SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with "A" Grade by NAAC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119.
Phone: 044 - 2450 3150 / 51 / 52 / 54 / 55 Fax: 044 - 2450 2344
www.sathyabama.ac.in

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SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY

SCHOOL OF MECHANICAL ENGINEERING
Department of Mechanical Engineering

Minutes of Board of Studies meeting held on 10th November 2017

The following members were present in the meeting:

1. Dr.L.Vijayaraghavan, Professor- IIT Madras - External Member
2. Er.James Michael Amulu, Director- SAP - External Member
3. Dr.A.Krishnamoorthy, Professor and Head- Mechanical Engineering - Internal Member
4. Dr.S.P.Venkatesan, Associate Professor- Mechanical Engineering - Internal Member
5. Mr.R.Devaraj, Associate Professor- Mechanical Engineering - Internal Member
6. Dr.G.Senthilkumar, Assistant Professor- Mechanical Engineering - Internal Member
7. Mr.M.Purusothaman, Assistant Professor- Mechanical Engineering - Internal Member
8. Mr.Abhishek Singh Chauhan, Alumni- Internal Member

The meeting was started with the welcome speech by the Chair Person. The Chair person welcomed all the BoS members, and explained the agenda for the meeting. After deep discussion and recommendations, the following deliberations were made as per the items of the circulated agenda.

Agenda #1: Addition of new courses for Bachelors of Engineering– Mechanical Engineering
Based on the feedback from the Alumni, the Head of the department narrated the importance of including the courses on the emerging trends like renewable energy. Dr. L. Vijayaraghavan insisted the importance of non-conventional energy sources and the significance of including the same in the curriculum. Er. James Michael Amulu suggested the importance of fundamental knowledge on the elasticity for manufacturing sector. Based on their feedbacks and the mutual acceptance of majority, the Department proposed the following two courses to be included as the elective courses from January 2018.

Course1: SME1617 - Non Conventional Energy systems
Course 2: SME1620 - Theory of Elasticity

Resolutions:
The BOS members recommended for including the new courses in the curriculum, and approved for the inclusion in "B.E - Mechanical Engineering" programme.

Agenda #2: Skilling in professional domains to promote industry ready competency among learners. Necessary certification courses to improve the domain knowledge

The department offered the skill development programs, such as, Drafting and modelling using Solidworks, CATTIA and Tool path simulation. The head highlighted the salient features of these programs, and how these programs were effective for the students to promote Industry ready competency among learners.

Resolutions: The BoS members approved the same to promote the industry ready competency among the students.

Agenda # 3: Any other points with the permission of Chair
The BoS members suggested the need of academic flexibilities so that the self-learning capabilities and advanced skills can be acquired by the students. The BoS members were also keen to know if any extra credits could be earned by students from off-campus learning.

Resolutions: The BoS recommended to promote the self-learning by encouraging students to opt for MOOC courses / NPTEL courses. It was also recommended that the students can opt these courses at the end of the third semester subject to the condition prescribed by the Board of Management time to time.

With the above discussion, recommendations and resolutions, the Head expressed his deep sense of gratitude to all members for their valuable time, discussion, valuable suggestions and recommendations, and the approval. The meeting ended with the Vote of Thanks by the Chair.

Member	Designation	**Signature**
Dr.L.Vijayaraghavan	Professor	
Er.James Michael Amulu	Director	
Dr.A.Krishnamoorthy	Professor and Head	
Dr.S.P.Venkatesan,	Associate Professor	
Mr.R.Devaraj	Associate Professor	
Dr.G.Senthilkumar	Assistant Professor	
Mr.M.Purusothaman	Assistant Professor	
Mr. Abhishek Singh Chauhan	Alumni- Internal Member	

1: Addition of new courses for Bachelors of Engineering– Mechanical Engineering

SME1617	NON CONVENTIONAL ENERGY SYSTEMS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES:

On completion of the course, student will be able to

CO1: identify the energy demands and co relate with available energy resources

CO2: identify and to estimate the solar energy utilization and principles involved in solar energy Collection

CO3: understand the types of wind energy systems, and to implement the performance, safety and environmental aspects.

