NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE FILE

Academic year	**: 2022-23**
Department	**: ME**
Course Name	**: B.Tech**
Student's Batch	**: 2019-23**
Regulation	**: R19**
Year and Semester	**: IV B.Tech I Semester**
Name of the Subject	**:** Power Plant Engineering
Subject Code	**:** 19BME7PE09
Faculty In charge	**:** P. Sravani

P. Sravani

Signature of Faculty

Head of the Department

Professor & Head
Dept. of Mechanical Engineering
NARASARAOPETA ENGINEERING COLLEGE
NARASARAOPET - 522 601, Guntur (Dt), A.P.

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE FILE CONTENTS

S. NO:	CONTENTS
1	Institute Vision and Mission
2	Department Vision and Mission
3	Program Educational Objectives (PEOs) and Program Specific Outcomes (PSOs)
4	Program Outcomes (POs)
5	Bloom's Taxonomy Levels
6	Course Outcomes (COs)
7	Course Information Sheet
8	Academic Calendar
9	Time Table
10	Syllabus Copy
11	Lesson Plan
12	CO-POs & CO-PSOs Mapping (Course Articulation Matrix)
13	Web References
14	Student's Roll List
15	Hand Written/Printed Lecture Notes
16	Mid & Assignment Examination Question Papers with Scheme and Solutions
17	Unit Wise Important Questions
18	Previous Question Papers
19	CO-POs & CO-PSOs Attainment

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

INSTITUTE VISION AND MISSION

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

INSTITUTE VISION AND MISSION

VISION:

To emerge as a **Centre of excellence** in technical education with a blend of effective **student centric teaching learning** practices as well as **research** for the transformation of **lives and community**.

MISSION:

1. Provide the best class infrastructure to explore the field of engineering and research.
2. Build a passionate and a determined team of faculty with student centric teaching, imbibing experiential and innovative skills.
3. Imbibe lifelong learning skills, entrepreneurial skills and ethical values in students for addressing societal problems.

PRINCIPAL

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

DEPARTMENT VISION AND MISSION

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

DEPARTMENT VISION AND MISSION

VISION:

To strive for making competent **Mechanical Engineering Professionals** to cater the real time needs of Industry and **Research** Organizations of high repute with **Entrepreneurial Skills and Ethical Values.**

MISSION:

M1. To train the students with State of Art Infrastructure to make them industry ready professionals and to promote them for higher studies and research.

M2. To employ committed faculty for developing competent mechanical engineering graduates to deal with complex problems.

M3. To support the students in developing professionalism and make them socially committed mechanical engineers with morals and ethical values.

HOD-ME

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

AND

PROGRAM SPECIFIC OUTCOMES (PSOs)

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Excel in profession with sound knowledge in mathematics and applied sciences

PEO 2: Demonstrate leadership qualities and team spirit in achieving goals

PEO 3: Pursue higher studies to ace in research and develop as entrepreneurs.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1. The students will be able to apply knowledge of modern tools in manufacturing enabling to conquer the challenges of Modern Industry.

PSO2. The students will be able to design various thermal engineering systems by applying the principles of thermal sciences.

PSO3. The students will be able to design different mechanisms and machine components of transmission of power and automation in modern industry.

HOD-ME

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM OUTCOMES
(POs)

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM OUTCOMES (POs):

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

HOD-ME

NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

BLOOM'S TAXONOMY LEVELS

REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory

derson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing, Abridged Edition. Boston, MA: Allyn and Bacon.

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE OUTCOMES
(COs)

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING
POWER PLANT ENGINEERING
COURSE OUTCOMES

Course Name: POWER PLANT ENGINEERING (ELECTIVE-II)		Course Code: C415
CO	After successful completion of this course, the students will be able to:	
C415.1	**Examine** basic power generation types and steam cycles.	
C415.2	**Identify** different boilers and their applications.	
C415.3	**Categorize** the Combustion equipment and firing methods.	
C415.4	**Analyze** the Boiling water reactor, Pressurized water reactor, Gas cooled reactor, Pebble bed reactor, and Fast breeder reactor.	
C415.5	**Categorize** the Hydro-electric power plants and their applications.	
C415.6	**Analyze** various power generation units in the view of economic, environmental and social requirements.	

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING
POWER PLANT ENGINEERING
COURSE OUTCOMES

Course Name: POWER PLANT ENGINEERING (Professional Elective-3)	Course Code: C415
CO	**After successful completion of this course, the students will be able to:**
C415.1	**Explain** the layout, construction and working of the components inside a thermal power plant.
C415.2	**Illustrate** the components inside a Diesel, Gas and Combined cycle power plants.
C415.3	**Analyze** the concepts and flows and processes of different power plants.
C415.4	**Enumerate** the types of power production from renewable energy.
C415.5	**Examine** the economics of power plants.

NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE INFORMATION SHEET

Narasaraopeta Engineering College
(Autonomous)
Yallmanda(Post), Narasaraopet- 522601
Department of Mechanical Engineering

COURSE INFORMATION SHEET

PROGRAMME: B.Tech Mechanical Engineering	
COURSE: **POWER PLANT ENGINEERING**	Semester : **VII** CREDITS: **3**
COURSE CODE: **(19BME7PE09)** REGULATION: **R19**	COURSE TYPE (CORE /ELECTIVE / BREADTH/ S&H): **CORE**
COURSE AREA/DOMAIN: THERMAL ENGINEERING	PERIODS: 6 Per Week.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
19BME5TH04	Heat power Engineering	An ability to understand the Enthalpy and second law of thermodynamics and also understand the heat source and heat pump.	III- I

COURSE OUTCOMES:

S. No.	Course Outcome Statement
CO1	**Explain** the layout, construction and working of the components inside a thermal power plant.(K2)
CO2	**Illustrate** the components inside a Diesel, Gas and Combined cycle power plants (K2)
CO3	**Analyze** the concepts and flows and processes of different power plants (K4)
CO4	**Enumerate** the types of power production from renewable energy (K3)
CO5	**Examine** the economics of power plants (K4)

SYLLABUS:

UNIT	DETAILS
I	**COAL & GAS BASED THERMAL POWER PLANTS:** **Rankine cycle**: Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Steam Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants - Fuel and ash handling, Draught system, Feed water treatment.
II	**DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS:** Otto, Diesel, Dual & Brayton Cycle based power plants, Components. Combined Cycle Power Plant- Integrated Gasifier based Combined Cycle systems.
III	**NUCLEAR POWER PLANTS** Basics of Nuclear power, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), Canadian Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

IV	**POWER FROM RENEWABLE ENERGY** Hydro Electric Power Plants - Classification, Typical Layout and associated components. Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.
V	**ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS** Power tariff types, Load distribution parameters, load curve, site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control techniques including Waste Disposal. .

TEXT BOOKS	
T	**BOOK TITLE/AUTHORS/PUBLISHER**
T1	Power Plant Engineering- P.K.Nag, Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008
T2	A course in Power Plant Engineering, Arora and Domkundwar, Dhanpatrai& Co
REFERENCE BOOKS	
R	**BOOK TITLE/AUTHORS/PUBLISHER**
R1	Power Plant Technology, M. M. El-Wakil, McGraw-Hill International Editions
R2	A Text Book of Power Plant Engineering, R. K. Rajput, Laxmi Publications
R3	Power Plant Engineering, P.C.Sharma, S.K.Kataria Publications.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS:

SNO	DESCRIPTION	Associated PO & PSO
1	Boiler Thermal Hydraulics	PO1, PO3, PO5 & PSO1
2	Gas & Steam Turbines	PO1, PO3, PO5 & PSO1

WEB SOURCE REFERENCES:

1	https://nptel.ac.in/courses/108105058/8
2	https://nptel.ac.in/courses/108105058/10
3	https://nptel.ac.in/courses/108105058/12
4	https://nptel.ac.in/courses/108105058/13
5	https://nptel.ac.in/courses/108105058/35
6	http://www.ignou.ac.in/upload/Unit-2-58.pdf
7	http://www.vssut.ac.in/lecture_notes/lecture1423005996.pdf
8	https://lecturenotes.in/notes/1968-notes-for-power-plant-engineering-ppe-by-susant-kumar-sahu
9	https://easyengineering.net/me6701-power-plant-engineering/
10	https://www.vidyarthiplus.com/vp/Thread-EE2252-Power-Plant-Engineering-Full-Lecture-Notes-All

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

☑Chalk & Talk	☑ PPT	☐Active Learning
☑Web Resources	☐ Students Seminars	☑Case Study
☐Blended Learning	☐ Quiz	☑Tutorials
☐Project based learning	☐NPTEL/MOOCS	☐ Simulation
☐Flipped Learning	☐Industrial Visit	☐Model Demonstration
☐Brain storming	☐Role Play	☐Virtual Labs

ANNEXURE I:

(A) PROGRAM OUTCOMES (POs) Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5.Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(B) PROGRAM SPECIFIC OUTCOMES (PSOs) :

PSO1.The students will be able to understand the modern tools of machining which gives them good expertise on advanced manufacturing methods.

PSO2.The students will be able to design different heat transfer devices with emphasis on combustion and power production.

PSO3.The students are able to design different mechanisms and machine components suitable to automation industry.

Cognitive levels as per Revised Blooms Taxonomy:

Cognitive Domain	LEVEL	Key words
Remember	K1	Defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.
Understand	K2	Comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates.
Apply	K3	Applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, selects, shows, solves, uses.
Analyse	K4	Analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates.
Evaluate	K5	Appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports
Create	K6	Categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, write

MAPPING CO'S WITH PO'S

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C415.1	3	-	-		-	-	-	-	-	-	-	-	-	3	-
C415.2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
C415.3	-	3	-	-	-	-	-	-	-	-	-	-	-	1	-
C415.4	3	-	-	2	-	-	-	-	-	-	-	-	-	2	-
C415.5	2	-	-	-	-	-	3	-	-	-	-	-	-	2	-
Average	2.7	3	3	2	-	-	3	-	-	-	-	-	-	2	-

MAPPING COURSE WITH POs & PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C415	2.7	3	3	2	-	-	3	-	-	-	-	-	-	2	-

Course Outcome Assessment Methods			Weightages		
Direct Assessment	Cumulative Internal Examinations (CIE)	Descriptive Test	30%	90%	Final Course Outcome (100%)
		Objective Test			
		Assignment Test			
	Semester End Examinations (SEE)		70%		
Indirect Assessment	Course End Survey			10%	

Rubrics for overall attainment of course outcomes:
If 50% of the students crossed 50% of the marks: Attainment Level 1
If 60% of the students crossed 50% of the marks: Attainment Level 2
If 70% of the students crossed 50% of the marks: Attainment Level 3

Note: Percentages mentioned in above rubrics can be slightly changed depending upon the complexity of your respected subject.

Course Instructor

Course Coordinator

Module Coordinator

Head of the Department

NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC CALENDAR

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

ACADEMIC CALENDAR
(B.Tech. 2020 Admitted Batch, Academic Year 2022-23)

2020 Batch 3rd Year 1st Semester			
Description	From Date	To Date	Duration
Commencement of Class Work	25-07-2022		
1st Spell of Instructions	25-07-2022	10-09-2022	7 Weeks
Assignment Test-I	15-08-2022	20-08-2022	
I-Mid examinations	12-09-2022	17-09-2022	1 Week
2nd Spell of Instructions	19-09-2022	05-11-2022	7 Weeks
Assignment Test-II	10-10-2022	15-10-2022	
II Mid examinations	07-11-2022	12-11-2022	1 Week
Preparation & Practicals	14-11-2022	19-11-2022	1Week
Semester End Examinations	21-11-2022	03-12-2022	2 Weeks.
2020 Batch 3rd Year 2nd Semester			
Commencement of Class Work	05-12-2022		
1st Spell of Instructions	05-12-2022	21-01-2023	7 Weeks
Assignment Test-I	26-12-2022	31-12-2022	
I Mid examinations	23-01-2023	28-01-2023	1 Week
2nd Spell of Instructions	30-01-2023	18-03-2023	7 Weeks
Assignment Test-II	20-02-2023	25-02-2023	
II Mid examinations	20-03-2023	25-03-2023	1 Week
Preparation & Practicals	27-03-2023	01-04-2023	1 Week
Semester End Examinations	03-04-2023	15-04-2023	2 Weeks
Commencement of 4th Year 1st Sem Class Work	05-06-2023		

PRINCIPAL

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

ACADEMIC CALENDAR FOR IV B.TECH I & II SEMESTERS
ACADEMIC YEAR 2021-22

Description	From Date	To Date	Weeks
I SEMESTER			
Commencement of Class Work	27-09-2021		
1st Spell of Instructions	27-09-2021	13-11-2021	7 Weeks
I Assignment Examination	11-10-2021	16-10-2021	
II Assignment Examination	01-11-2021	08-11-2021	
I Mid Examination	15-11-2021	20-11-2021	1 Week
2nd Spell of Instructions	22-11-2021	08-01-2022	7 Weeks
III Assignment Examination	06-12-2021	11-12-2021	
IV Assignment Examination	27-12-2021	01-01-2022	
II Mid Examination	10-01-2022	15-01-2022	1 Week
Preparation & Practicals	17-01-2022	22-01-2022	1 Week
End Examinations	31-01-2022	11-02-2022	2 Weeks
II SEMESTER			
Commencement of Class Work	14-02-2022		
1st Spell of Instructions	14-02-2022	02-04-2022	7 Weeks
I Assignment Examination	28-02-2022	05-03-2022	
II Assignment Examination	21-03-2022	26-03-2022	
I Mid Examination	04-04-2022	09-04-2022	1 Week
2nd Spell of Instructions	11-04-2022	28-05-2022	7 Weeks
III Assignment Examination	25-04-2022	30-04-2022	
IV Assignment Examination	16-05-2022	21-05-2022	
II Mid Examination	30-05-2022	04-06-2022	1 Week
Preparation & Practicals	06-06-2022	11-06-2022	1 Week
End Examinations	13-06-2022	18-06-2022	1 Week

PRINCIPAL

Narasaraopeta Engineering College (Autonomous)
Korappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

ACADEMIC CALENDAR
(B.Tech. 2019, 2018 and 2017 admitted batches, Academic Year 2020-21)

2019 Batch 2nd Year 1st Semester, 2018 Batch 3rd Year 1st Semester and 2017 Batch 4th Year 1st Semester			
Description	**From Date**	**To Date**	**Duration**
Commencement of Class Work	02-11-2020		4 Weeks
1st Spell of Instructions	**02-11-2020**	**30-11-2020**	
I Mid examinations	01-12-2020	05-12-2020	1 Week
2nd Spell of Instructions	**07-12-2020**	**20-02-2021**	11 Weeks
II Mid examinations	22-02-2021	27-02-2021	1 Week
Preparation & Practicals	01-03-2021	06-03-2021	1 Week
Semester End Examinations	08-03-2021	20-03-2021	2 Weeks
2019 Batch 2nd Year 2nd semester, 2018 Batch 3rd Year 2nd Semester and 2017 Batch 4th Year 2nd Semester			
Commencement of Class Work	22-03-2021		7 Weeks
1st Spell of Instructions	**22-03-2021**	**08-05-2021**	
I Assignment Test	**12-04-2021**	**17-04-2021**	
II Assignment Test	**26-04-2021**	**30-04-2021**	
I Mid examinations	10-05-2021	15-05-2021	1 Week
2nd Spell of Instructions	**17-05-2021**	**03-07-2021**	7 Weeks
III Assignment Test	**31-05-2021**	**05-06-2021**	
IV Assignment Test	**21-06-2021**	**26-06-2021**	
II Mid examinations	05-07-2021	10-07-2021	1 Week
Preparation & Practicals	12-07-2021	17-07-2021	1 Week
Semester End Examinations	19-07-2021	31-07-2021	2 Weeks

PRINCIPAL

Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

ACADEMIC CALENDAR
(B.Tech. 2019, 2018 and 2017 admitted batches, Academic Year 2020-21)

2019 Batch 2nd Year 1st Semester, 2018 Batch 3rd Year 1st Semester and 2017 Batch 4th Year 1st Semester			
Description	**From Date**	**To Date**	**Duration**
Commencement of Class Work	02-11-2020		4 Weeks
1st Spell of Instructions	**02-11-2020**	**30-11-2020**	
I Mid examinations	01-12-2020	05-12-2020	1 Week
2nd Spell of Instructions	**07-12-2020**	**20-02-2021**	11 Weeks
II Mid examinations	22-02-2021	27-02-2021	1 Week
Preparation & Practicals	01-03-2021	06-03-2021	1 Week
Semester End Examinations	08-03-2021	20-03-2021	2 Weeks
2019 Batch 2nd Year 2nd semester, 2018 Batch 3rd Year 2nd Semester and 2017 Batch 4th Year 2nd Semester			
Commencement of Class Work	22-03-2021		7 Weeks
1st Spell of Instructions	22-03-2021	08-05-2021	
I Assignment Test	**12-04-2021**	**17-04-2021**	
II Assignment Test	**26-04-2021**	**30-04-2021**	
I Mid examinations	10-05-2021	15-05-2021	1 Week
2nd Spell of Instructions	17-05-2021	03-07-2021	7 Weeks
III Assignment Test	**31-05-2021**	**05-06-2021**	
IV Assignment Test	**21-06-2021**	**26-06-2021**	
II Mid examinations	05-07-2021	10-07-2021	1 Week
Preparation & Practicals	12-07-2021	17-07-2021	1 Week
Semester End Examinations	19-07-2021	31-07-2021	2 Weeks

PRINCIPAL

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

ACADEMIC CALENDAR :: A.Y. : 2019-20

Date: 24-05-2019.

