells, low and high temperature fuel cells. Fuel Cell performance, Polymer electrolyte fuel cells, Alkaline fuel cells, Phosphoric fuel cells, Molten carbonate fuel cells, Solid oxide fuel cells, Fuel cell systems and Sample calculations.

Fuel cell thermodynamics - heat, work potentials, prediction of reversible voltage, fuel cell efficiency.

Fuel cell reaction kinetics - electrode kinetics, over voltages, Tafel equation, charge transfer reaction, exchange currents, electrocatalyses - design, activation kinetics, Fuel cell charge and mass transport - flow field, transport in electrode and electrolyte.

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