CO4: understand and pursue research work behind the concept of Bio mass, Bio gas and Bio diesel energy system

CO5: understand and evaluate tidel energy and other Renewable energies.

CO6: acquire knowledge on Geothermal energies and fuel cell systems.

UNIT 1 INTRODUCTION **9Hrs.**

World Energy Use Reserves of Energy Resources Environmental Aspects of Energy Utilization Renewable Energy Scenario in Tamilnadu, India and around the World - Potentials - Achievements / Applications Economics of renewable energy systems

UNIT 2 SOLAR ENERGY **9Hrs.**

Solar Radiation Measurements of Solar Radiation - Flat Plate and Concentrating Collectors Solar direct Thermal Applications Solar thermal Power Generation - Fundamentals of Solar Photo Voltaic Conversion Solar Cells Solar PV Power Generation Solar PV Applications.

UNIT 3 WIND ENERGY **9Hrs.**

Wind Data and Energy Estimation Types of Wind Energy Systems Performance - Site Selection Details of Wind Turbine Generator Safety and Environmental Aspects

UNIT 4 BIO ENERGY **9Hrs.**

Biomass direct combustion Biomass gasifiers Biogas plants Digesters Ethanol production Bio diesel Cogeneration - Biomass Applications

UNIT 5 OTHER RENEWABLE ENERGY SOURCES **9Hrs.**

Tidal energy Wave Energy Open and Closed OTEC Cycles Small Hydro-Geothermal Energy Hydrogen and Storage - Fuel Cell Systems Hybrid Systems, Magneto Hydro dynamometer.

Max: 45 Hrs

TEXT/ REFERENCE BOOKS

1. G.D. Rai, Non Conventional Energy Sources, Khanna Publishers, New Delhi, 2011.
2. Twidell, J.W. & Weir, A., Renewable Energy Sources, EFN Spon Ltd., UK, 2006.
3. S.P. Sukhatme, Solar Energy, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Godfrey Boyle, Renewable Energy, Power for a Sustainable Future, Oxford University Press,U.K., 1996.
5. G.N. Tiwari, Solar Energy Fundamentals Design, Modelling& Applications, Narosa Publishing House, New Delhi, 2002.
6. David M. Mousdale Introduction to Biofuels, CRC Press, Taylor & Francis Group, USA2010 Limited, New Delhi 2009.

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END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 No choice **20 Marks**

PART B: 4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6

SME1620	THEORY OF ELASTICITY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES:

On completion of the course, student will be able to

CO1: Understand the basic definitions of the theory of elasticity.
CO2: Understand the governing equations of elasticity.
CO3: Solve the 2D and 3D problems of elasticity
CO4: Evaluate the stress and strain conditions of beams.
CO5: Summarize the bending effects of various structures.
CO6: Evaluate the torsion effects on solid and hollow bars.

UNIT 1 INTRODUCTION **9 Hrs.**

Definition, notations and sign conventions for stress and strain. Stress - strain relations,Strain-displacement relations- Elastic constants. Coordinates and Tensors Transformation. Stress in Cartesian Coordinates. Principal Stresses and Principal Coordinates. Stress Ellipsoid.

UNIT 2 BASIC EQUATIONS OF ELASTICITY **9 Hrs.**

Generalized Hoke's Law.Relationships between Elastic Moduli.Boundary-Value Problems in Elasticity.Navier's Equations. Beltrami-Michell's Equations.Saint-Venant's Principle.

UNIT 3 2D PROBLEMS OF ELASTICITY **10 Hrs.**

Plane stress and plain strain problems -Airys stress function and cartesian coordinates.Biharmonic equations. 2-D problems Cantilever and simply supported beams. Thick-Walled Cylindrical Pure Bending of a Curved Beam in polar coordinates.