B.Tech. 2016 Batch IV Year I Semester

Description	From Date	To Date	Duration
Commencement of Class Work	06-06-2019		
1st Spell of Instructions	06-06-2019	03-08-2019	
I Assignment test	24-06-2019	29-06-2019	8 Weeks
II Assignment test	15-07-2019	20-07-2019	
I Mid examinations	05-08-2019	10-08-2019	1 Week
2nd Spell of Instructions	12-08-2019	05-10-2019	
III Assignment test	26-08-2019	31-08-2019	8 Weeks
IV Assignment test	16-09-2019	21-09-2019	
II Mid examinations	07-10-2019	12-10-2019	1 Week
Preparation & Practicals	14-10-2019	19-10-2019	1 Week
Semester End Examinations	21-10-2019	02-11-2019	2 Weeks
Semester Break	04-11-2019	16-11-2019	2 Weeks

B.Tech. 2016 Batch IV Year II Semester

Description	From Date	To Date	Duration
Commencement of Class Work	18-11-2019		
1st Spell of Instructions	18-11-2019	11-01-2019	
I Assignment test	02-12-2019	07-12-2019	8 Weeks
II Assignment test	23-12-2019	28-12-2019	
I Mid examinations	13-01-2020	18-01-2020	1 Week
2nd Spell of Instructions	20-01-2020	14-03-2020	
III Assignment test	03-02-2020	08-02-2020	8 Weeks
IV Assignment test	24-02-2020	29-02-2020	
II Mid examinations	16-03-2020	21-03-2020	1 Week
Preparation & Practicals Examinations	23-03-2020	28-03-2020	1 Week
Semester End Examinations	30-03-2020	11-04-2020	2 Weeks

PRINCIPAL

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

TIME TABLE

NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.TECH I SEM TIME TABLE
Section-A

ROOM NO: 1315

Wef: 25/07/2022

	1	2	BREAK	3	4		5	6	7
TIMINGS	9.10-10.00	10.00-10.50	10.50-11.00	11.00-11.50	11.50-12.40	12.40-1.30	1.30-2.20	2.20-3.10	3.10-4.00
MON	CAD/CAM	IEM	B	MCT			FEM		LSCM
TUE	MCT	MECHATRONICS & SIMULATION LAB				L	CAD/CAM	LSCM	CAD/CAM
WED	MCT	PPE	R	FEM		U	IEM		PPE
THU	PPE		E	IEM		N	MECHATRONICS & SIMULATION LAB		
FRI	CAD/CAM		A	LSCM	MCT	C	FEM		LSCM
SAT	LSCM		K	CAD/CAM	IEM	H	MCT	PPE	

CODE	SUBJECT	FACULTY
FEM	Finite Element Methods	Dr. S. Jaya Krishna
CAD/CAM	CAD/CAM	Mr.M.Venkaiah
MCT	Mechatronics	Mr.CH.Sekhar
IEM	Industrial Engineering and Management	Dr. T.R.Santosh Kumar
PPE	Power Plant Engineering	Mr.M.Sreenivasa Rao
LSCM	Logistics & Supply Chain Manegement	Dr.M.Aravind
MCT&S LAB	Mechatronics & Simulation LAB	Mr.K.Kiran Chand/Mr.N.Arun Kumar

Signature of HOD

Signature of Principal

NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.TECH I SEM TIME TABLE
Section-B

ROOM NO: 1316

Wef: 25/07/2022

	1	2	BREAK	3	4		5	6	7
TIMINGS	9.10-10.00	10.00-10.50	10.50-11.00	11.00-11.50	11.50-12.40	12.40-1.30	1.30-2.20	2.20-3.10	3.10-4.00
MON	FEM		B	LSCM	PPE	L	IEM		LSCM
TUE	LSCM	PPE	R	MCT		U	PPE	IEM	
WED	PPE	MECHATRONICS & SIMULATION LAB				N	LSCM	CAD/CAM	
THU	CAD/CAM		E	MCT		C	FEM		PPE
FRI	FEM		A	IEM		H	MECHATRONICS & SIMULATION LAB		
SAT	PPE	LSCM	K	MCT			LSCM	CAD/CAM	

CODE	SUBJECT	FACULTY
FEM	Finite Element Methods	Mr. E.Saidulu
CAD/CAM	CAD/CAM	Mr. K.Govardhan Reddy
MCT	Mechatronics	Dr. B.Venkata Siva
IEM	Industrial Engineering and Management	Dr.P.Suresh Babu
PPE	Power Plant Engineering	Mr.K.John Babu
LSCM	Logistics & Supply Chain Management	Mr.D.Satish Babu
MCT&S LAB	Mechatronics & Simulation Lab	Mr.K.Govardhan Reddy/ Mr.N.Arun Kumar

Signature of HOD

Signature of Principal

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS COPY

IV B.TECH I SEMESTER Professional Elective-III	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
Code: R20ME4104	POWER PLANT ENGINEERING						

COURSE OBJECTIVES

The course content enables students to:

- Identify different types of energy sources and processing of the energy sources
- Summarize the different thermodynamic cycles to be used for power plants
- Differentiate the types of power produced in different plants like solar, petrol, diesel and nuclear plants

COURSE OUTCOMES

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

CO1: Explain the layout, construction and working of the components inside a thermal power plant.

CO2: Illustrate the components inside a Diesel, Gas and Combined cycle power plants.

CO3: Analyze the concepts and flows and processes of different power plants.

CO4: Enumerate the types of power production from renewable energy

CO5: Examine the economics of power plants

UNIT- I

COAL & GAS BASED THERMAL POWER PLANTS:

RANKINE CYCLE: Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Steam Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants - Fuel and ash handling, Draught system, Feed water treatment.

UNIT- II

DIESEL, GAS TURBINE POWER PLANTS:

General layout of Diesel Power Plant, Advantages, Disadvantages and Applications. Fuel & Lubrication system of Diesel power plant. Supercharging System of Diesel power Plant, Exhaust System and Cooling System of Diesel Power plant. Efficiency of Diesel Power Plant & Heat Balance Sheet.

GAS TURBINE: Classification & Elements of Gas Turbine Power Plant, Regeneration, Reheating, Auxiliary Systems, Gas Turbine Efficiency, Operations and Maintenance Performance, Applications.

UNIT- III

NUCLEAR POWER PLANTS

Basics of Nuclear power, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), Canadian Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants. Site selection and Commissioning Procedure.

UNIT- IV

POWER FROM RENEWABLE ENERGY

Hydro Electric Power Plants - Classification, Typical Layout and associated components. Selection of site for Hydro Electric Power Plant, Essential features of Power plant, Power House and Turbine setting, Draft Tubes.

UNIT- V

POWER PLANT ECONOMICS, POLLUTION AND ITS CONTROL:
Factors effecting Power plant Design, Effect of Power Plant on Costs, Power tariff types, Load distribution parameters, load curve, site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Air & Water Pollution by Thermal Power plants, Environment Concerns and Diesel Power Plant, Nuclear Power Plant and the Environment, Method for Pollution Control.

TEXT BOOKS:

1. Power Plant Engineering- P.K.Nag, Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.
2. Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub

REFERENCE BOOKS

1. A course in Power Plant Engineering –Arora and Domkundwar, Dhanpatrai& Co.
2. An Introduction to Power Plant Technology / G.D. Rai.

WEB REFERENCES:

1. http://indianpowersector.com/home/power-station/thermal-power-plant/
2. https://dieselgasturbine.com/power-plants-of-the-world-3/
3. https://en.wikipedia.org/wiki/Nuclear_power_plant
4. https://www.nrdc.org/stories/renewable-energy-clean-facts
5. https://aip.scitation.org/doi/10.1063/1.3220701

IV B.TECH I SEMESTER **Professional Elective-3**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
Code: 19BME7PE09	**POWER PLANT ENGINEERING**						

COURSE OBJECTIVES

The course content enables students to:

- Identify different types of energy sources and processing of the energy sources
- Summarize the different thermodynamic cycles to be used for power plants
- Differentiate the types of power produced in different plants like solar, petrol, diesel and nuclear plants

COURSE OUTCOMES

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

CO1: Explain the layout, construction and working of the components inside a thermal power plant.
CO2: Illustrate the components inside a Diesel, Gas and Combined cycle power plants.
CO3: Analyze the concepts and flows and processes of different power plants.
CO4: Enumerate the types of power production from renewable energy
CO5: Examine the economics of power plants

Course Prerequisites: Thermodynamics, Heat Transfer

UNIT- I

COAL & GAS BASED THERMAL POWER PLANTS:

Rankine cycle: Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Steam Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants - Fuel and ash handling, Draught system, Feed water treatment.

UNIT- II

DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS:

Otto, Diesel, Dual & Brayton Cycle based power plants, Components. Combined Cycle Power Plant-Integrated Gasifier based Combined Cycle systems.

UNIT- III

NUCLEAR POWER PLANTS

Basics of Nuclear power, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), Canadian Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT- IV

POWER FROM RENEWABLE ENERGY

Hydro Electric Power Plants - Classification, Typical Layout and associated components. Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT- V

ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS

Power tariff types, Load distribution parameters, load curve, site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control techniques including Waste Disposal.

TEXT BOOKS

1. Power Plant Engineering- P.K.Nag, Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.
2. Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub

REFERENCE BOOKS

1. A course in Power Plant Engineering –Arora and Domkundwar, Dhanpatrai& Co.
2. An Introduction to Power Plant Technology / G.D. Rai.

WEB REFERENCES:

1. http://indianpowersector.com/home/power-station/thermal-power-plant/
2. https://dieselgasturbine.com/power-plants-of-the-world-3/
3. https://en.wikipedia.org/wiki/Nuclear_power_plant
4. https://www.nrdc.org/stories/renewable-energy-clean-facts
5. https://aip.scitation.org/doi/10.1063/1.3220701

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ELECTIVE –II POWER PLANT ENGINEERING							

COURSE OUTCOMES

CO1: Understand basic power generation types and steam cycles.
CO2: Identify different boilers and their applications
CO3: Solve problems related to Brayton and Rankine cycles.
CO4: Contrast various power generation units in the view of economic, environmental and social requirements
CO5: Observe the contemporary issues like nuclear waste disposal
CO6: Explain the terms related to power plant economics

UNIT – I:
INTRODUCTION TO POWER PLANTS: Power plants, Types, Components and layouts, working principle of Steam, Hydro, Nuclear, Gas Turbine and Diesel power plants, Selection of site, Analysis of steam cycles, Rankine cycle, Reheating and Regenerative cycles.

UNIT – II:
STEAM GENERATORS: Boiler classification, Types of Boilers, Fire tube and Water tube boilers, High pressure and Supercritical boilers, Positive circulation boilers, Fluidized bed boilers, Waste heat recovery Boiler, Feed water heaters, Super heaters, Reheaters, Economiser, Condenser, Cooling tower, Feed water treatment, Air heaters.

UNIT – III:
COMBUSTION AND FIRING METHODS: Coal handling and preparation, Combustion equipment and firing methods, Mechanical stokers, Pulverized coal firing systems, Cyclone furnace, Ash handling systems, Electrostatic Predicator, Fabric filter and Bag house, Forced draft and Induced draft fans-Chimney.

UNIT – IV:
NUCLEAR AND GAS TURBINE POWER PLANTS: Principles of nuclear energy, Energy from nuclear reactions, Energy from fission and fuel Burn up, Boiling water reactor, Pressurized water reactor, Pressurized Heavy Water Reactor, Gas cooled reactor, High temperature gas cooled reactor, Pebble bed reactor, Fast breeder reactor, Liquid metal fast breeder reactor, reactor materials, Radiation shielding, Waste disposal. Gas turbine power plant-Open and closed cycles, Intercooling, Reheating and Regenerating, Combined cycle power plants.

UNIT – V:
HYDRO AND DIESEL POWER PLANTS: Classification of Hydro-electric power plants and their applications, Selection of prime movers, Governing of turbine. Diesel power plant-Subsystems, Starting and stopping, Heat Balance, Supercharging of Diesel engines.

UNIT – VI:
POWER PLANT ECONOMICS AND ENVIRONMENTALCONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor, related exercises. Effluents from power plants and Impact on environment, pollutants and pollution standards, methods of pollution control.
ENERGY AUDITING: Definition and Objectives of energy management, Energy audit- types

and methodology, Need for energy audit, Types of energy audit, Preliminary energy auditing methodology, detailed energy auditing methodology.

TEXT BOOKS:

1. P. K. Nag, (2001), Power Plant Engineering: Steam and Nuclear, Tata McGraw-Hill Publishing Company Ltd., Second Edition.
2. A course in Power Plant Engineering, Arora and Domkundwar, Dhanpatrai& Co.

REFERENCES:

1. Power Plant Technology, M. M. El-Wakil, McGraw-Hill International Editions
2. A Text Book of Power Plant Engineering, R. K. Rajput, Laxmi Publications.
3. Power Plant Engineering, P.C.Sharma, S.K.Kataria Publications.

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3

ELECTIVE –II
POWER PLANT ENGINEERING

COURSE OUTCOMES

CO1: Understand basic power generation types and steam cycles.
CO2: Identify different boilers and their applications
CO3: Solve problems related to Brayton and Rankine cycles.
CO4: Contrast various power generation units in the view of economic, environmental and social requirements
CO5: Observe the contemporary issues like nuclear waste disposal
CO6: Explain the terms related to power plant economics

UNIT – I:
INTRODUCTION TO POWER PLANTS: Power plants, Types, Components and layouts, working principle of Steam, Hydro, Nuclear, Gas Turbine and Diesel power plants, Selection of site, Analysis of steam cycles, Rankine cycle, Reheating and Regenerative cycles.

UNIT – II:
STEAM GENERATORS: Boiler classification, Types of Boilers, Fire tube and Water tube boilers, High pressure and Supercritical boilers, Positive circulation boilers, Fluidized bed boilers, Waste heat recovery Boiler, Feed water heaters, Super heaters, Reheaters, Economiser, Condenser, Cooling tower, Feed water treatment, Air heaters.

UNIT – III:
COMBUSTION AND FIRING METHODS: Coal handling and preparation, Combustion equipment and firing methods, Mechanical stokers, Pulverized coal firing systems, Cyclone furnace, Ash handling systems, Electrostatic Predicator, Fabric filter and Bag house, Forced draft and Induced draft fans-Chimney.

UNIT – IV:
NUCLEAR AND GAS TURBINE POWER PLANTS: Principles of nuclear energy, Energy from nuclear reactions, Energy from fission and fuel Burn up, Boiling water reactor, Pressurized water reactor, Pressurized Heavy Water Reactor, Gas cooled reactor, High temperature gas cooled reactor, Pebble bed reactor, Fast breeder reactor, Liquid metal fast breeder reactor, reactor materials, Radiation shielding, Waste disposal. Gas turbine power plant-Open and closed cycles, Intercooling, Reheating and Regenerating, Combined cycle power plants.

UNIT – V:
HYDRO AND DIESEL POWER PLANTS: Classification of Hydro-electric power plants and their applications, Selection of prime movers, Governing of turbine. Diesel power plant-Subsystems, Starting and stopping, Heat Balance, Supercharging of Diesel engines.

UNIT – VI:
POWER PLANT ECONOMICS AND ENVIRONMENTALCONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor, related exercises. Effluents from power plants and Impact on environment, pollutants and pollution standards, methods of pollution control.
ENERGY AUDITING: Definition and Objectives of energy management, Energy audit- types

and methodology, Need for energy audit, Types of energy audit, Preliminary energy auditing methodology, detailed energy auditing methodology.

TEXT BOOKS:

1. P. K. Nag, (2001), Power Plant Engineering: Steam and Nuclear, Tata McGraw-Hill Publishing Company Ltd., Second Edition.
2. A course in Power Plant Engineering, Arora and Domkundwar, Dhanpatrai& Co.

REFERENCES:

1. Power Plant Technology, M. M. El-Wakil, McGraw-Hill International Editions
2. A Text Book of Power Plant Engineering, R. K. Rajput, Laxmi Publications.
3. Power Plant Engineering, P.C.Sharma, S.K.Kataria Publications.

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

NEC	**Narasaraopeta Engineering College (Autonomous)** **Yallmanda (Post), Narasaraopet- 522601**

DEPARTMENT OF MECHANICAL ENGINEERING
LESSON PLAN (2022-2023)

Course Code	Course Title (Regulation)	Sem	Branch	Contact Periods/ Week	Sections
19BME7PE09	Power Plant Engineering	IV-I	Mechanical Engineering	6	A & B

COURSE OUTCOMES: Students are able to

S. No.	Course Outcome Statement
CO1	**Explain** the layout, construction and working of the components inside a thermal power plant (K2)
CO2	**Illustrate** the components inside a Diesel, Gas and Combined cycle power plants (K2)
CO3	**Analyze** the concepts and flows and processes of different power plants (K4)
CO4	**Enumerate** the types of power production from renewable energy (K3)
CO5	**Examine** the economics of power plants (K4)

Unit No	Outcome		Topics/Activity	Ref Text book	Total Periods	Delivery Method
1	CO 1: Explain the layout, construction and working of the components inside a thermal power plant (K2		**Unit-I COAL & GAS BASED THERMAL POWER PLANTS:**			
		1.1	**Rankine cycle**: Layout of modern coal power plant,	T1, R1	2	Chalk & Talk
		1.2	Super Critical Boilers	T1, T2, R2	2	PPT
		1.3	FBC Boilers, Steam Turbines,	T1, R2	3	Chalk & Talk
		1.4	Condensers, Steam & Heat rate	T1, T2, R1	4	PPT
		1.5	Subsystems of thermal power plants - Fuel and ash handling,	T1, R1	2	Chalk & Talk
		1.6	Draught system, Feed water treatment.	T1, T2, R1	2	PPT
2	CO 2: Illustrate the components inside a Diesel, Gas and Combined cycle power plants (K2)		**Unit-2 DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS**			
		2.1	Otto, Diesel, Dual Cycle based power plants	T1, T2, R1	4	Chalk & Talk PPT&
		2.2	Brayton Cycle based power plants	T1, T2, R1	2	PPT
		2.3	Combined Cycle Power Plants	T2, R2	3	Chalk & Talk PPT&

		2.4	Diesel power plant components.	T2, R2	2	PPT
		2.5	Gas turbine power plants.	T2, R2	2	Chalk & Talk
		2.6	Integrated Gasifier based Combined Cycle systems.	T1, T2, R1	2	Chalk & Talk PPT&
		Unit-3 NUCLEAR POWER PLANTS				
3	CO3: : Analyze the concepts and flows and processes of different power plants (K4)	3.1	Basics of Nuclear power, Layout and subsystems of Nuclear Power Plants,	T1, T2, R2	3	Chalk & Talk
		3.2	Working of Nuclear Reactors: Boiling Water Reactor (BWR),	T1, R2	3	Chalk & Talk
		3.3	Pressurized Water Reactor (PWR),	T1, T2, R2	2	PPT
		MID I EXAMINATIONS				
		3.4	Breeder, Gas Cooled and Liquid Metal Cooled Reactors	T2, R1	2	Chalk & Talk PPT
		3.5	Canadian Deuterium- Uranium reactor (CANDU),	T2, R1	2	
		3.6	Safety measures for Nuclear Power plants.	T2, R1	2	Chalk & Talk
4	CO4: Enumerate the types of power production from renewable energy (K3)	**Unit-4 POWER FROM RENEWABLE ENERGY**				
		4.1	Hydro Electric Power Plants	T1, R1	3	PPT
		4.2	Classification, Typical Layout and associated components	T1, T2, R1	4	Chalk & Talk
		4.3	Construction and working of Wind and Tidal	T1, R1	2	Chalk & Talk
		4.4	Solar Photo Voltaic (SPV), Solar Thermal, Geo Thermal	T1, T2, R1	2	PPT
		4.5	Biogas and Fuel Cell power systems.	T1, T2, R1	2	PPT
5	CO5: Examine the economics of power plants (K4)	**Unit-5 ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS**				
		5.1	Power tariff types, Load distribution parameters,	T1, T2, R2	4	Chalk & Talk
		5.2	Curve, site selection criteria, relative merits & demerits,	T1, T2, R2	3	PPT&
		5.3	curve, site selection criteria, relative merits & demerits,	T1, R2	2	Chalk & Talk
		5.4	Pollution control techniques	T1, R2	2	Chalk & Talk
		5.5	Waste Disposal techniques	T1, T2, R2	2	Chalk & Talk
				Total	70	
MID II EXAMINATIONS						
END EXAMINATIONS						

TEXT BOOKS	
T	**BOOK TITLE/AUTHORS/PUBLISHER**
T1	Power Plant Engineering- P.K.Nag, Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008
T2	Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub

REFERENCE BOOKS	
R	**BOOK TITLE/AUTHORS/PUBLISHER**
R1	A course in Power Plant Engineering –Arora and Domkundwar, Dhanpatrai& Co.
R2	An Introduction to Power Plant Technology / G.D. Rai.

Faculty **HOD** **Principal**

NEC	Narasaraopeta Engineering College (Autonomous) Yallmanda(Post), Narasaraopet- 522601

DEPARTMENT OF MECHANICAL ENGINEERING
LESSON PLAN

Course Code	Course Title (Regulation)	sem	Branch	Contact Periods/Week	Sections
R16ME4104	POWER PLANT ENGINEERING	VII	Mechanical Engineering	6	A+B

COURSE OUTCOMES: Students are able to

CO1: **Illustrate** the basic power generation plants & steam cycles
CO2: **Classify** different boilers and their applications
CO3: **Solve** problems related to Brayton and Rankine cycles
CO4: **Contrast** various power generation units in the view of economic, environmental and social requirements
CO5: **Identify** the contemporary issues like nuclear waste disposal
CO6: **Explain** the terms related to power plant economics

Unit No	Outcome		Topics/Activity	Ref Text book	Total Periods	Delivery Method
			Unit-1: INTRODUCTION TO POWER PLANTS			
1	CO 1: **Illustrate** the basic power ation plants &steam cycles.	1.1	Power plants, Types, Components and layouts	T1, R1	08	Chalk & Talk, PPT,
		1.2	working principle of Steam, Hydro, Nuclear, Gas Turbine and Diesel power Plants	T1, R1		
		1.3	Selection of site	T1, R1		
		1.4	Analysis of steam cycles	T1		
		1.5	Rankine cycle, Reheating and Regenerative cycles	T1, T3		
			Unit-2: STEAM GENERATORS			
2	CO2: **Classify** different boilers and their applications.	2.1	Boiler classification, Types of Boilers,	T1	10	Chalk & Talk, PPT
		2.2	Fire tube and Water tube Fire tube and Water tube	T1		
		2.3	Positive circulation boilers, Fluidized bed boilers	T1		
		2.4	Positive circulation Super heaters, Reheaters, Economiser	T1, R2		
		2.5	Condenser, Cooling tower, Feed water treatment	T1		
		2.6	Air heaters.	T1, T2		
			Unit-3: COMBUSTION AND FIRING METHODS			
3	CO 3: **Solve** problems related to Brayton and Rankine cycles.	3.1	Coal handling and preparation, Combustion equipment and firing methods	T1, T3, R3	08	Chalk & Talk, PPT
		3.2	Mechanical stokers, Pulverized coal	T1, T2, R3		

			firing systems			
		3.3	Cyclone furnace, Ash handling systems	T1, T2, R3		
		3.4	Electrostatic Predicator, Fabric filter and Bag house, Forced draft and Induced draft fans-Chimney.	T1, T2, R3		
		3.5	problems			
1st MID EXAMINATIONS						
4	CO 4. **Contrast** various power generation units in the view of economic, environmental and social requirements.	**Unit-4: NUCLEAR AND GAS TURBINE POWER PLANTS**				
		4.1	Principles of nuclear energy, Energy from nuclear reactions	T1, R2	12	Chalk & Talk, PPT
		4.2	Energy from fission and fuel Burn up, Boiling water reactor, Pressurized water reactor, Pressurized Heavy Water Reactor, Gas cooled reactor	T1		
		4.3	High temperature gas cooled reactor, Pebble bed reactor, Fast breeder reactor	T1, T2		
		4.4	Liquid metal fast breeder reactor, reactor materials, Radiation shielding	T1		
		4.5	Waste disposal. Gas turbine power plant-Open and closed cycles	T1		
		4.6	Intercooling, Reheating and Regenerating, Combined cycle power plants.	T1, T2		
5	CO 5. **Identify** the contemporary issues like nuclear waste disposal.	**Unit 5: HYDRO AND DIESEL POWER PLANTS**				
		5.1	Classification of Hydro-electric power plants and their applications	T1, T2, R3	08	Chalk & Talk, PPT,
		5.2	Selection of prime movers, Governing of turbine.	T1, T2, R3		
		5.3	Diesel power plant- Subsystems	T1, T2, R3		
		5.4	Starting and stopping, Heat Balance, Supercharging of Diesel engines.	T1		
6	CO 6. **Explain** the terms related to power plant economics.	**Unit 6: POWER PLANT ECONOMICS AND ENVIRONMENTALCONSIDERATIONS & ENERGY AUDITING**				
		6.1	Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve	T1, T2, R1	10	Chalk & Talk, PPT
		6.2	Definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor, related exercises.	T1, T2, R1		
		6.3	Effluents from power plants and Impact on environment, pollutants and pollution standards, methods of pollution control.	T1, T2, R1		
		6.4	**ENERGY AUDITING:** Definition and Objectives of energy management, Energy audit- types and methodology, Need for energy audit,	T1, T2, R1		
		6.5	Types of energy audit, Preliminary	T1		

			energy auditing methodology, detailed energy auditing methodology.			
				Total	56	
			2nd MID EXAMINATIONS			

TEXT BOOKS:

T1. Engineering: Steam and Nuclear, Tata McGraw-Hill Publishing Company Ltd., Second Edition: P. K. Nag Power Plant, (2001),.

T2. A course in Power Plant Engineering, Arora and Domkundwar, Dhanpatrai& Co.

REFERENCES:

R1. Power Plant Technology, M. M. El-Wakil, McGraw-Hill International Editions.

R2. A Text Book of Power Plant Engineering, R. K. Rajput, Laxmi Publications.

R3. Power Plant Engineering, P.C.Sharma, S.K.Kataria Publications.

Principal **HOD** **Faculty**

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

CO-POs & CO-PSOs MAPPING (COURSE ARTICULATION MATRIX)

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DEPARTMENT OF MECHANICAL ENGINEERING
COURSE ARTICULATION MATRIX

R20-REGULATION

Explanation of Course Articulation Matrix Table to be ascertained:

- Course Articulation Matrix correlates the individual COs of a course with POs and PSOs.
- The Course Outcomes are mapped with POs and PSOs in the scale of 1 to 3.
- The strength of correlation is indicated as **3** for **Substantial (High)** correlation, **2** for **Moderate (Medium)** correlation, and 1 for **Slight (Low)** correlation.

IV B.Tech I SEMESTER

POWER PLANT ENGINEERING (Professional Elective-3)

Course Code: C415	Course Name: POWER PLANT ENGINEERING (Professional Elective-3)														
COs	POs & PSOs														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C415.1	3	2	2	-	-	-	-	-	-	-	-	-	2	3	-
C415.2	3	2	2	-	-	-	-	-	-	-	-	-	-	3	-
C415.3	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-
C415.4	3	2	-	-	-	-	2	-	-	-	-	-	-	3	-
C415.5	3	1	-	-	-	-	-	-	-	-	2	-	2	3	-
C415	3.00	1.80	2.00	2.00	-	-	2.00	-	-	-	2.00	-	2.00	3.00	-

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DEPARTMENT OF MECHANICAL ENGINEERING
COURSE ARTICULATION MATRIX

R16-REGULATION

Explanation of Course Articulation Matrix Table to be ascertained:

- Course Articulation Matrix correlates the individual COs of a course with POs and PSOs.
- The Course Outcomes are mapped with POs and PSOs in the scale of 1 to 3.
- The strength of correlation is indicated as 3 for **Substantial (High)** correlation, 2 for **Moderate (Medium)** correlation, and 1 for **Slight (Low)** correlation.

Course Code: C415	Course Name: POWER PLANT ENGINEERING (ELECTIVE–II)														
COs	POs & PSOs														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C415.1	3	2	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.2	3	1	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.3	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.4	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.5	3	1	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.6	3	3	-	-	-	-	2	-	-	-	2	-	-	3	-
C415	3.00	2.17	-	-	-	-	2.00	-	-	-	2.00	-	-	3.00	-

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WEB REFERENCES

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1	https://nptel.ac.in/courses/108105058/8
2	https://nptel.ac.in/courses/108105058/10
3	https://nptel.ac.in/courses/108105058/12
4	https://nptel.ac.in/courses/108105058/13
5	https://nptel.ac.in/courses/108105058/35
6	http://www.ignou.ac.in/upload/Unit-2-58.pdf
7	http://www.vssut.ac.in/lecture_notes/lecture1423005996.pdf
8	https://lecturenotes.in/notes/1968-notes-for-power-plant-engineering-ppe-by-susant-kumar-sahu
9	https://easyengineering.net/me6701-power-plant-engineering/
10	https://www.vidyarthiplus.com/vp/Thread-EE2252-Power-Plant-Engineering-Full-Lecture-Notes-All

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STUDENT'S ROLL LIST

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DEPARTMENT OF MECHANICAL ENGINEERING

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2	19471A0302	BADDETI RAMBABU
3	19471A0303	BANDARU PRASANNA BABU
4	19471A0304	BOBBILI VISHNU VARDHAN REDDY
5	19471A0305	CHAVA ASHOK
6	19471A0306	CHIRUGURI KARUNAKAR
7	19471A0307	DURGAMPUDI MAHESH REDDY
8	19471A0308	GANGAVARAPU SRI CHANDRASEKHAR
9	19471A0309	GANNEPALLI RAVI
10	19471A0311	GONA VAMSI
11	19471A0312	GORANTLA ANIL
12	19471A0313	GUDE JAYANTH KUMAR
13	19471A0315	JANDHAYALA SANDLEYA
14	19471A0316	JANGA NAGENDRA BABU
15	19471A0317	JONNALAGADDA MADHU
16	19471A0318	KAKANI NAGENDRA BABU
17	19471A0319	KAMBAMPATI AJITHKUMAR
18	19471A0320	KIKKURU PRUDHVI YASHWANTH REDDY
19	19471A0321	KONDA JOHNY
20	19471A0322	LINGISETTY RAJASEKHAR
21	19471A0323	MAHANKALI RAKESH
22	19471A0326	MELAM STEPHEN WILLIAMS
23	19471A0327	NARENDRA BABU SADHE
24	19471A0328	NOORBASHA ANWAR BASHA
25	19471A0329	ONTERU VEERANJANEYULU
26	19471A0330	PATHAN AMEER KHAN
27	19471A0331	PEERLA HUSSIAN
28	19471A0333	PODILA GOPINADH
29	19471A0335	RAMAR SATISH KUMAR
30	19471A0336	SAVALAM MANI KUMAR
31	19471A0337	SHAIK JILANI
32	19471A0338	SHAIK MAHAMMAD BILAL
33	19471A0339	SHAIK MAHAMMAD RIYAZ

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34	19471A0340	SHAIK SUBHANI
35	19471A0341	TALAKAYALA VINAY KUMAR
36	19471A0342	VADLAMUDI YASWANTH SAI
37	19471A0343	VEERLA KOTESWARA RAO
38	19471A0344	VEJARLA AVINASH
39	20475A0354	KOPPOLU BHANU PRASAD
40	20475A0355	CHOPPARA LAKSHMI SUMANTH
41	20475A0356	INDURI PRATHAP REDDY
42	20475A0357	INAGANTI NAGULMEERAVALI
43	20475A0358	BATTU JAGADEESH
44	20475A0359	VEMULA HEMANTH KUMAR
45	20475A0360	KAKARLAMUDI NAVEEN
46	20475A0361	KUMMARA PARAMESWARA RAO
47	20475A0362	BOKKA PRASANNA KUMAR
48	20475A0363	GANJI HASHWANTH PRAVEEN REDDY
49	20475A0364	URJANA SHANMUKHARAO
50	20475A0365	DAMERA SANTHOSH
51	20475A0366	MUVVA NAGA LAKSHMAIAH
52	20475A0301	PUTTA RAJESH
53	20475A0302	LINGIREDDY GOPI REDDY
54	20475A0303	YELURI RAKESH
55	20475A0304	VANGAVOLU NAGA SESHU
56	20475A0305	GUNJI VENKATA BHASKAR
57	20475A0306	THAPPETA RADHAKRISHNA
58	20475A0307	EDEBOINA ASHOK
59	20475A0308	MARRI AJAY KUMAR
60	20475A0309	MADEM JAYANTH KUMAR
61	20475A0310	RAJABATHULA KISHORE
62	20475A0311	SHAIK SAMEER
63	20475A0312	SHAIK THUPAKULA MASTAN VALI
64	20475A0313	PARIMI GANESH
65	20475A0314	MUVVA VAMSI
66	20475A0315	RYALI M T SURYA PRAKASH
67	20475A0316	SHAIK DASTAGIRI
68	20475A0317	MANDA RAJA SEKHAR
69	20475A0318	DANDE VENKATA GOPAL

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71	20475A0320	BALACHANDAR M
72	20475A0321	KUKKAMALLA NIKHIL KUMAR
73	20475A0322	PENUMALA KALYAN
74	20475A0323	KOTHAMSETTI ASHOK
75	20475A0324	NUNNA BALA NAVEEN
76	20475A0325	KOTHAMASU ANANTA KOTI SRIKRISHNA
77	20475A0326	NAGISETTY RAKESH
78	20475A0327	RAVURI SIVANJANEYULU
79	20475A0328	ANKEM NAGENDRA BABU
80	20475A0330	PARASA NAVEEN
81	20475A0331	DUPATI ANIL
82	20475A0332	SHAIK NARAVADA ALTHAF HUSSAIN
83	20475A0333	RAVURI ANIL
84	20475A0334	TELUKUTLA SIVAREDDY
85	20475A0335	KOTARU SAIRAGHU VAMSI
86	20475A0336	MIDDELA BAJIVALI
87	20475A0337	VATTIGORLA YOGANJANEYULU
88	20475A0338	GANTASALA GOPI CHAND
89	20475A0339	KOILADA PRADEEP
90	20475A0340	DASARI HEMAGURUNADH
91	20475A0341	JILABOINA KARUNAKAR
92	20475A0342	MALLAVARAPU JESUDASU
93	20475A0343	VANGARA AYYAPPA
94	20475A0344	YADARI RAJESH
95	20475A0345	KASUKURTHI AKASH
96	20475A0346	KANAPARTHI VENKATA KRISHNA
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99	20475A0349	AVVARU YUGANDHAR
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103	20475A0353	GADIBOYINA NAGAIAH

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HAND WRITTEN/PRINTED LECTURE NOTES

ॐ UNIT - I & II

calamity - disaster

F.D: Forced draught I.D. Induced draught

Steam power plant:

- plant layout, working of different circuits, Fuel & handling equipments, types of coals, coal handling, Choice of handling equipment, coal storage, ash handling systems.

The development of power in any country depends upon the available resources in that country. The hydel power totally depends upon natural sites available & hydrological cycle in that country. New sites can't be humanly created for hydel plants.

The development of nuclear power in a country depends on advanced technology & fuel resources. This source of power generation is not much desirable for developing countries as it is dependent on high technology & high capital based systems.

Many times hydel power suffers if draught comes even once during a decade & the complete progress of the nation stops. The calamity of rain draught on power industry has been experienced by many states in this country.

To over come this difficulty it is absolutely necessary to develop thermal plants in the country which are very much suitable for base load plants. Hydel power plants are much better for peak load requirement.

General layout of modren thermal Power plant:

The general layout of thermal powerplant consists of mainly four Circuits as shown in fig.

1. coal & ash ckt
2. Air and gas circuit.
3. Feed water & steam flow circuit
4. cooling water circuit.

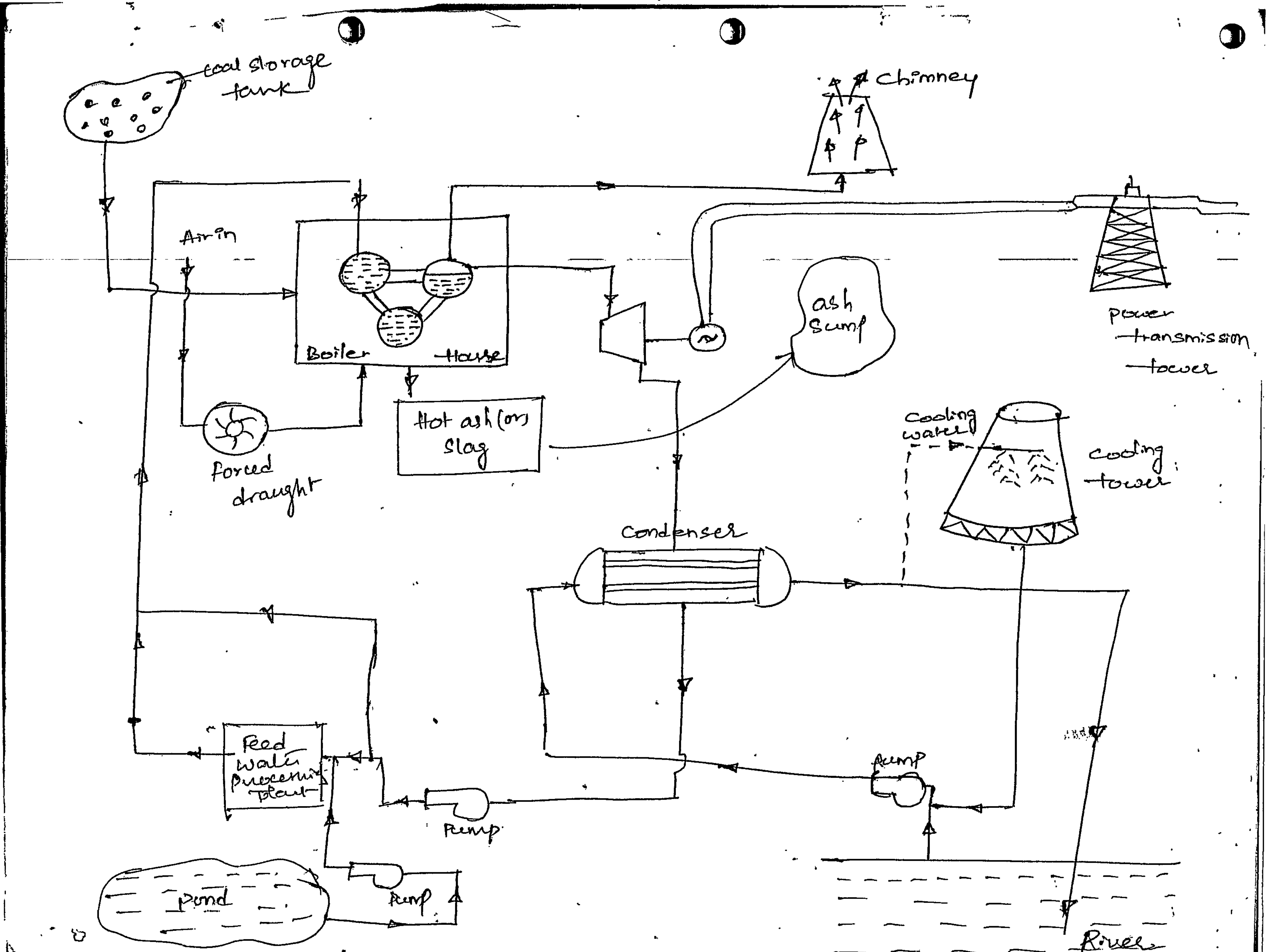
A thermal power station using steam as working fluid works basically on Rankine cycle. Steam is generated in the boiler, expanded in the prime mover & condensed in condenser & fed to in to the boiler again with the help of pump. However in practice there are numerous modifications and improvements in this cycle with the aim of effecting heat economy & to increase thermal efficiency of the plant.

1 coal & ash circuit:-

In this circuit, the coal from the storage is fed to the boiler through coal handling equipment. Ash produced due to the combustion of coal is removed to ash storage through ash handling system.

2. Air and gas circuit:

Air is supplied through to combustion chamber of the boiler either through F.D (or) I.D fan or by using both. The dust from the air is removed before supplying to the combustion chamber sufficient quantity of the exaust gases carrying



Coal storage tank
Chimney
Air in
Boiler
House
Forced draught
Hot ash (or) slag
ash sump
power transmission tower
Cooling water
cooling tower
Condenser
Feed water processing plant
Pump
Pump
Pump
Pond
River

heat and ash are passed through the air heater where the exaust heat of the gases is given to the air and then it is passed through the (air - heater) dust collectors where most of the dust is removed before exausting the gases to the atmosphere through chimney

3. Feed water & steam circuit:

The steam generated in the boiler is fed through the steam prime mover to generator power. The steam coming out of prime mover is condensed in the condenser & fed to the boiler with help of pump. The condensate is heated in feed heaters using steam tapped from different points of turbine. The feed heaters may be mixed type or indirect type.

Some of steam & water is lost passing through different components of the system, therefore feed water fed through external source to compensate this loss. The feed water ~~passed~~ supplied ~~through~~ from external source is passed through the purifying plant to reduce the dissolved salts to acceptable level. the purification is necessary to avoid scaling of the boiler tubes.