UNIT 4 3D PROBLEMS OF ELASTICITY **9 Hrs.**

Bar Stretched by its Own Weight. Torsion of a Circular Shaft. Bending of a Prismatic Bar.Thermo elasticity- General Approach- Plane Thermoplastic Problem in Polar Coordinates.

UNIT 5 TORSION 8 Hrs.

Torsion of a uniform circular shaft. Torsion of Elliptical and Triangular sections bars. Torsion of hollow bars. Prandle's theory-Membrane analogy.

Max: 45 Hrs

TEXT / REFERENCE BOOKS:

1. S.P. Timoshenko and J.N. Goodier, Theory of Elasticity, McGraw-Hill, 1985.
2. E. Sechler, "Elasticity in Engineering" John Wiley & Sons Inc., New York, 1980.
3. Ugural, A.C and Fenster, S.K, Advanced Strength and Applied Elasticity,Prentice hall, 2003
4. Wang, C.T. Applied elasticity, McGraw Hill 1993
5. Enrico Volterra and Caines, J.H, Advanced strength of Materials, Prentice Hall,1991.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 No choice **20 Marks**

PART B: 4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6 with internal choice, each carrying 16 marks 80 Marks

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SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
SCHOOL OF MECHANICAL ENGINEERING

Department of Mechanical Engineering

Minutes of Board of Studies meeting held on 10th April 2017.

The following members were present in the meeting:

1. Dr. L. Vijayaraghavan, Professor- IIT Madras - External Member
2. Er. James Michael Amulu, Director- SAP - External Member
3. Dr.A.Krishnamoorthy, Professor and Head- Mechanical Engineering - Internal Member
4. Dr. S. P. Venkatesan, Associate Professor- Mechanical Engineering - Internal Member
5. Mr.R.Devaraj, Associate Professor- Mechanical Engineering - Internal Member
6. Dr.G.Senthilkumar, Assistant Professor- Mechanical Engineering - Internal Member
7. Mr.M.Purusothaman, Assistant Professor- Mechanical Engineering - Internal Member
8. Mr.Abhishek Singh Chauhan, Alumni- Internal Member

At the outset, the Chair Person welcomed the members of BoS and placed the agenda for the discussions of the members. The following deliberations were made as per the items of thecirculated agenda.

1. Agenda Item # 1 :Syllabus Modifications proposed for the course SME1304 Power plant Engineering
The Head of the Department proposed some modifications for the course "SME1304 Power plant Engineering" based on the inputs from the subject experts. The suggested modifications are listed below:

Inclusion of the following topics in Unit I: Steam generators. Steam turbines, Binary cycles

Inclusion of the following topics in Unit II: Classification of plant instruments-Pressure gauges and types, Thermo-meters and types, Liquid level, gauges and types, Flow meter, pH measurement instruments, Gas Analysis, Impurity measurement instruments, Speed measuring instruments. Major Electrical Equipment in Power Plant-Layout of Electrical Equipment, Generator and Excites, Switch gear installations, Circuit breakers, Power transformers, Methods of Earthing a power system, Protective devices and control system used in power plant, Types of relays and voltage regulation.

Inclusion of the following topics in Unit III : Pressurized Water Reactor (PWR), CANada Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants. Hydel plants – classification, selection of turbines, pumped storage system.

Inclusion of the following topics in Unit V Co-generation, types of Co-generation Systems and its economics , Waste Disposal Options for Coal and Nuclear Power Plants.

Resolutions: HOD pointed that the Inclusion of topics are necessary with viewpoints of Industrial requirements. The External members Dr. L. Vijayaraghavan and Er. James Michael Amulu are considered the revisions that are to be made and approved.

2.Agenda item # 2 Increase Skills in professional domains to promote industry ready competency among learners. Necessary Training programs and Value added courses

The Head pointed out that the Training program offered by the department in the field of Non Destructive Testing (NDT) and Value added program on Drafting and Modelling Using Solidworks will improve the skills in professional domains to promote industry ready competency among learners.