4. cooling water Circuit:-

The quantity of cooling water required to condense the steam is considerably large & it is taken from lake, river or sea. The cooling water is taken from the upper side of the river, it is passed through condensers and heated water is discharged to lower side of the river. Such System of cooling water supply is possible if adequate cooling water is available throughout the year. This system is known as open system.

When the adequate water is not available then water coming out from the condenser is cooled either in cooling pond or cooling tower. The cooling is effected by partially evaporating the water circulated in the system. This evaporative loss & carry over is nearly 2 to 5% of cooling water. To compensate evaporative loss water from river is continuously supplied

When the cooling water coming out of the condenser is cooled again & supplied to the condenser, then the system is known as closed system.

When water coming out condenser is discharged to river down side directly the system is known as open system.

Open System is economical than closed system provided adequate water is available through out the year.

→ Site selection for thermal power stations:

The location of the thermal power stations should be made with full consideration not only of the trends in the development & location of demand but also of the availability & location of cheapest sources of primary energy.

diesel, gas → T.P.P Sources are limited

1. Availability of coal:

L major source for T.P.P — coal.

huge quantity of coal req for T.P.S

Ex: 400 MW capacity — 5000 to 6000 tons of coal/day

Coal Tr ——— [T.P.P] ——— Power transmission charges

2. Ash disposal Facilities:

L disposal of ash from T.P.S has become serious problem

L coal — 20 to 40% of ash

↓

hot condition & highly corrosive

Its effect on atm pollution is more serious as human health is concerned.

400 MW P.S ——— 10 hectares area/year

L if ash dumped to a height of 6.5m

L ash is easily disposed in sea, rivers or lakes if economically such facilities are available

presently ash from power plants is used for many industrial purposes therefore the question of its disposal to sea or rivers does not arise.

3. Space requirements

The average land requirement is 3 to 5 acres/MW capacity } 10% buildings; 33% space for coal storage, ash disposal, staff colony, mkt facilities & space required for whole m/cry; 27% cooling towers; 7% switch yard; 23% for other

Selection land — having low cost is economical

4. Nature of land :— good bearing capacity [min b.c is 10 bar]

↓

To withstand the dead load of the plant & forces transmitted to foundation due to the M/c operations

5. Availability of water :

Large quantities of water required for condensers, for disposal of ash, & as feed water to boiler, & drinking water for the working staff.

for 60 MW — water req in condenser is of 20 to 30 thousand tons/hour

for closed cycle : makeup water is 500 to 600 tons/hour

feed water — 6 to 10 tons/hr

water must be as pure as possible to avoid scaling of boiler tubes.

The large quantity of water is also required for disposing of ash if hydraulic system is used

→ Transportation facilities

It is always necessary to have a railway line available near the power station for bringing in heavy m/c for installation & bringing coal.

economical to select site of T.P near coal pit head than near to load center .. danger of arising from dislocation

[If there are lock outs, strikes in the railways. Also in the event of war emergency the transport capacity is unavoidably free dup in moving coal for power generation] for transmission lines — maintenance cost is less

E.E transport mode economical for

U.K Electricity board — load H 200MW 220kV, 475MW 1,404 kV

180 tonnes transformer transport from New castle factory to a Yorkshire power station in U.K. is example to understand access importance during construction.

fac —— 100 miles —— p.s

transformer is too long — ~~rail~~ ~~road~~ not weak bridge

shipping & another road root round the North of Scotland to river pool 900 miles.

7. Availability of labour:

Cheap labour should be available at the proposed site as enough labour is required during construction of the plant.

8. public problems:

The proposed sites should be far away from the towns to avoid nuisance from smoke, fly ash, & heat discharged from the power plant.

9. Size of the plant: (near to et to minimize annual operating cost)

Small size plant — prob electric transmission problem

Large capacity plants — cost of transporting enormous quantity of coal & water are high

near to rail road — plant located near to them

(having ample space for coal storage)

(half year supply storage)

→ Analysis of coal! — Chemical composition

→ The common tests which are used to find commercial val of coal are proximate analysis & ultimate analysis

proximate analysis,

Constitutes	Moisture	volatile matter	Ash	fixed
percentages	8 to 30%	8 to 50%	2 to 30%	16 to

↳ decides design of power plant

[C handling, combustion, Ash handling & dust removal sys

1. Moisture: % Mois — 1 to 40%

Inherent: present in the pores of coal (It never rem cost

It is determined by heating coal to 110° in presence of nitro

free moisture:

↳ exposing coal to natural air flow or drying with the help of air at 50°C.

presence of moisture in coal objectionable

→ it adds to transporting, handling & storing cost & does n't play any useful role.

→ It decreases heating value of the fuel & part of it goes away as vapour by taking heat in the chamber with exaust gases.

→ It quenches the fire in the furnace of the boiler

The coal which is used in power plants is generally dried & the free moisture is removed from coal.

2. Volatile matter: ——→ 50%

It may be

combustible gases such as

methane, H_2, CO & other hydro carbons

or Incombustible gases like CO_2 / N_2.

presence of incombustible gases is undesirable as they don't add to heat value, but increases volume of furnace required.

overall the presence of volatile matters combustible or noncombustible affect the furnace volume & arrangement of heating surfaces.

3. Ash: Ash is another most undesirable constituent in the coal.

ash —— Fixed ash (It comes from the original vegetable matter & it can't be removed from coal before burning)

└── Free ash —→ in form of claly, shale & pyrites.

It is reduced or removed by mechanical processing of coal such as washing & screening but the presence of fixed ash is more or less unavoidable.

Disadvan —
- Increases transport, handling & storage costs.
- Decrease heat value of fuel & involves additional cost in ash disposal.
- Causes early wear of furnace walls, Burning apparatus & feeding m/cnism.

└ Clinker — material formed by the fusion ash at high temp 1000°C.

The clinker formation on ~~choke~~ furnace choke ... passages & remain attached with the unburned fuel, causes loss of fuel.

% of fixed ash $\xrightarrow{\text{decides}}$ type of Combustion chamber, [illegible] & feeding System

It is always economical to use high ash content coal in form of powdered coal as it eliminates the clinkering difficulties & reduces loss fuel & helps for efficient burning

→ Ultimate analysis:—

Proximate analysis of coal does not give idea of suitability of coal for the purpose of heating & calorific value of fuel.

To findout chemical analysis of coal like C_2, N_2, O_2, H_2, S_2 & ash ultimate analysis of coal is generally used

(It is used to know composition of fluegases.)

Constituents	C_2	H_2	O_2	N_2	S_2	Ash
Percentage	50–95%	1–5.5%	2–40%	0.5–7%	0.5–3%	2–30%

→ 1. carbon: (It plays most important role in the selection of coal for thermal power plant)

high heat value,

high % C — high

↳ less size of combustion chamber.

→ Hydrogen: some H_2 in combined form with oxygen

↳ H_2O is objectionable (carries heat with flue gas

High percentage of H_2 (free) is always desirable as it increases heating value of the coal.

3- oxygen:

oxygen which is present in coal is always in combined form with H_2. 100% of O_2 is always desirable as it reduces % of H_2 available for free heating

4- Nitrogen: does play any important role (no heating value)

5- Sulphur:

It adds a little heating value, but furnishes many undesirable characteristics.

It occurs in coal as pyrites, sulphates, Iron sulphides & organic Sulphur compounds.

High % of Sulphur is objectionable b/c the Sulphur is responsible for clinkering, slagging, corrossion of air preheaters, economisers & stacks, spontaneous combustion during storage & air pollution.

6. Ash:

Ash is a residue from combustion, while clinker is caused by the melting of this ash.

Ash contains silica, Al_2O_3, ferric oxide, calcium oxide, Mg_2O, & alkalies. It also contains 1 to 2% Sulphur. The % of Sulphur left in ash depends upon grate temp.

High ash content coal => burns slowly reduces steam output of Boiler.

It increases the rate of burning & consequently steam generation rate by increasing air feed rate. This method is effective as long as the ash content does not exceed 35% & calorific value 20,000 kJ/kg of coal.

→ Th
ar
her

The coal with high ash content >35% & lower calorific value <20000 kJ/kg does not respond to increase in air flow rate.

the

→ Classification of coal:

Coals are classified in the following manner in the increasing order of their heating value

Al
C

They are 1. peat, 2. Lignite 3. Bituminous coal 4 Anthracite coal.

Peat:

The Peat is the first stage in the progress of transformation of buried vegetation in to coal. It contains high percentages of moisture (90%) and small percentage of volatile matter and carbon. It is not suitable to power plants as it contains high percentage of moisture. It is used for domestic purposes. It is sun dried to remove greater part of moisture & converted in to briquettes before being transported.

Lignite:

Lignite is the next stage in the development of coal. It contains high percentage of moisture (30 to 45%) but can be dried just by exposing to air. It is brown in colour & exhibits a woody structure. It hardly contains 6% moisture when dried. Therefore it can be used as a fuel in pulverised form.

Considerable deposits of lignites exists in India, Germany, Russia & Australia

Neyveli power plant in Tamilanadu is the first power plant in the country uses lignite as fuel. Another Super thermal power station is proposed at Neyveli using lignite as fuel.

India will have two more thermal power plants using lignite.

they are one in Bikaner (Rajasthan)

another in Kutch (Gujarat)

Govt has also sanctioned plan a lignite thermal power plant in Rajasthan of 120MW cap which will develop by using lignite.

"There are 24 million tonnes of lignite deposits in Bikanar can sustain a power station of 120MW capacity for its life time 25 years.

Ash fusion temp

Mild reducing atmosphere ~~temp~~ - 1030 to 1160°C

oxidising atmosphere - 1060 to 1180°C

Caking: The volatile matter is driven off from the coal when heated leaving behind practically pure carbon. This process is known as caking & formed product is known as Coke.

— . ... the ...

→ 3. Bituminous Coal :

It is most popular form of coal used for all purposes. It has low moisture content. It has high caking power. The ash content may vary from 6 to 12%. fusion temperature of ash is usually 1093°C.

Low volatile matter & high caking coals are prepared for metallurgical industries while high volatile matter and low caking power coals have great utilities in gas making industries.

Sub-Bituminous coal is similar to lignite. It contains 50% less moisture than lignite. It also contains less ash content than lignite but it has no caking power. It is also used either in the form of briquettes or pulverised form.

Semi-bituminous coal is intermediate between anthracite & bituminous coals in properties & it is widely used in thermal power plants. It has low percentages of moisture, ash, sulphur, & volatile matter & has high percentage of available hydrogen. Its CV is high & it has usually caking property. It contains 90 to 93% carbon, 10 to 20% volatile matter & 2 to 4% oxygen. It is used on moving grates as well as in pulverished form.

4. Anthracite coal :

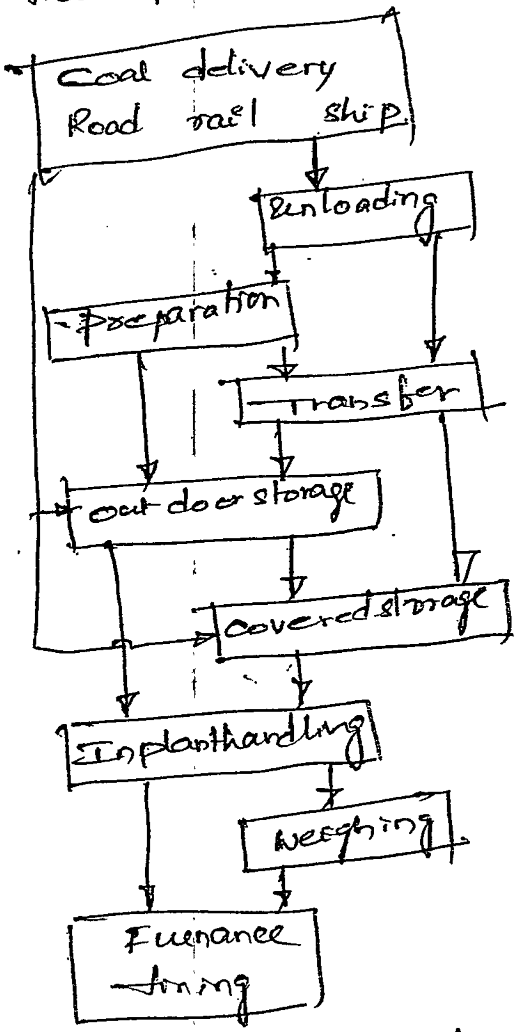
This is the last stage in the process of transformation of buried vegetation in to coal & it contains highest percentage of carbon & lowest percentage of volatile matter below 8%. It has zero caking power. It burns only at high temperature &

is very difficult & costly, therefore it is used only on the grate with forced draft.

The properties of semi anthracite coal lie b/w anthracite & bituminous coal. These are found in small quantities & are costly for power generation.

→ **Inplant handling of coal:-** coal handling starts at the discharge of the carrier system (rail head or harbour)

In large power stations it is not possible to handle large quantities of coal manually. So mechanical operation is introduced to the plant for easy & better control. (handling system)



It is not necessary to follow flow chart for all the plants. Some intermediate steps may be eliminated depending on type of plant, capacity of plant & load factor.

Unloading equipments:

Car shakers, rotary car dumpers, unloading towers, bridges, self unloading boats, lifts, trucks, cranes and buckets

Preparing equipments:

Crushers, sizers, driers

Transfer equipments:

Belt conveyers, screw conveyer, flight conveyer, bucket elevator, skip hoist

Storage system:

Bulldozer, scraper, tramways, cranes & conveyer system.

Covered storage equipments:

Bins, bunkers, indicators, gates & values.

Weighing devices

→ scales, coal meters, and samplers

Coal preparation and required equipments:-

3. Bit

The preparation of coal before feeding to the combustion Chamber is necessary when un sized coal brought to the The coal preparation plant either can be located near the coal receiving point or at the point of actual use.

purp caki fus

The coal preparation plant includes crushers, driers Sizers & magnetic separators.

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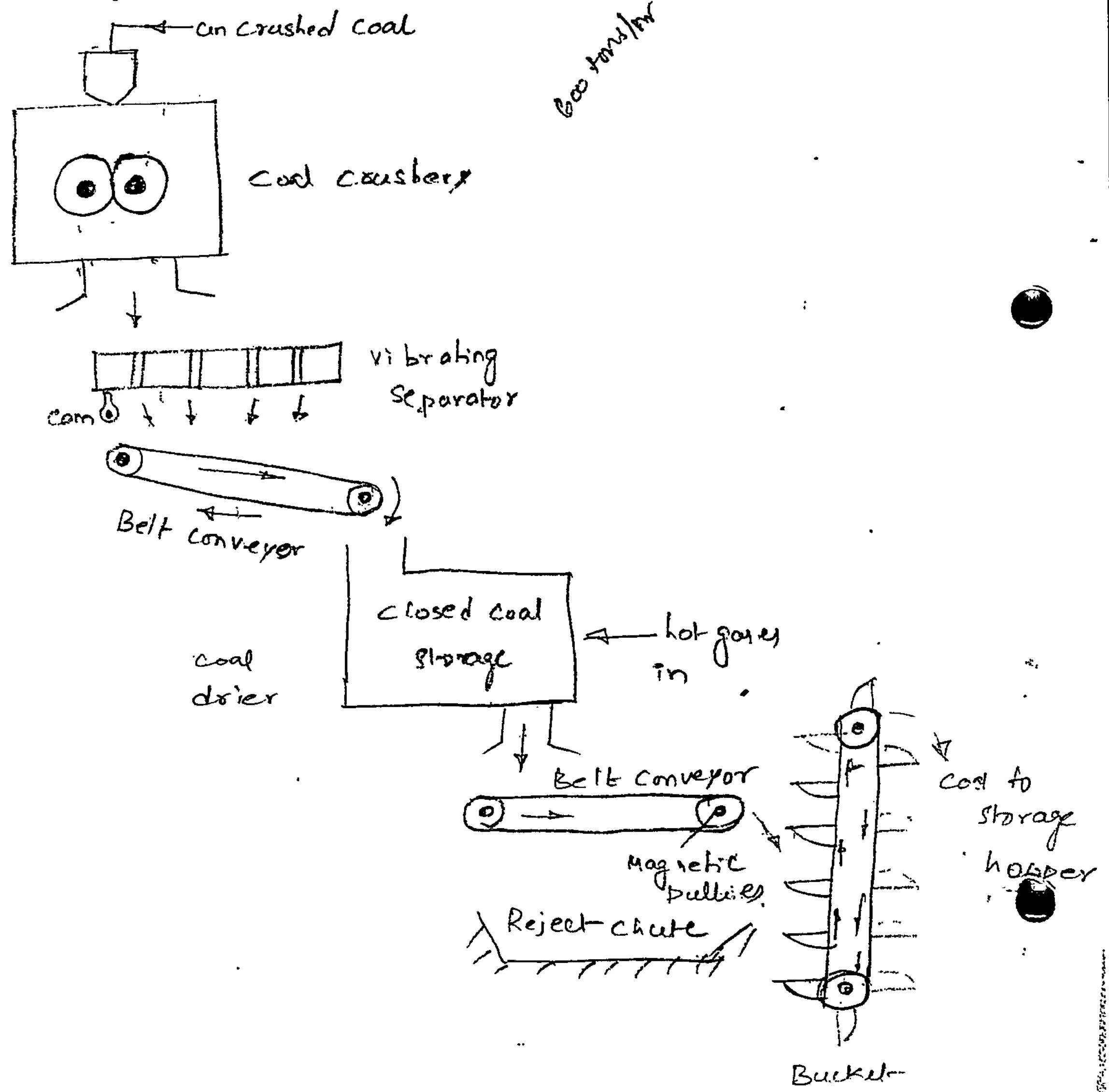


coal preparation plant

of "volatile ... power. It burns only at high ...

Coal crushers are absolutely necessary to prepare coal of required size before feeding to the combustion chamber. part of coal obtained from mines does not require sizing & is bypassed. The capacity of coal crushing plant must be sufficient to meet peak load requirements. The capacity of crushers used in central plant is as high as 600 tons/hr.

Sizers are used along with crushers for the separation of coal of required size. The crushed coal is passed over the sizer which removes unsized coal & feeds back to the crusher.

The sized coal is further passed to the drier to remove the moisture from the coal. Coal driers are used in order to remove excess of free moisture from supplied coal or if it is wetted during transport. Hot flue gases are passed through the coal storage in closed spaces for removing the moisture from coal.

Before supplying coal to the storage hoppers the iron scrap & particles are removed with the help of magnetic separators. The removal of the iron particles are necessary as they may choke the burners & may increase the wear of handling equipment. The separator is usually a magnetized pulley over which the loaded coal belt is run. Iron particals cling to the belt as it travels over magnetized pulley, where as coal falls of the iron particles are drop off into a reject sooner. The chute as the belt leaves the pulley. Thus the coal & Iron are quickly separated.

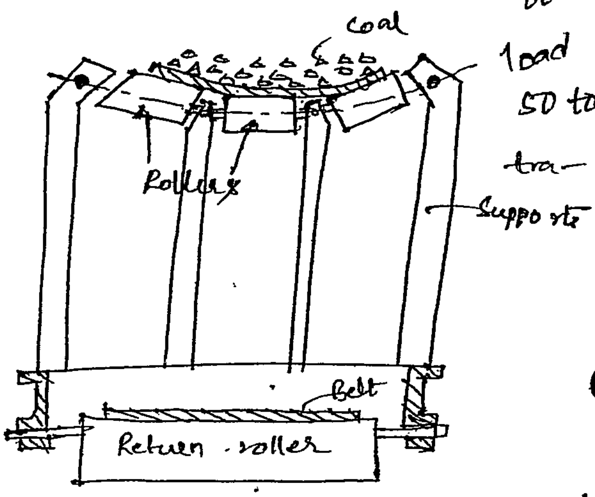
Transfer of coal & related equipments:

Transfer of coal includes the carrying of coal from unloading point to the storage site.

The type of equipments used for transferring of coal:

(a) Belt conveyors
(b) screw conveyors
(c) Bucket elevators
(d) Grab bucket elevators
(e) skip hoist
(f) flight conveyors

Speed 60 m to 100
load cap 50 to 100
tra- 400



(a) Belt conveyor

This is very suitable means of carrying large quantities of coal to large distances. Belt conveyor consists of endless belt made of rubber, canvas or balata running over a pair of end drums or pulleys & supported by a series of rollers (know as Idlers) provided at regular interval. The return idlers which support the empty belt are plain rolls and are spaced wide apart.

The initial cost of this coal carrying system is not high and power consumption is also low. The belt conveyors are successful used on inclination up to 20° to the horizontal. The avg speed of belt conveyor is 60 m to 100 m per minute. The load carrying capacity of the belt may vary from 50 to 100 tonnes/hours. It can easily be transferred through 400 m.

Advantages:-

1. This is most economical method coal transport in medium as well large capacity plants.
2. The rate of coal transfer can be easily varied just by varing the speed of the belt.
3. The repair & maintanance costs are minimum

of "volatile ... power. It burns only at high ...

4. The coal over the belt can be easily protected from wind and rain gust by providing over heads covers.

5. The power consumption to carry the coal minimum compared to other conveyors.

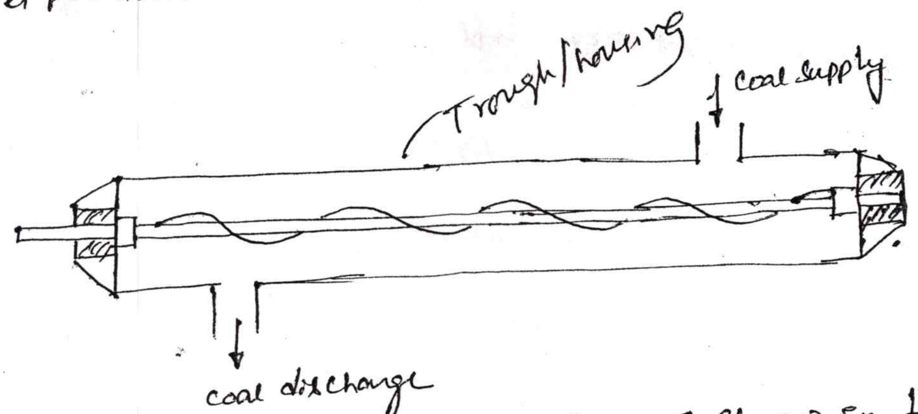
Disadvantages: 1. It is not suitable for short distances & grater heights.

2. It can't be used to carry coal at greater heights as its inclination is limited to 20°.

(b) Screw conveyor:— It consists of end less helicoid screw fitted to a shaft. The driving mechanism is connected to one end the shaft & other end of the shaft is supported in an enclosed ball bearing. The screw while rotating in a trough transfers coal from one end to the other end. The diameter of screw varies from 15 cm to 50 cm & its speed varies from 70 to 120 r.p.m as per capasity required.

The max capacity of this conveyor is 125 tonnes per hour.

Speed 70 to 120 r.p.m
capasity 125 tonnes/hr
dis 30 m



advantages: 1. It requires minimum space & cheap in first cost.

2. It is most simple & compact.

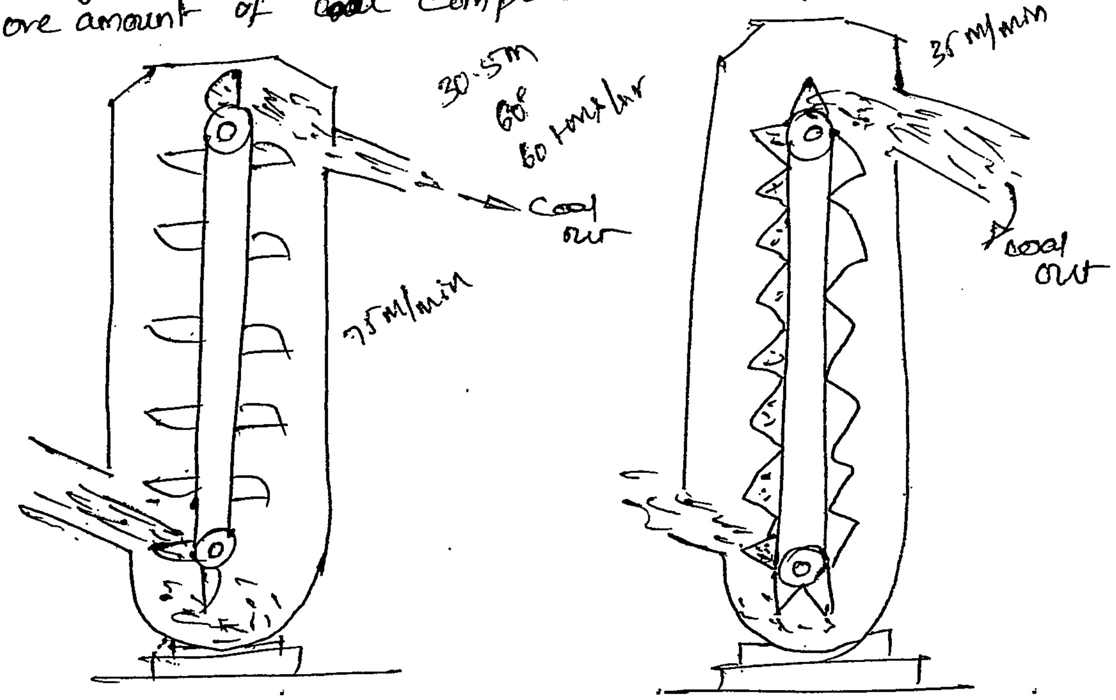
3. It can be made dust tight.

Dis adv: 1. The power consumption per unit weight is considerably high.

2. The length of feed hardly exceeds 30 m due to torsional strain on shaft.

3. The wear & tear is very high & life of conveyor is considerably short compared with belt convey.

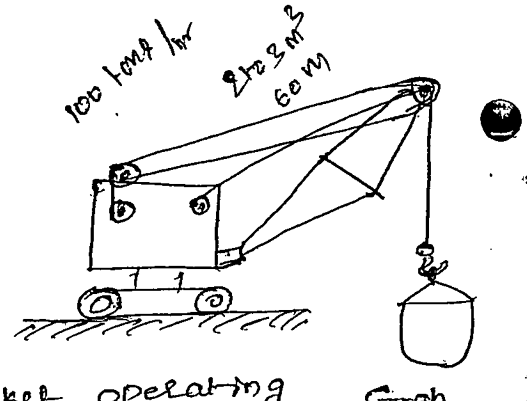
Bucket elevators: This conveyor is extensively used for vertical lift. It consisting of buckets fixed to a chain which moves over two wheels. The coal is carried by the bucket from the bottom & discharged at the top. Another continuous bucket elevator carries more amount of coal compared with first



centrifugal   Continuous.

The max height of lift is limited to 30.5 m & max inclination to the horizontal is limited to 60°. The speed of chain required in first case is 75 m/min & continuous type is 35 m/min for about 60 tonnes capacity/hr.

ⓓ Grab bucket conveyors



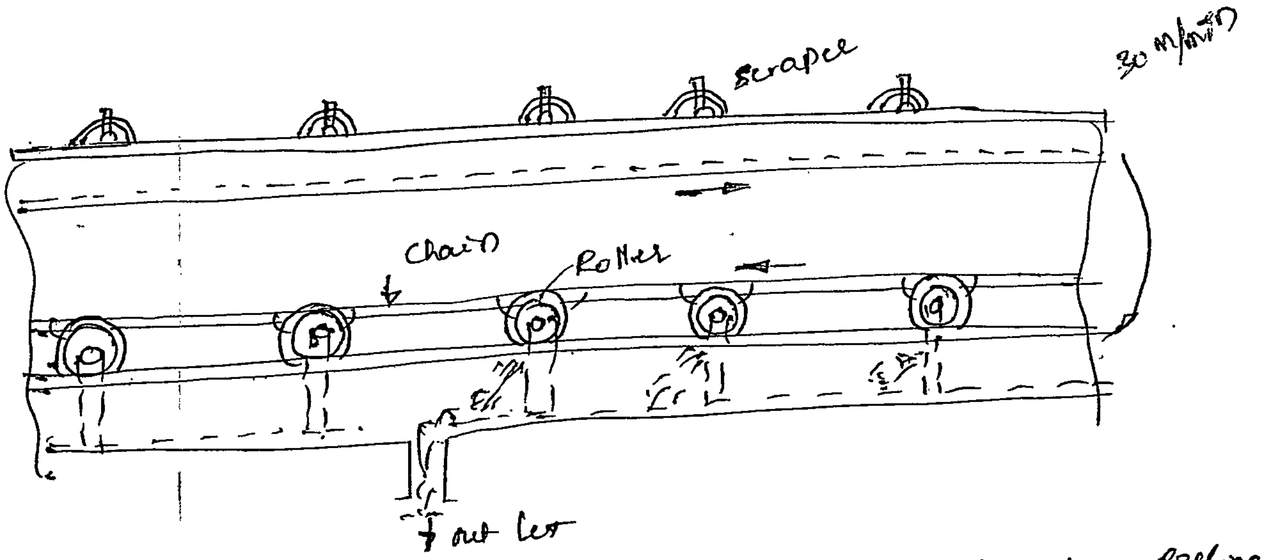
Grab bucket

A grab bucket conveyor lifts as well as transfers coal from one point to another. The grab conveyor can be used with crane or tower as shown in fig. A 2 to 3 cu-m bucket operating over a distance of 60m transfers nearly 100 tonnes per hour. The initial cost of this m/c is high but operation cost is less. Its use for transferring coal is justified only

of volatile ... burns only at high

when other arrangements are not possible.

(e) Flight conveyor:



This conveyor is generally used for transfer of coal when filling a no. of storage bins situated under the conveyor is required. It consists of one or two strands of chain, to which steel scrapers are attached. The scrapper scraps coal through a trough & the coal is discharged at the bottom of the trough.

Adv: 1. It requires small head room.

2. The speed of the conveyor can be regulated easily to suit the requirements.

3. It can be used for coal as well as ash transfer.

Dis adv:

1. There is excessive wear & tear due to scraping action & therefore life is short.

2. The repair & maintanance cost is high.

3. The speed is limited to 30 m/min, to reduce abrasive action of material to be handled.

4. The power consumption per unit of coal or ash transfered is considerably high due to dragging action.

Trough = a long open container

→ Storage of coal at plant site:-

The purpose of coal storage is two fold.

1. If there is any failure of normal supplies the stored coal is used for power production.

2. It allows the management to take advantage of seasonal market conditions.

Storage of coal protects the plant failure in case of coal strikes, failure of transportation system & general coal storage.

A coal storage is normally sized to have a capacity of a quarter of the annual burn.

1.25 million tons for 200 MW capacity plant. If the quantity is stacked to a height of 10 m it would cover an area of 30 acres.

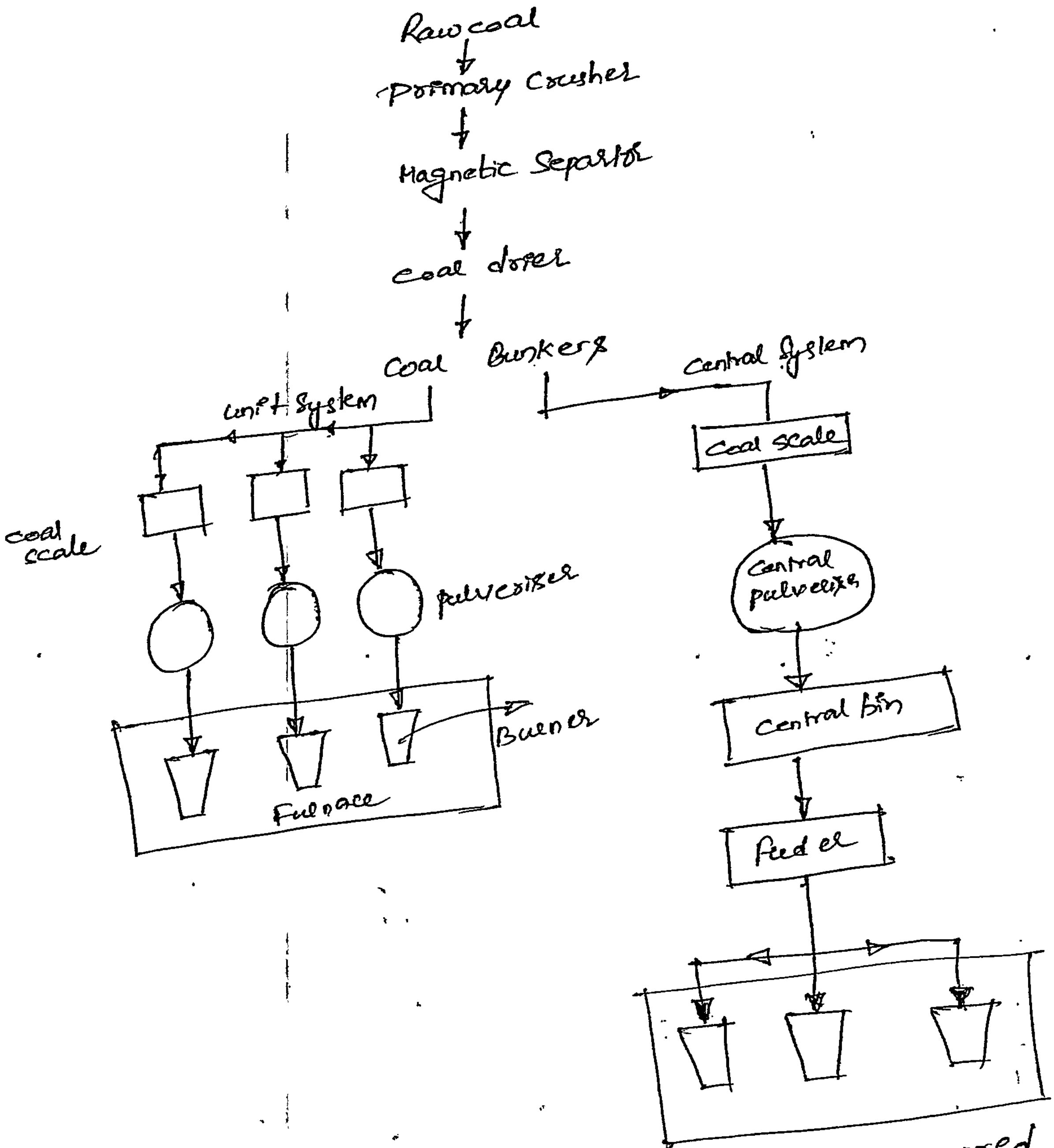
The storage of coal is undesirable, b/c as it costs more as there is risk of spontaneous combustion, possibility of loss and deterioration during storage, interest on capital cost of coal lying dormant, cost of insurance, handling cost required by storage & reclamation, cost of area required, cost required to protect stored coal from deterioration & many others.

With all these disadvantages of coal storage, it is more important to public service stations as light power have become vital & essential in every day domestic & industrial life.

of "volatile matter ... power. It burns only at high ...

Two methods are generally used to feed the pulverised fuel to the combustion chamber of power plant.

They are unit system & central system.

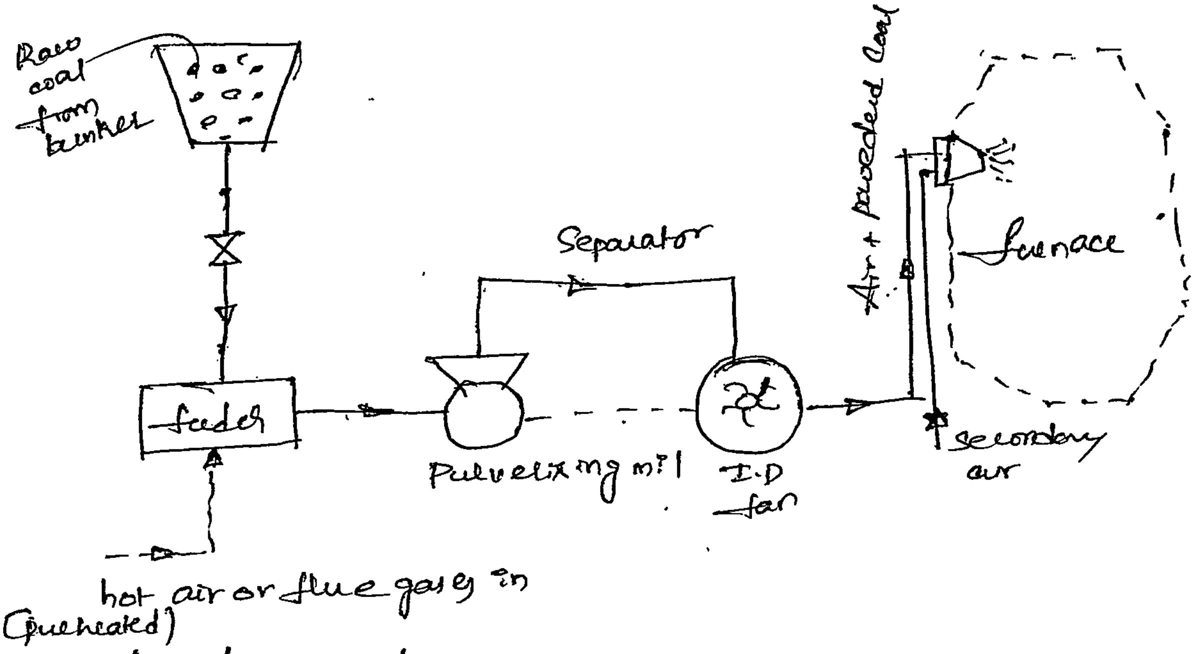


Pulverised coal handling plant showing all required for unit & central system.

In unit system each burner consists of an individual pulverizer. But in central system the fuel is pulverised in central bin and then is distributed to each furnace with the help of high pressure air current. Each type of fuel handling system consists of coushers, magnetic separators, storage bins, driers, pulverising mills, conveyors, feeders etc.

The fuel from mines may widely vary in sizes. It is necessary to make coal of uniform size before it is fed to pulverizer for efficient grinding. So the fuel from mines is fed to primary crusher to make its size to allowable limit (30 mm). Then it is passed over magnetic separator to remove pyrites & tramp iron. Then it passed through drier etc.

Unit system:-



Unit System

of ... ower. It burns only at m...

In unit System each burner and pulverisser constitutes a unit. According to steam generation rate required in the boiler or combustion requirements the crushed coal is fed to the pulveriser, through feeder. Hot air or flue gases are passed through the feeder to dry the coal before feeding to the pulveriser. The pulverised coal carried from the mill with the help of induced draught fan. This further carries coal to burner through short delivery pipe. i.e, in I.D fan pulverised coal & air is mixed & fed to burner. Secondary air is entered in to burner before entering the fuel in to combustion chamber. A plant feeding 1 ton of pulverised coal per hour requires 10 to 15 Kwhr energy.