Resolutions: The BoS recommended the same and approved

3.Agenda Item #3 Any other points with the permission of Chair :

Academic flexibilities with extra credits acquired through either advanced study of same courses or with procuring additional credits from additional courses as per students' choice. Head asked for the suggestions from the BOS External members on students' specialization.

Resolutions: The BoS recommended that advanced courses/NPTEL courses and can be selected for the specialization.

With the above discussion, the Head expressed his deep sense of gratitude to all the members for an academic vibrant discussion on various matters. Since there was no other agenda, the meeting ended with the Vote of thanks

Member	Designation	**Signature**
Dr.L.Vijayaraghavan	Professor	
Er.James Michael Amulu	Director	
Dr.A.Krishnamoorthy	Professor and Head	
Dr.S.P.Venkatesan,	Associate Professor	
Mr.R.Devaraj	Associate Professor	
Dr.G.Senthilkumar	Assistant Professor	
Mr.M.Purusothaman	Assistant Professor	
Mr. Abhishek Singh Chauhan	Alumni- Internal Member	

1. Modifications proposed SME1304 Power plant Engineering Course.

SMEX1016	POWER PLANT ENGINEERING	L	T	P	Credits	Total Marks
		2	1	0	3	100

UNIT I STEAM POWER PLANT **10 hrs.**

Plant layout, types of firing systems – pulverized fuel, tilting and tangential firing system, pulverized bed combustion system. Coal handling systems – crushers – feeders, ash handling system – dust collectors id and id fans – economizers, air preheaters, super-heaters, re-heaters.

UNIT II BOILER CALCULATIONS AND POWER CYCLES **10 hrs.**

Subcritical and supercritical boilers, boiler calculations – boiler efficiencies, equivalent evaporation, boiler power. Condensers – types – calculation of vacuum efficiency, cooling towers – tower characteristics. Review of Rankine cycle – reheat regeneration with open and closed types of feed water heaters and their representation in TS diagram.

UNIT III GAS TURBINE, NUCLEAR AND HYDEL POWER PLANTS **10 hrs.**

Gas turbine plants – open and closed cycles – construction details –, reheating regeneration and intercooling, combined cycle plants and their represention in TS diagram. Nuclear energy – fission – fusion reaction, nuclear fuel, enrichment, nuclear reactor – parts and types, waste disposal and safety in nuclear plants. Hydel plants – classification, selection of turbines, pumped storage system.

UNIT IV NON CONVENTIONAL ENERGY BASED POWER PLANT **10 hrs.**

Non conventional energy – various forms – capacity – availability and limitations. Solar energy plants – various collecting devices – solar devices, photovoltaic cells and solar ponds, wind mills – types – site selection – capacity estimation – performance evaluation, tidal power plants, fuel cells – working – types – limitations, performance evaluation.

UNIT V ECONOMIC AND ENVIRONMENTAL ASPECTS **10 hrs.**

Load curves, fixed and operating costs, economics of load sharing and plant selection, comparison of economicsof various power plants and co-generation, environmental hazards of various power plants- SO_2, CO_2, NO_x and particulate emissions and their control, land and water pollution.

TEXT / REFERENCE BOOKS:

1. Nagpal G.R., Power Plant Engineering – Khanna Publishers, 1996.
2. Domkundwar, Power Plant Engineering – Dhanpat Rai & Sons, Delhi, 1988.
3. Vopal and Stortzki," Power Plant Engineering", PHI, 2007.
4. El Wakil M.N., "Power Plant Technology", McGraw Hill, 1985.
5. Joel Weisomon and Roy Eckart, "Modern Power Plant Engineering", PHI, 1985.
6. Rai G.D., "Non conventional sources of Energy", Khanna Publishers Delhi, 1994.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max Marks : 80 Exam Duration : 3 hrs.