Advantage:

1. It is simple in layout & cheaper than central system & coal transmission system is simple.

2. It requires less maintanance cost, as it requires less spare parts

3. This allows direct control of combustion from the pulveriser and it affords efficient fuel feeding to the boiler furnace

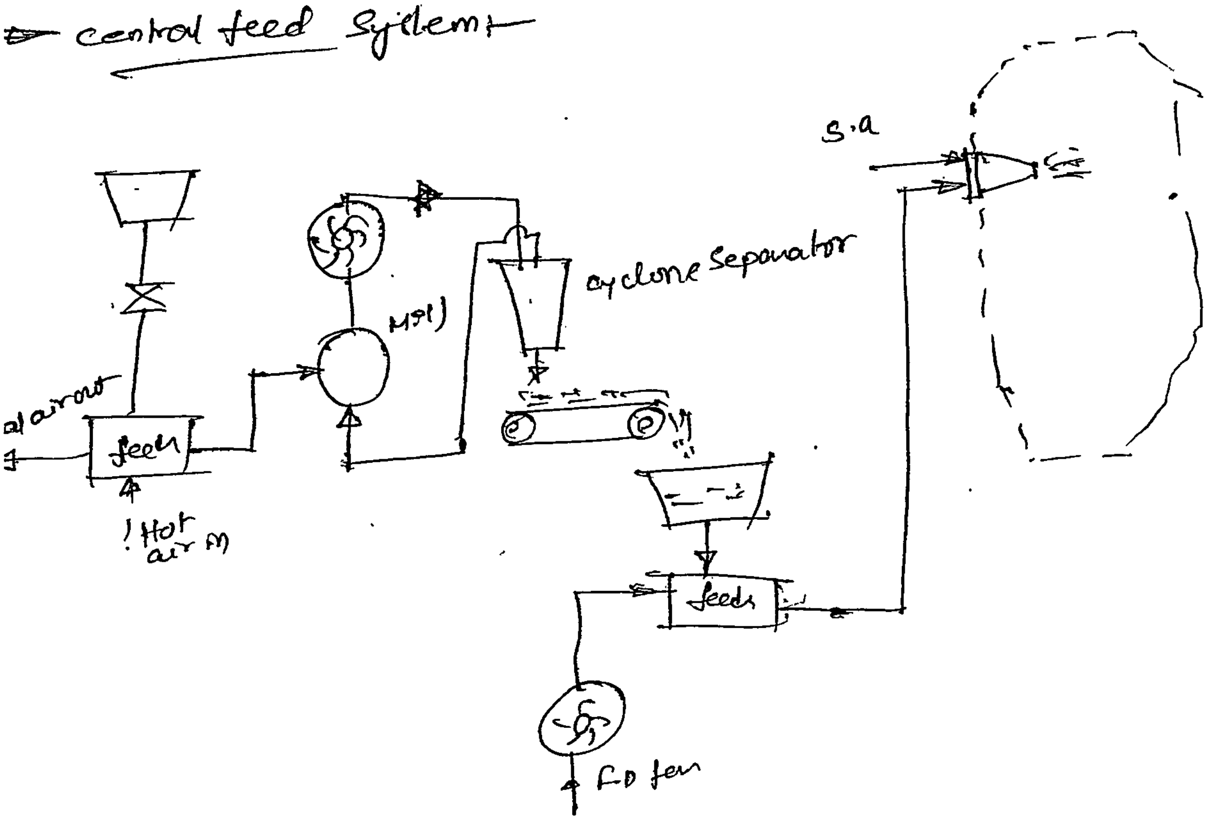
4. In unit system coal is fed with out drying but for the efficient handling of the central system coal is fed after drying

5. In the case of replacement of stokers, old conveyors are used with out much alteration.

Disadvantage:

1- It consumes more power per ton of coal at partial load
2- Degree of flexibility is less when compared to central system.
3- It requires strict maintanace as its operation directly depends upon the pulverising mill
4. In the event of failure of the auxilliaries of the burner, the burner is put of as there is no reserve capacity
5. There is excessive wear & tear of the fan blades as it handles air & coal particles.
6. The total capacity of all mills must be higher than of the central system with load factory common in practice.
7- The fault in the preparation unit may put entire system out of use.

central feed system



power. It burns only an

... The drying of coal is effected either by using hot gases, preheated air or bled steam. The dried coal is fed to the pulveriser with the help of air & is separated in cyclone separator. The separated pulverised coal is transferred to central bunker with the help of conveyor. The central system uses practically all the equipments as used in unit syst with higher capacity of each part. The storage bins also used in addition to other equipments.
The energy consumption of this system lies b/w 15 to 25 kw hr per ton of coal pulverised.

Advantages:

1. The central system is flexible & changes can be made to accomodate quick changes in demand. There is always a supply of fuel available in reserve in the fuel bunkers since any mill can be used to supply any boiler, the outage of boiler parts of the mills or even short outage of entire plant will not cause a boiler plant outage.

2. There is a greater flexibility as fuel & air can separately controlled

3. The pulveriser always runs at its rated load irrespective of the load on the plant, therefore the power consumption / ton of coal/hr crushed is less.

4. Burners can be operated independently of the operation of coal preparation

5. The pulveriser can shut-down when reserve cap has been achived. The same can achived during peak load.

6. Fan handles only air therefore no problem of excessive wear.

1. Central System is higher in first cost & occupies large space.

2. The power consumption of auxiliaries is high.

3. over all consumption/ton of coal ↑

3. There is a possibility of fire hazard due to stored pulverized coal

4 - coal transportation becomes more complex

5 - Dryers are inevitable

6 - The operation & maintenance charges are higher than unit System of Same capacity

power. It burns

Burning of fuels

Coal Burning methods:

The efficient combustion of the fuel in the combustion chamber and efficient transfer of heat energy to water for steam generation are essential for economical working of a power plant.

Two methods are used for burning coal:
- Stoker firing
- pulverised firing

The Stoker firing is used for solid fuel and pulverised firing method is used for pulverised coal.

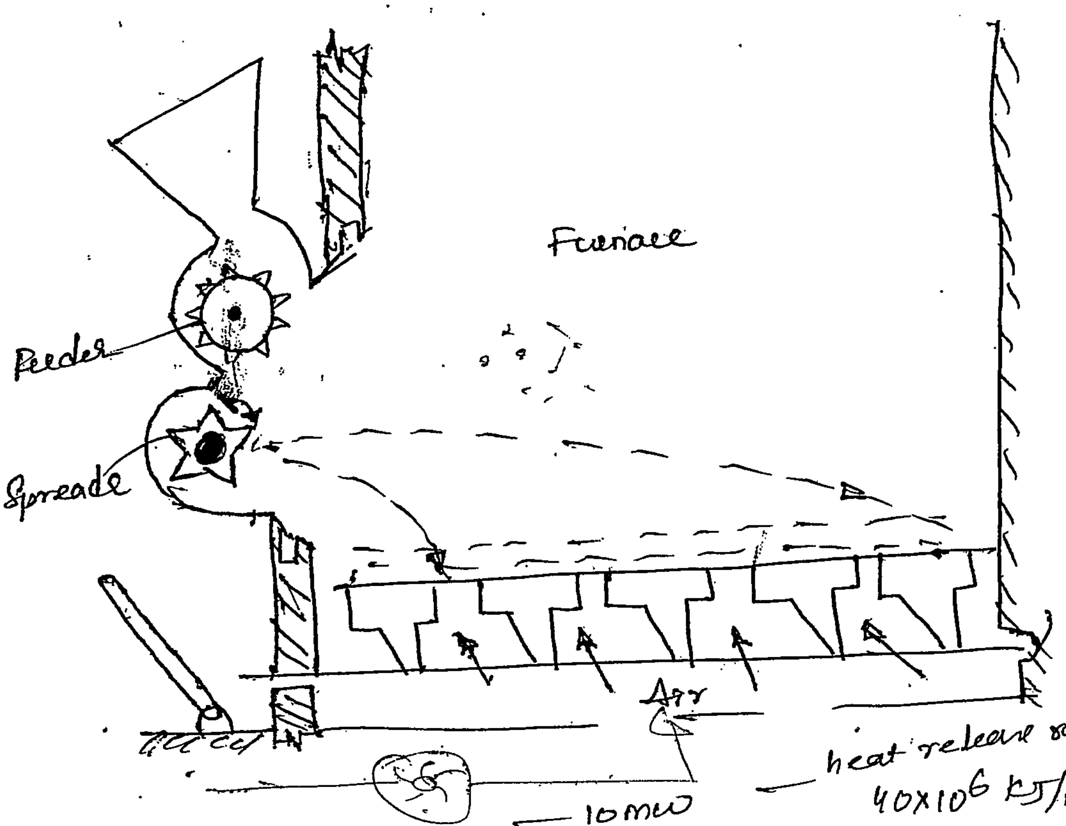
The selection of firing method depends on following factors:

1) The characteristics of available coal
2) capacity of the plant
3) Load factor of the power plant
4) Nature of load fluctuation
5) Reliability and efficiency of various combustion equipments available.

Classification of Combustion system

- Solid fuel firing
  - Hand fired
  - Stoker feed
    - (large capacity) over feed
      - Chain grate (or) travelling grate
      - Spreader type
    - under feed
      - Single retort
      - Multi retort
- pulverised fuel firing
  - unit system
  - Central system

Spreader type or Sprinkler Stoker



heat release rate

Stationary grates — 10 MW — 40×10^6 kJ/m²-hr

Moving grates — 10 to 30 MW — 80×10^6 kJ/m²-hr

Feeder - Reciprocating arm, endless belt

Coal size — 6 to 36 cm

suitable to boilers → 80 tons to 150 tons steam/hr

Adv: wide variety of coal is used, clinkering difficulties are less

ble of spreading.

Use of high temp preheated air possible

less amount of Secondary air supply

→ Give quick response to load changes.

Adv: a wide variety of coal can burnt.

use of high temp preheated air is possible
operation cost is low
volatile matter can easily burn
clinkering difficulties as less

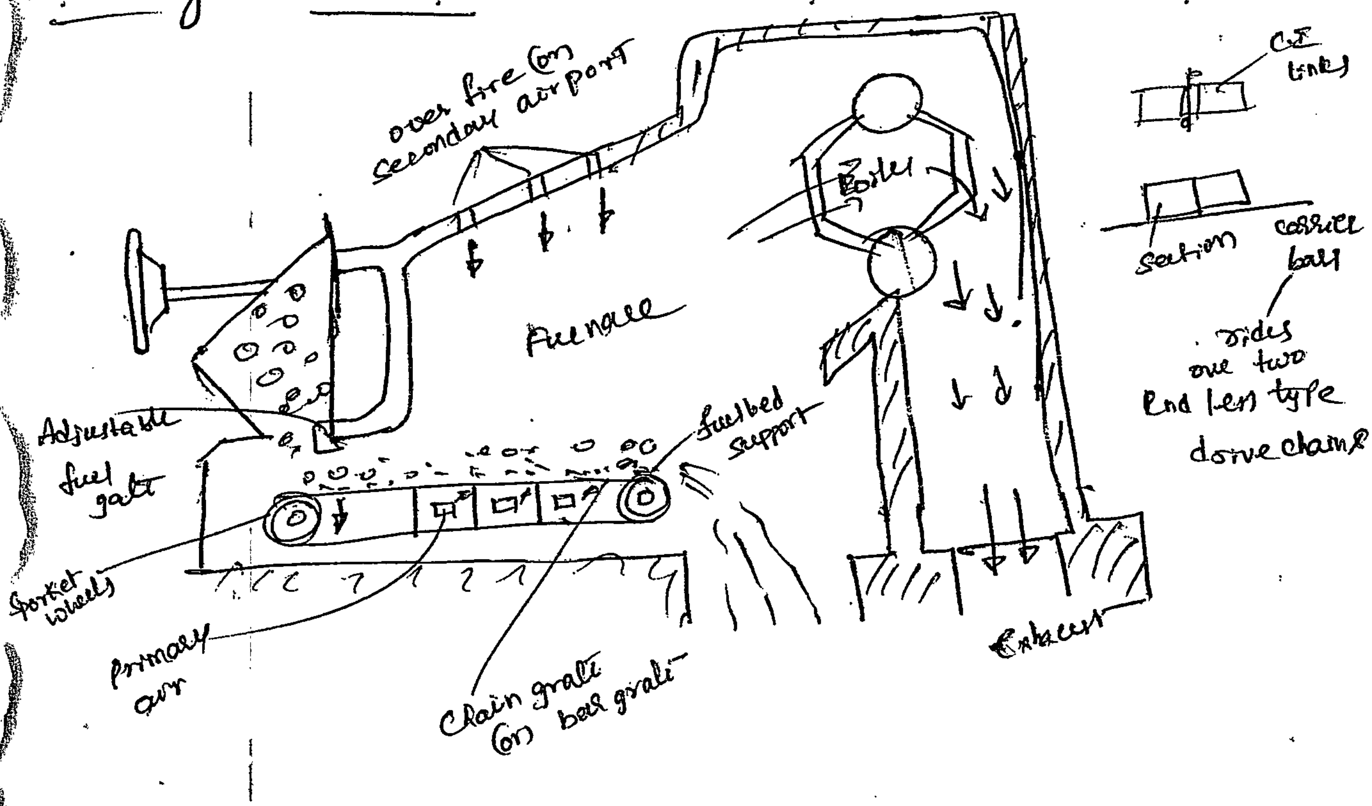
dis advant:

1. Difficult to operate with coal having varing moisture content

2. fly is much more
3. fuel will loss in cinder up the stack b/c fuel suspension firing

This type of stokers are used for large capacity boiler installation where the coal is burned without pulverisation.

Travelling grate stoker: Chain type or bar grate type



Travelling grate stokers (Details of construction)

- Chain grate: Series of cast iron links are attached by pins to form endless chains.
- Bar grate stoker: Series of cast iron sections are mountained on carrier bars & these bars rides on two endless type drive chains.

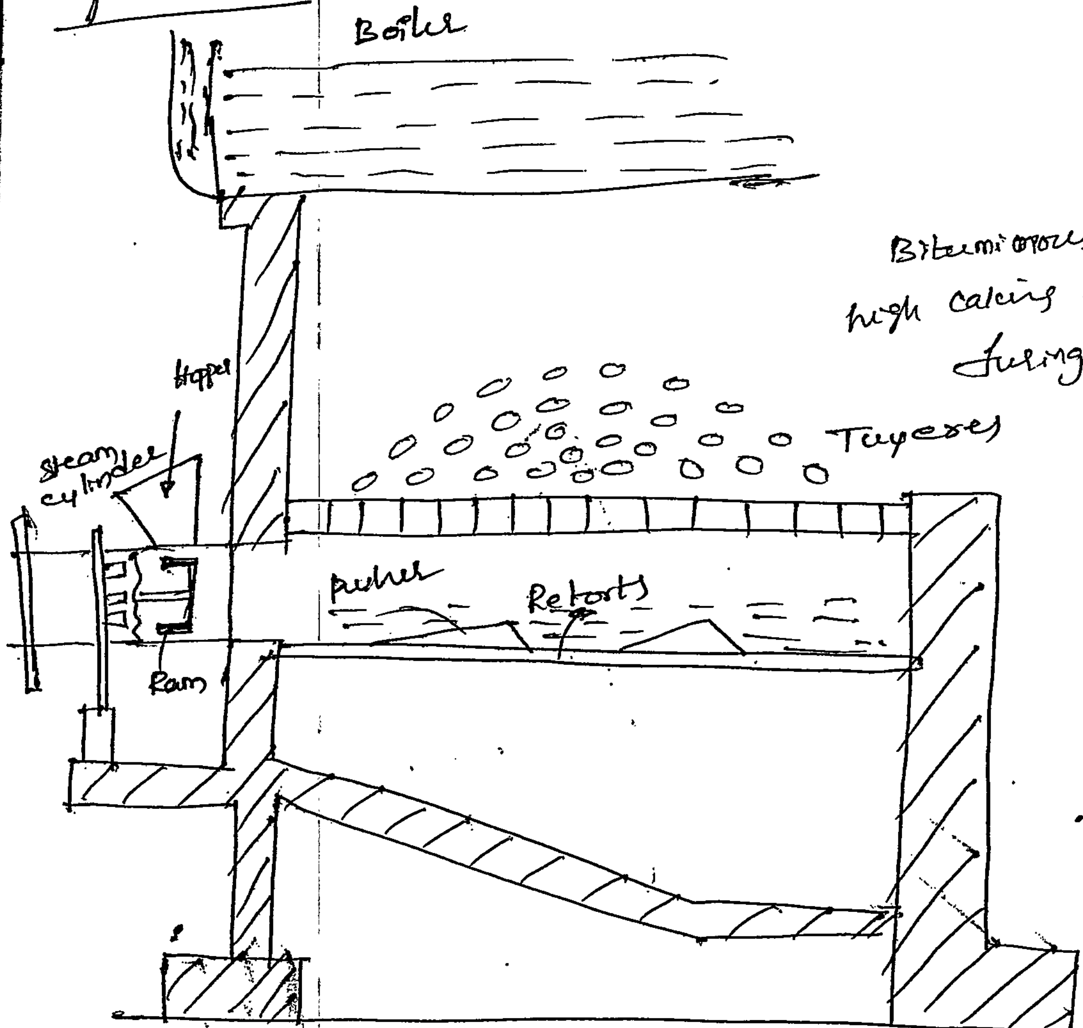
In chainless type stoker an endless chain supports the fuel bed. The chain travels over two sporket wheels. The front sporket wheel is connected to a variable speed drive. The coal is fed by gravity from a hopper located in front of the stoker. Coal supplied to grate is varied by varing the depth of coal with the help of grate valve & the rate of grate travel. The speed of grate varies at the rate at which coal is fed to the furnace. The ash containing a small amount of combustible matter is carried to the rear end of the stoker.

The air required for combustion is supplied through the air inlets situated below the grate. The secondary air is supplied the openings are provided in the furnace wall above the grate. The combination of primary air & over fire air supplied provide turbulance required for rapid combustion. The primary air is brought in from the sides & then forced to the uppergrate. The air ducts under the stoker is divided into sections, so the air supplied to diffrent parts of the stoker is regulated to meet the change in demand. Air dampers are provided to control air supplied to different zone. They reduce the loss of coke to ashpit. If satisfactory operation can't achived by damper by adjusting fuel bed depth control is achived. There are suitable for low rating fuel. The rate of burning with stoker is 200 to 300 kg/m²/hr when forced draught is used. If bituminous coal are used leads to max carbon loss.

adv = Simple in construction, Initial cost is low, Maintenance Charges low, Self cleaning stoker, Give high heat release per unit vol of the furnace, Heat release rates controlled by adjusting the speed of Chain

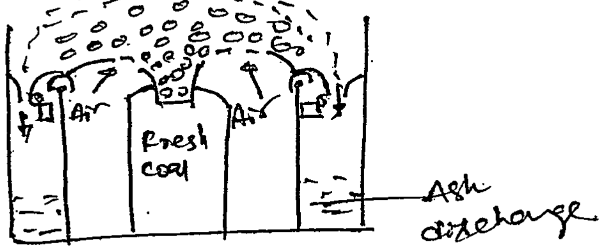
dis. 1. preheated air temp limited 180°C, clinker troubles are common, loss of coal, Ignition arches required, can't be used for high cap boilers (200 tons/hr)

Single retort stoker:

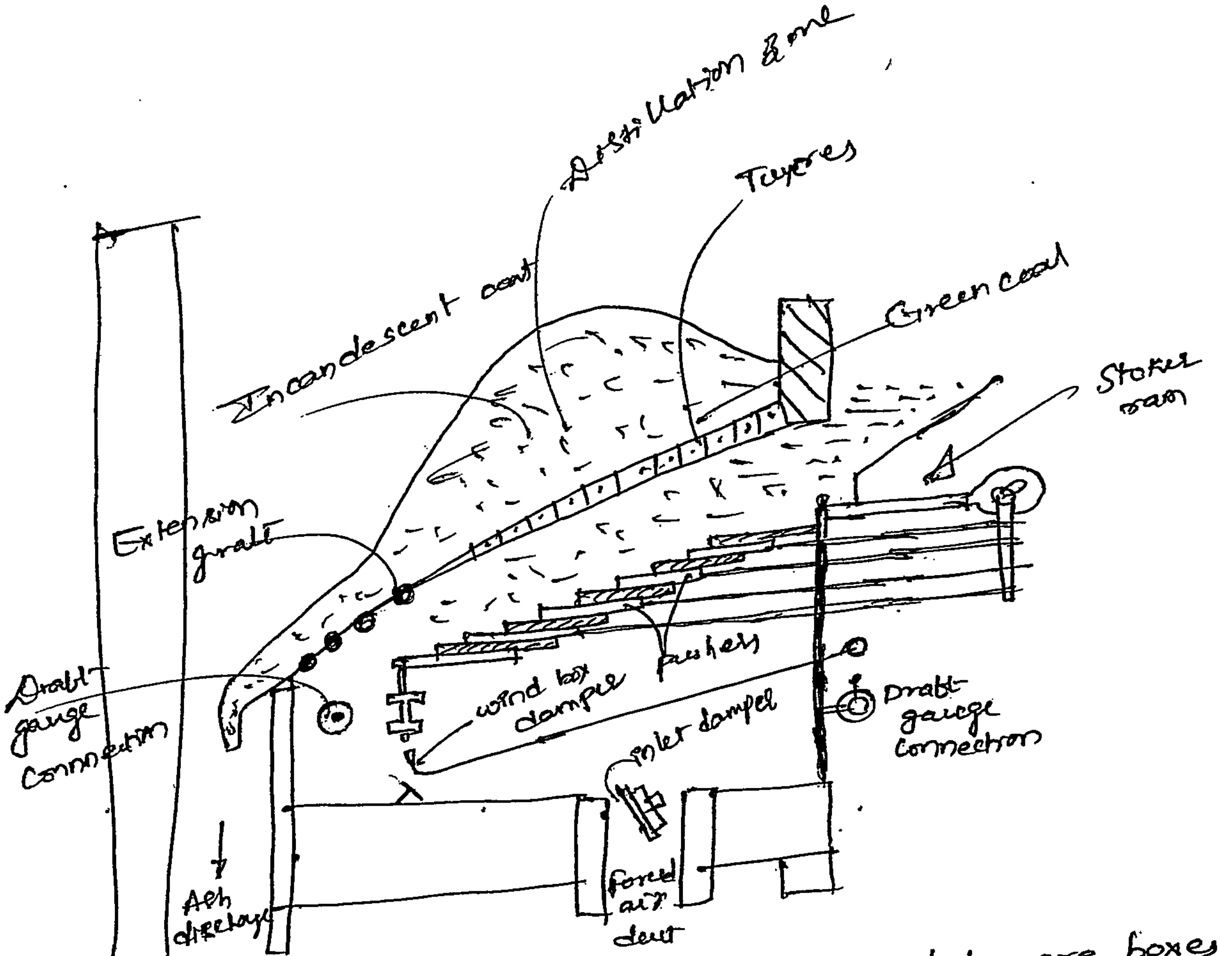


Bituminous, non bituminous
high caking or non caking
fusing pt - 1300°c
very much suitable

Single retort type stoker



Multi retort stoker.



It consists of a series of alternate retors and tuyere boxes for the supply of air. Each retort is fixed with a reciprocating ram for feeding and pusher plates for the uniform distribution of coal. The coal falling from the hopper is pushed forward during the inward stroke of the stoker ram. Then the distributing rams push the entire coal down the length of the stoker. The ash formed is collected at the other end. The no. of retorts may vary from 2 to 20 with coal burning capacity ranging from 800 kg to 2000 kg per hr per retort.

Adv:

1. It gives higher η_{th} compared to chain grate stokes
2. part load efficiency is high
3. combustion rate is considerably higher.
4. Sufficient amount of coal always remains on the grate so that the combustion is continued in the event of temporary breakdowns of supply system
5. The grate is self cleaning
6. Different varieties of coals can be used with this type of stokes
7. Tuyeres, grate bars, & retorts are not subjected to high temp as they remain always in contact with fresh coal
8. The use of forced draft & relatively large quantity of fuel on the stoker make them responsive to rapid changes in load.
9. The coal continuously agitated by the plunger & pusher plates due to this the fuel bed remains porous & free from clinkers.
10. Smoke less operation is possible even at very light load
11. It can be used with all refractory furnaces b/c of non exposure of stoker to the furnace.
12. Under feed stokers are suitable for non clinkering high v.m & low ash content coals.

Disadv:

1. The initial cost of unit is high.
2. It requires large building space
3. The clinker troubles are usually present
4. low grade fuels with high ash content can't burn economically

→ Pulverised fuel firing:

In pulverised fuel firing system, the coal is reduced to a fine powder with the help of grinding mill and then projected in to the combustion chambre with the help of hot air current. Then the amount of secondary air required to complete the combustion is supplied separately to the combustion chamber. The resulting turbulence in the combustion chamber helps for uniform mixing of fuel and air and through combustion.

The amount of air which required to carry coal & to dry it before entering in to combustion chamber is known as primary air, & the amount which supplied for complete combustion is known as secondary air.

In this system a given mass of coal is breaked into smaller pieces which exposes more coal surface area for combustion.

Dis: fly ash problem

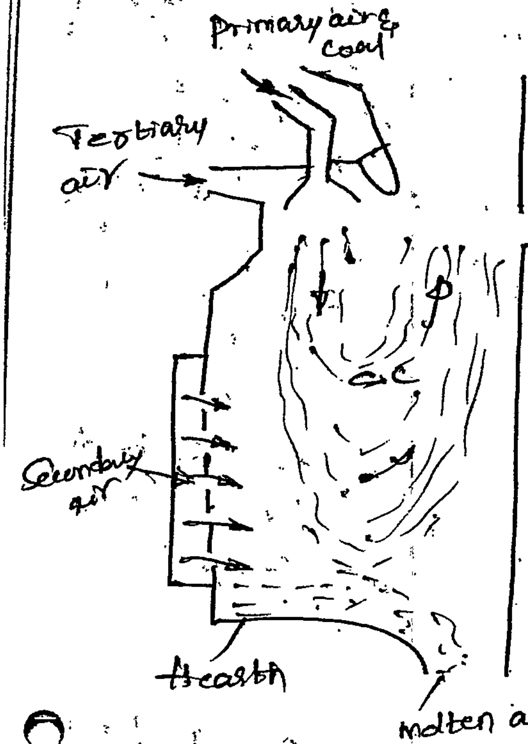
pulverised fuel burners:

The f^n of burner is it produce uniform mixing of coal & air and turbulence with in the furnace.

i.e.:

1. Long flame or U-flame or stream lined burners
2. Short flame or turbulent burner
3. Tangential burners
4. Cyclone burner

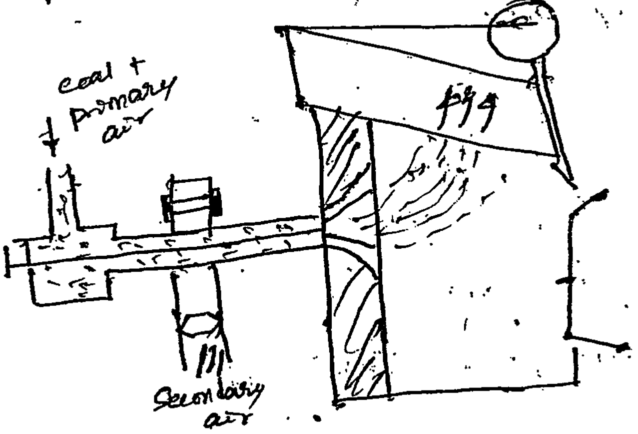
Long flame or U-flame or Stream lined burner:



In this System tertiary air is Supplied around the burner to form an envelope around primary air and fuel to provide better mixing. The burner discharges fuel and air mixture vertically in thin flat streams with periodically no turbulence and produces a long flame. Heated secondary air is introduced at right angles to the flame which provides necessary mixing for better and rapid combustion.

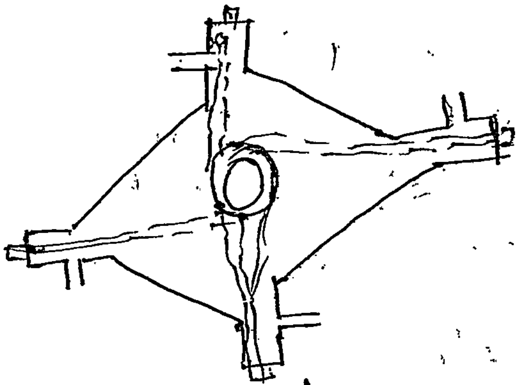
Furnaces with low volatile coal are equipped with such burners to give long flame path for slower burning of coal particles. The longer flame provides more time to burn. It is necessary to control velocity in this zone (tip velocity is limited to 25 m/s. Less heat of ignition is available due to low volatile content and it is necessary to reduce the cooling effect from the walls tubes in the ignition zone by using refractory belt around the furnace or by refractory front wall. Generally low volatile coal have higher fusion temperature than bituminous coal & therefore higher furnace ratings are permissable.

→ Short flame or turbulent burner



The turbulent burners are usually set in to furnace walls and project the flame horizontally in to the furnace. The fuel air mixture and secondary air are arranged to pass through the burner in such a way that there is good mixing and the mixture is projected in highly turbulent form in the furnace. Due to high turbulence created before entering in to furnace the mixture burns intensly and combustion completed in short distance. This burner gives high rate of combustion compared with other types. The velocity at the burner tip is as high as 50 m/s. The bituminous coal is successfully used with this burner. By proper adjustments, a long penetrating flame or short intensely hot flame is produced. All modren plants use this type of burner. This generally preferred for high volatile coals.

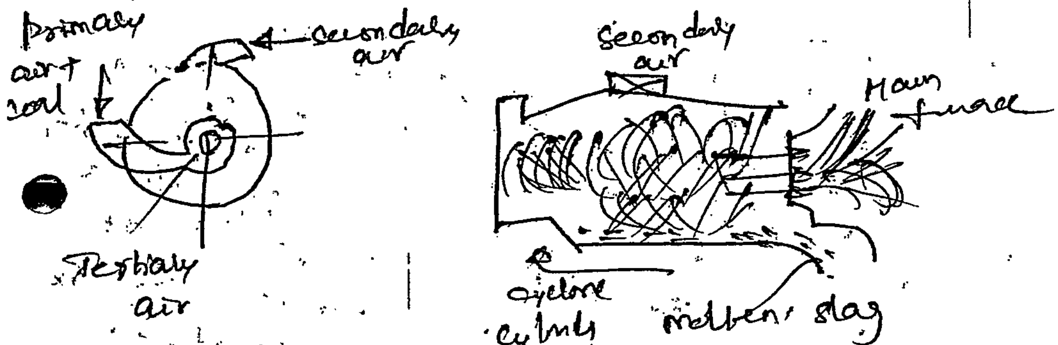
3. Tangential coal:



Tangential firing

The discharge of fuel mixture is done tangentially to an imaginary circle in the centre of furnace. The swirling action produces sufficient turbulence in the furnace to complete combustion in short period & avoids the necessity of producing high turbulence at the burner itself. High heat release rates are possible with this method of firing.

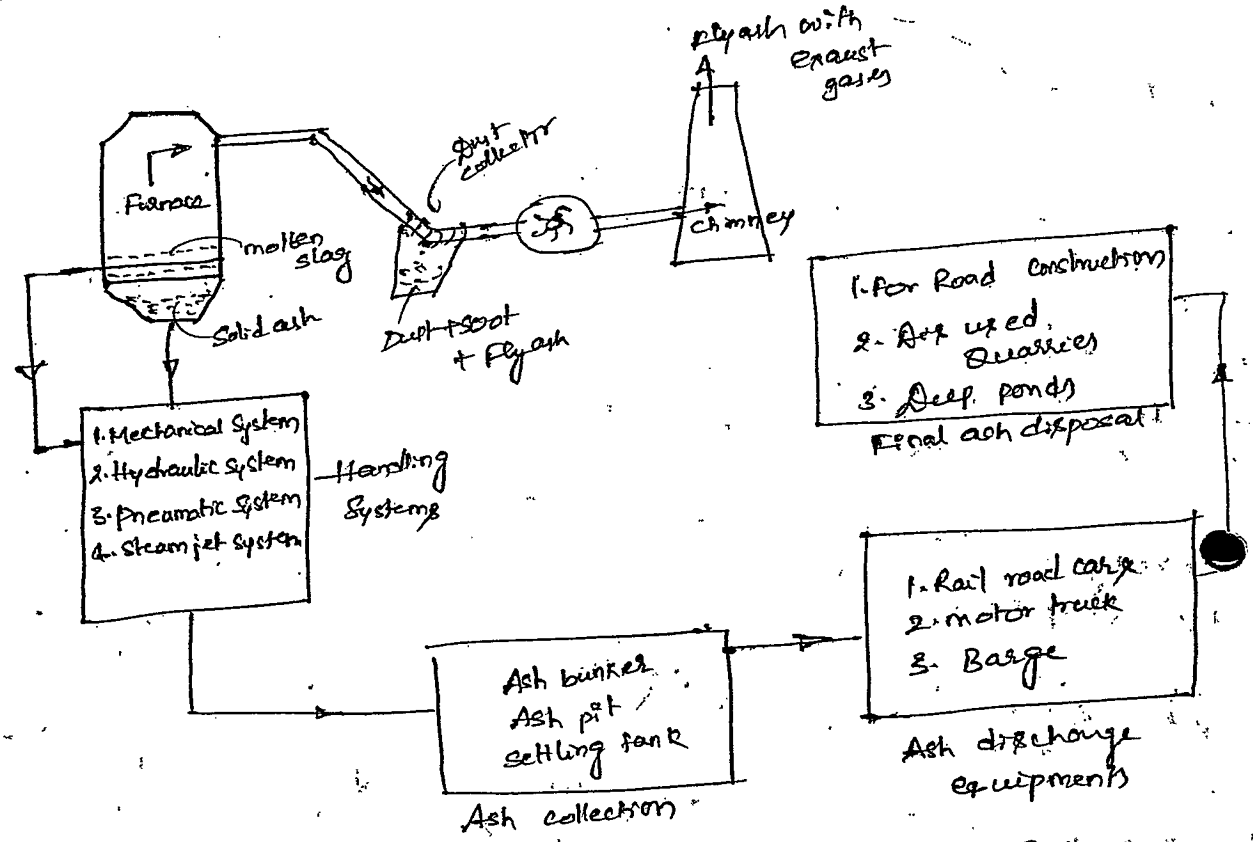
(4) cyclone furnace



Chrome ore
2 to 3 m dia
2.5 m length
Scroll type inlet
6mm coal
air at 80 cm of water pr
high heat 2000°C

It is a horizontal cylinder of water cooled construction 2 to 3 m in dia & 2.5 m in length. Inside is lined with chrome ore. The horizontal axis of the burner is slightly deflected towards the ~~furnace~~ boiler. It is externally arranged to the boiler furnace & equipped with a single scroll type inlet at one end and a gas discharge throat into the boiler at the other end.

The coal used in cyclone furnace is crushed to 6mm max size and blown into a cylindrical cyclone furnace. Air at 80cm water pressure and coal admitted tangentially to the cylinder at outer end creates strong and highly turbulent vortex. As the coal with air moves from the front to rear, secondary air is introduced tangentially as shown in fig to complete combustion. Extremely high heat liberation rate and the use of preheated air cause high temperatures 2000°C in the Cyclone. The fuel consumed quickly & liberated ash forms a molten slag film flowing over the inner wall of the cylinder. The molten ash flows to an appropriate disposal system as the horizontal axis of burner is tilted.



General layout of ash handling and dust collection System.

Ash handling is undesirable, irritating and annoying to handle the
(i) Ash is dusty, therefore ... of boiler furnace.
(ii) It is sufficiently hot when it comes out of boiler furnace.
(iii) It produces poisonous gases and corrosive acids when mixed with water.

There are difficulties like
It forms clinkers, it is abrasive and will wear out the conveyor part & it must be cooled the of hot condition.

The dumping of ash is done

(1) The barges may be used for dumping ashes in the sea where sea-borne coals is used.

(2) Disused quarries are worth for the disposing of ashes

(3) It is used for road making or to fill low lying areas

(4) Deep ponds may be constructed & the ash can be dumped into these ponds

Ash handling system comprises following operations :-

(i) Removing of ashes from furnace ash hopper.

(ii) Transfer of ash from hopper collection equipments with the use of handling systems

(iii) Disposal of ashes from the storage

In every ash handling plant, quenching of ashes before carrying to the sump is desirable & necessary

1) It reduces the temperature of ashes and it is always easier to handle cold ashes than hot.

(2) The quenching of ash tends to disintegrate large clinker and reduce it to more manageable proportions.

3. It reduces ashes to a dust less condition.

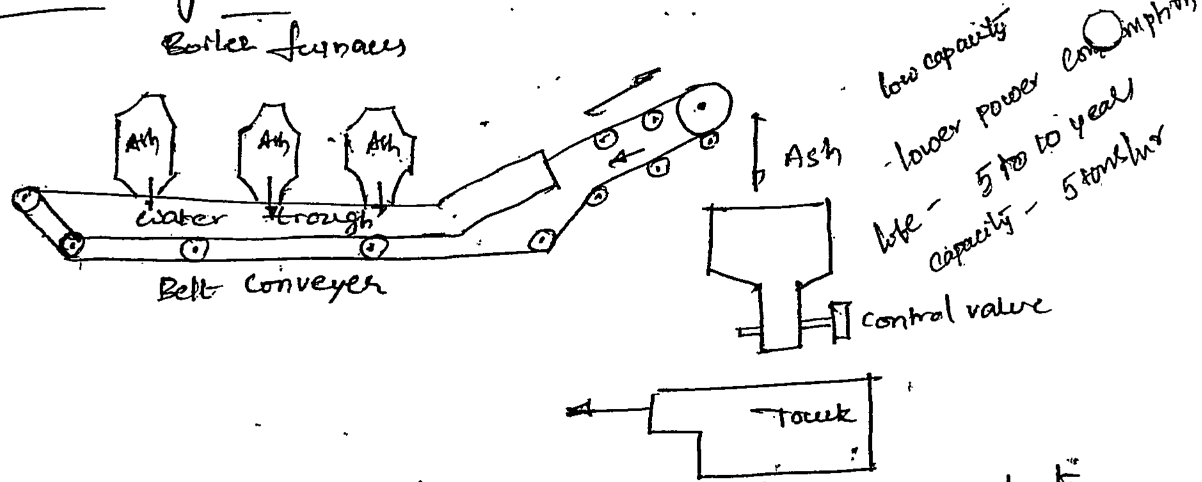
4. It reduces corrosive action of the ashes on the equipments used to carry it.