PART A : 2 Questions from each unit, each carrying 2 marks 20 marks
PART B : 2 Questions from each unit with internal choice, each carrying 12 marks 60marks

SME1304	POWER PLANT ENGINEERING (Mech)	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Comprehend knowledge of various components and systems of steam power plant.
CO2 - Evaluate the performance parameters of Boiler, condenser, feed water heater and cooling tower.
CO3 - Examine the functions of various instruments used in power plant.
CO4 - Analyze the various cycles of gas turbine and nuclear power plants.
CO5 - Comprehend knowledge of various non-conventional energy based power plants.
CO6 - Estimate the economic parameters and environmental aspects of power plant.

UNIT 1 STEAM POWER PLANT 9 Hrs.

Plant layout, types of firing systems – pulverized fuel, tilting and tangential firing system, pulverized bed combustion system. Coal handling systems – crushers – feeders, ash handling system – dust collectors id and id fans – economizers, air preheaters, super-heaters, re-heaters, Steam generators. Steam turbines, Binary cycles.

UNIT 2 POWER PLANT EQUIPMENTS AND INSTRUMENTATION 9 Hrs.

Subcritical and supercritical boilers, boiler calculations – boiler efficiencies, equivalent evaporation, boiler power. Condensers types – Calculation of vacuum efficiency, Feed Heaters. cooling towers – tower characteristics. Classification of plant instruments-Pressure gauges and types, Thermo-meters and types, Liquid level, gauges and types, Flow meter, pH measurement instruments, Gas Analysis, Impurity measurement instruments, Speed measuring instruments. Major Electrical Equipment in Power Plant-Layout of Electrical Equipment, Generator and Excites, Switch gear installations, Circuit breakers, Power transformers, Methods of Earthing a power system, Protective devices and control system used in power plant, Types of relays and voltage regulation.

UNIT 3 GAS TURBINE, NUCLEAR AND HYDEL POWER PLANTS 9 Hrs.

Gas turbine plants – open and closed cycles – construction details –, reheating regeneration and intercooling, combined cycle plants and their representation in TS diagram. Nuclear energy – fission – fusion reaction, nuclear fuel, enrichment,nuclear reactor – parts and types, Pressurized Water Reactor (PWR), CANada Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants. Hydel plants – classification, selection of turbines, pumped storage system.

UNIT 4 NON CONVENTIONAL ENERGY BASED POWER PLANT 9 Hrs.

Non conventional energy – various forms – capacity – availability and limitations. Solar energy plants – various collecting devices – solar devices, photovoltaic cells and solar ponds, wind mills – types – site selection – capacity estimation –performance evaluation, tidal power plants, fuel cells – working – types – limitations, performance evaluation. Geo thermaland biogas power plant.

UNIT 5 ECONOMICS AND ENVIRONMENTAL ASPECTS 9 Hrs.

Load curves, fixed and operating costs, economics of load sharing and plant selection, comparison of economics of various power plants , Co-generation, types of Co-generation Systems and its economics , environmental hazards of various power plants- CO2 SOx, NOx and particulate emissions and their control, land and water pollution. Waste Disposal Options for Coal and Nuclear Power Plants.

Max.45 Hrs.

TEXT / REFERENCE BOOKS

1. Nagpal G.R., Power Plant Engineering – Khanna Publishers, 1996.
2. Domkundwar, Power Plant Engineering – Dhanpat Rai & Sons, Delhi, 1988.
3. Vopal and Stortzki," Power Plant Engineering", PHI, 2007.
4. El Wakil M.N., "Power Plant Technology", McGraw Hill, 1985.
5. Joel Weisomon and Roy Eckart, "Modern Power Plant Engineering", PHI, 1985.
6. Rai G.D., "Non conventional sources of Energy", Khanna Publishers Delhi, 1994.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100		**Exam Duration: 3 Hrs.**
PART A:	2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 – No choice	20 Marks
PART B:	4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6 with internal choice, each carrying 16 marks	80 Marks

- **Modifications proposed SME1304 Power plant Engineering Course.**