5. Water is used as a seal to prevent un controlled air entering the boiler & so upsetting combustion condition.

Modern ash handling system are mainly classified into 4 types

1. Mechanical handling system
2. Hydraulic "
3. Pneumatic "
4. Steam jet system

1. Mechanical handling System :-

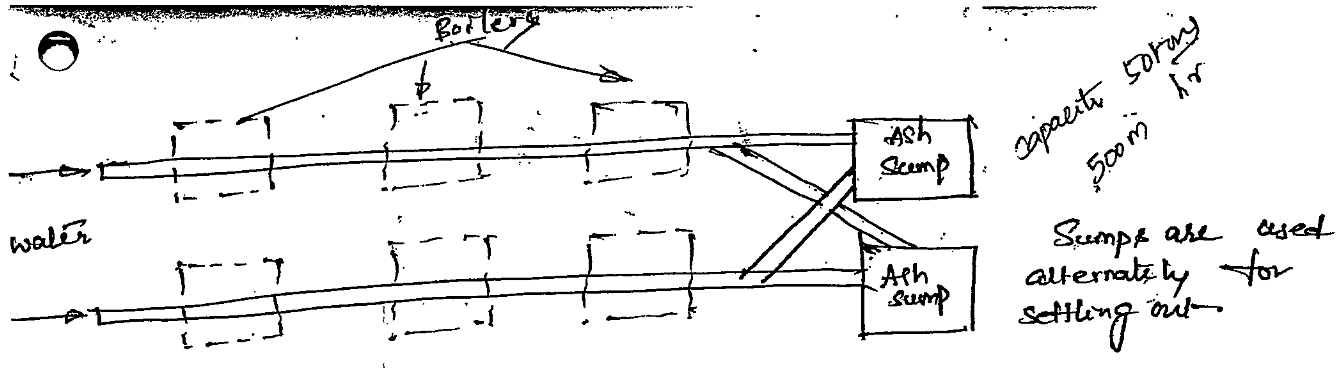


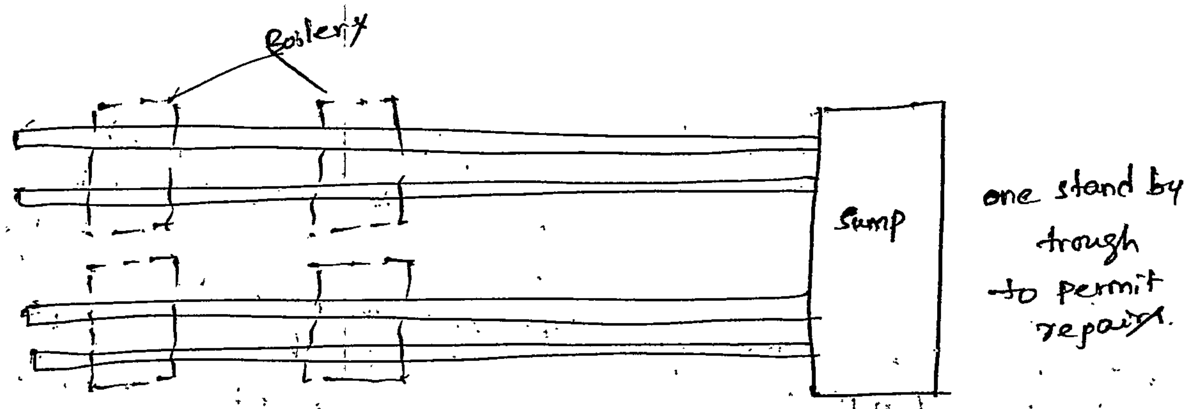
It is generally used for low capacity power plants using coal as fuel. The hot ash coming from the boiler furnace is made to fall over belt conveyor through a water seal. The cooled ash falls on the belt conveyor and it is carried continuously to dumping site or overhead bunker. Ash is carried ~~to the~~ dumping site from ash bunker with the help of trucks. The control valve is opened & closed manually to load the truck. The life time of this system is 5 to 10 years. The max capacity of this system is limited to 5 tons/hr. The major advantage of this system is lower power consumption.

2. Hydraulic Ash handling System :-

It carries ash with the flow of water with high velocity through a channel and finally dumped to the sump. The hydraulic system is subdivided as low velocity & high velocity system.

low vel System: In this system ash from the furnace grate falls into the system of water possessing low velocity and carried to sump with water. The velocity of water in water troughs is usually 3 to 5 m/s. With use of high water velocity, the abrasion is reduced as the ash tends to ride on the water, instead of scouring along the bottom. The ash is





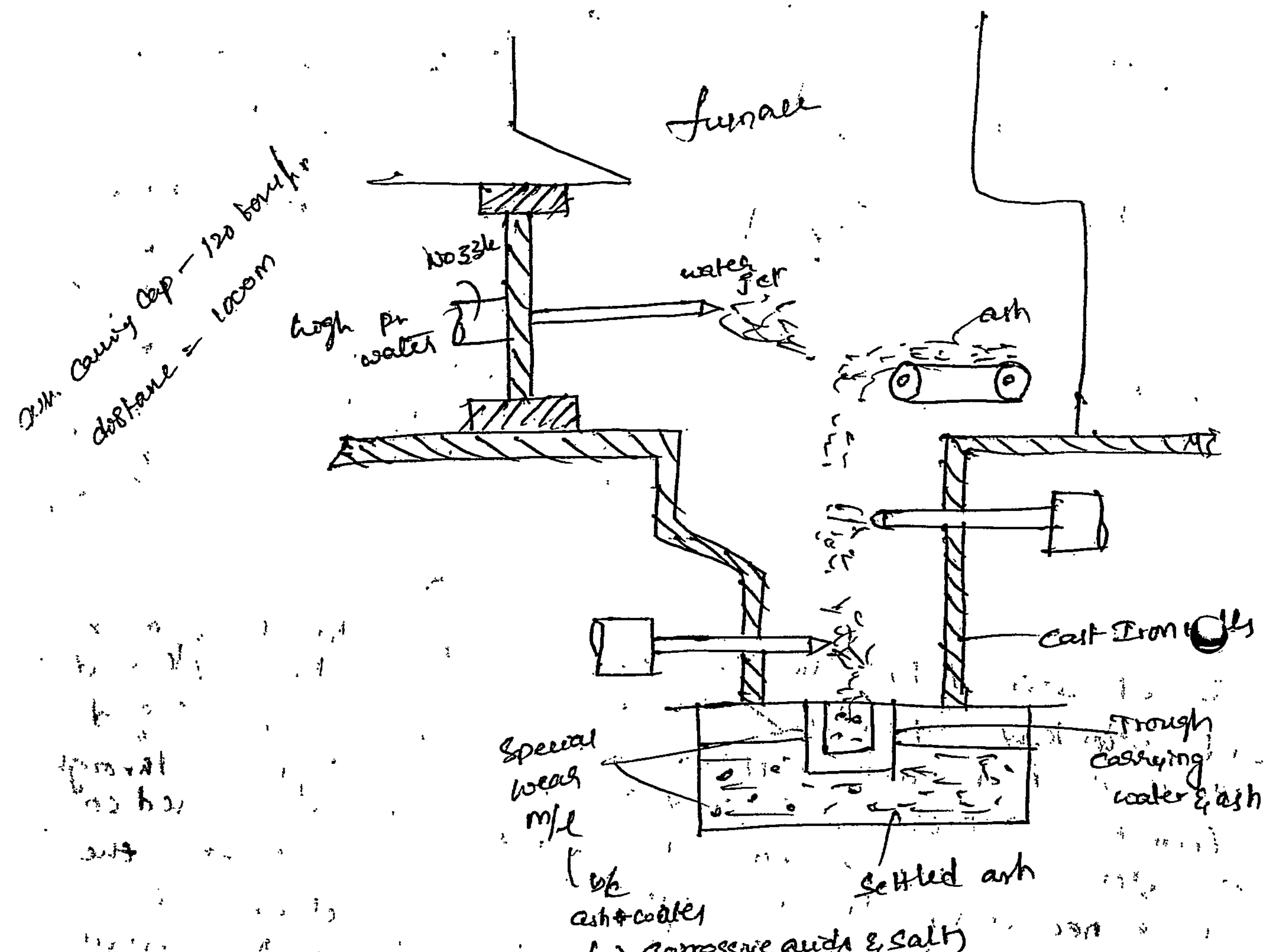
Low pressure (low vel) ash handling hydraulic system.

Separated from the water when it reaches the sump. The separated water is used again while the ash collected in the sump is sent out through carriages. The ash carrying capacity of this system is 50 tons/hr and distance covered is 500 m.

High velocity (high pr) ash handling hydraulic System

The hoppers below the boilers are filled with water nozzles at the top and on the sides. The top nozzle quench the ash and side nozzles provide the driving force to carry the ash through a trough. The cooled ash with high velocity water is carried to the sump. The water again separated from the ash and recirculated. The ash carrying capacity of this system is as large as 120 tons/hr & the distance covered is as large as 1000 m.

Some times the ash and water is pumped to the sump with the help of pump through the pipe to increase ash carrying capacity of the system. The only disadvantage is, the pump must be made of special wear resisting material.

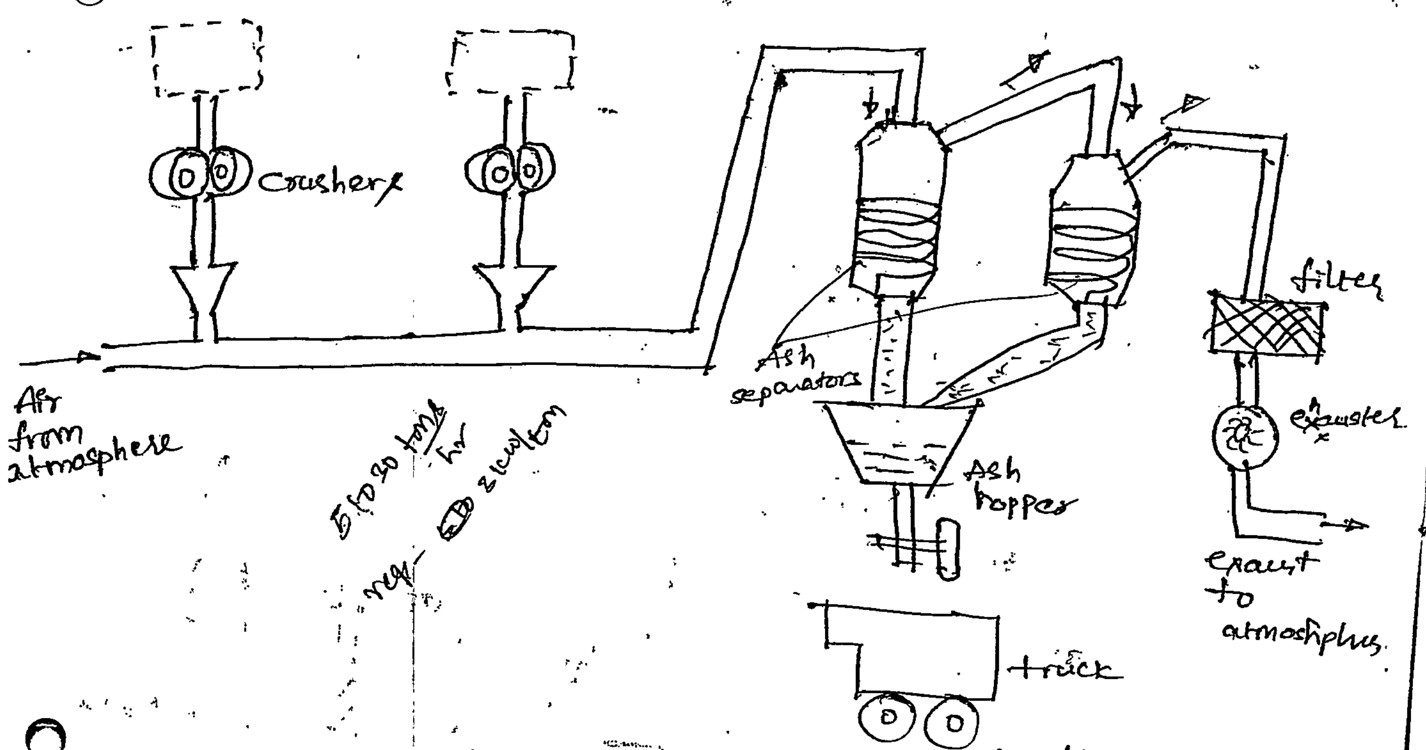


The important feature of this system is absence of working parts in contact with the ash.

→ Pneumatic ash handling system:–

This system has been devoloped for handling abrasive ash as well as fine dusty materials such as fly ash and soot. This is more suitable to the boiler plants from which ash and soot must be transported to some considerable distance for final disposal.

The ash and dust from all discharge points are picked up by a high velocity air stream created by an exauster at the discharge end. The ash collected in the ash hopper is passed through the ash crushers in to the air stream.



The ash carried by the air is separated in to the primary and secondary separators working on cyclone principle and is collected in ash hopper. The clean air is discharged from the top of secondary air in to atomosphere through exauster. In this mechanical exauster I.D fan used so it is necessary to use filter or air washer before the air enters in to exauster to ensure the clean air exaust in to atmosphere. Power required by mechanical exauster is 3kw/ton of material. Ash carrying capacity is 5 to 30 tons/hr.

Steam jet system :-

In this system of ash handling, steam is passed through a pipe at sufficiently high velocity which is capable of carrying dry solid materials of considerable size along with it. The high velocity is given to the steam by forcing it through the pipe under pressure greater than that of atmospheric.

adv

1. steam generated by the boiler is used, no auxiliary drive required

2. distance ≈ 200m & vertical dis ≈ 30m

3. capital cost/ton of ash handled is less.

4. It requires less space.

5. Equipment can be installed in awkward position too.

disadv

1. Greater wear of pipe (lined with nickel alloy)

2. operation of system is noisy

3. capacity of system limited to 15 tons/hr.

So continuous operation is necessary

(1) Dust collectors

- Dry type
  - Gravitational
  - Cyclone
- Wet type (Scrubber)
  - {used in order to reduce particulate emissions from coal fired boilers}
  - Spray typed
  - packed type
- Electrical

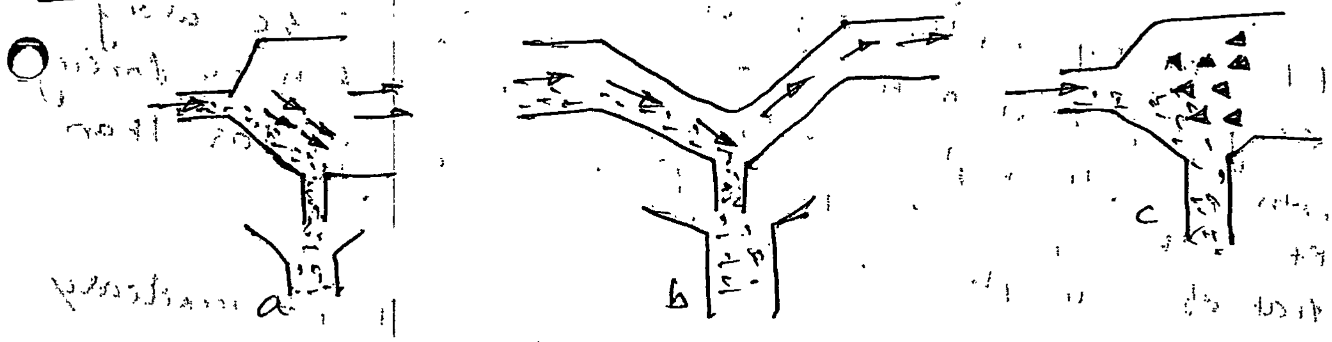
Mechanical dust collector

Cinder - a piece of partly burned coal or wood

Dry type:

Gravitational Separators:

(1)



Gravitational separators

(a) By increasing the crossectional area of the duct through which dust laden gases are passed the gas velocity is reduced and dust particles are allowed to fall down.

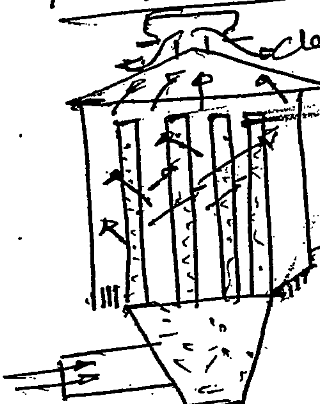
(b) Changeing the direction of gas flow allows the heavier particles to settle out as rapid change of direction of gas flow can be followed by heavious particles.

(c) The larger dust particles may be knocked out of the gas steam by impingment on babbles - These are used to drop large cinders from the gases.

Bag house dust collectors. In creased use of low sulpher coals necessitates use of higher efficiency particulate collection (These are) devices uses fabric filters.

Types: 1. open pressure type, 2. closed pressure type, 3. Closed suction type.

open pressure type: (glass bags)



In open pressure bag house in which fan is located to the dust loaded side, can be operated with open sides as long as protection is provided from weather. This type is normally constructed with corrugated steel or asbestos cement walls. It may have open grating at the cell plate level may not require hopper insulation.

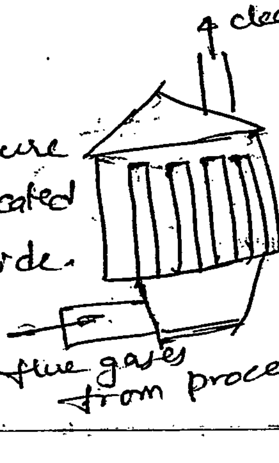
Closed pressure type:

It is a closed air tight structure and fan is located to the inlet side of the bag house similar to open system.

It is generally used for gases having high DPT. The floor of the unit is closed and structure walls and hopper are insulated.

Closed suction type.

This is just similar to closed pressure type arrangement except the fan is located to the out-let of bag house clean gas side. This is generally used for gases having



DPT from 75 to 85 °C. The floor, walls, and hopper of this unit are insulated. Blower maintance is cheaper as it located to clean side of gas.

low sulphur coals (less than 1%) temp < 300°C — bag house collector.

high sulphur coals — high temperatures favour electrostatic precipitator.

1 A well designed bag house collector (particle size above 1μ) will collect 99.9% of dust & the efficiency independent of the amount of dust in flue gas.

However bag houses are more sensitive to condensation of objectionable gases than other types of gases collectors and generally requires more maintanance due to periodic bag changing.

3 The presently used bag fabric filters are impregnated with teflon (high a-Resis (strength)) which assists in the lubrication of the glass fibres & resists possible deterioration if gas temperature were falls below dew point temperature.

Advs:

1) Bag houses are not sensitive to fly ash resistivity

2) High collection η — 99.9%.

3) less costly than e.s.p

4) Baghouses easily comply with capacity requirements.

Dis: They are very sensitive to fluctuations in gas temperatures. Continued operation at or below DPT of acid lead to corrosion of metal parts & reduces bag life

2. The formed SO_3 combines with the water vapour & forms H_2SO_4. The temp of flue gases should not drop below DPT of sulphuric acid as filters are highly susceptible to H_2SO_4 attack. Therefore it is always necessary to maintain operating temp above DPT of exhaust gases.

major (teflon or silicon graphite + fiberglass)

filter m/d

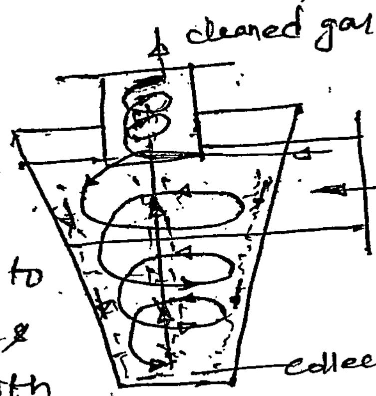
→ cotton is used for most applications up to 100°C.

Nylon offers abrasive resistance & can withstand caustic conditions.

The synthetic orlon and dacron can withstand acidic conditions & at temp 120°C.

Fiberglass cloth can be used even for gases at 300°C.

Cyclone Separator:



In this type of mechanical collector a high velocity gas stream carrying the dust particles enters at high velocity & tangential to the conical shell. This produces a whirling motion of the gas within the chamber & throws heavier dust particles to sides & fall out of gas stream & collected at the bottom of collector. The gas from conical (chamber) shell is passed through the secondary chamber for final dust separation.

used to collect coal of size – 10μ

Some time multi cyclone dust collectors are used or multitubular type have been used extensively in power plant.

Advan: 1. It is more rugged ∴ maintenance costs are relatively low

2. Its efficiency is higher for bigger size particles

3. Its efficiency increases with increasing load.

Dis adv:

1. It is incapable of removing dust & ash particles which remains in suspension with still air

2. It requires more power (b/c high vel is required to create vortex motion in the cyclone chamber)

3. It is collector is not flexible in terms of volume handled

4. pr loss is comparitively high from 2cm to 15cm water head.

5. It requires head room & placed outside the boiler room

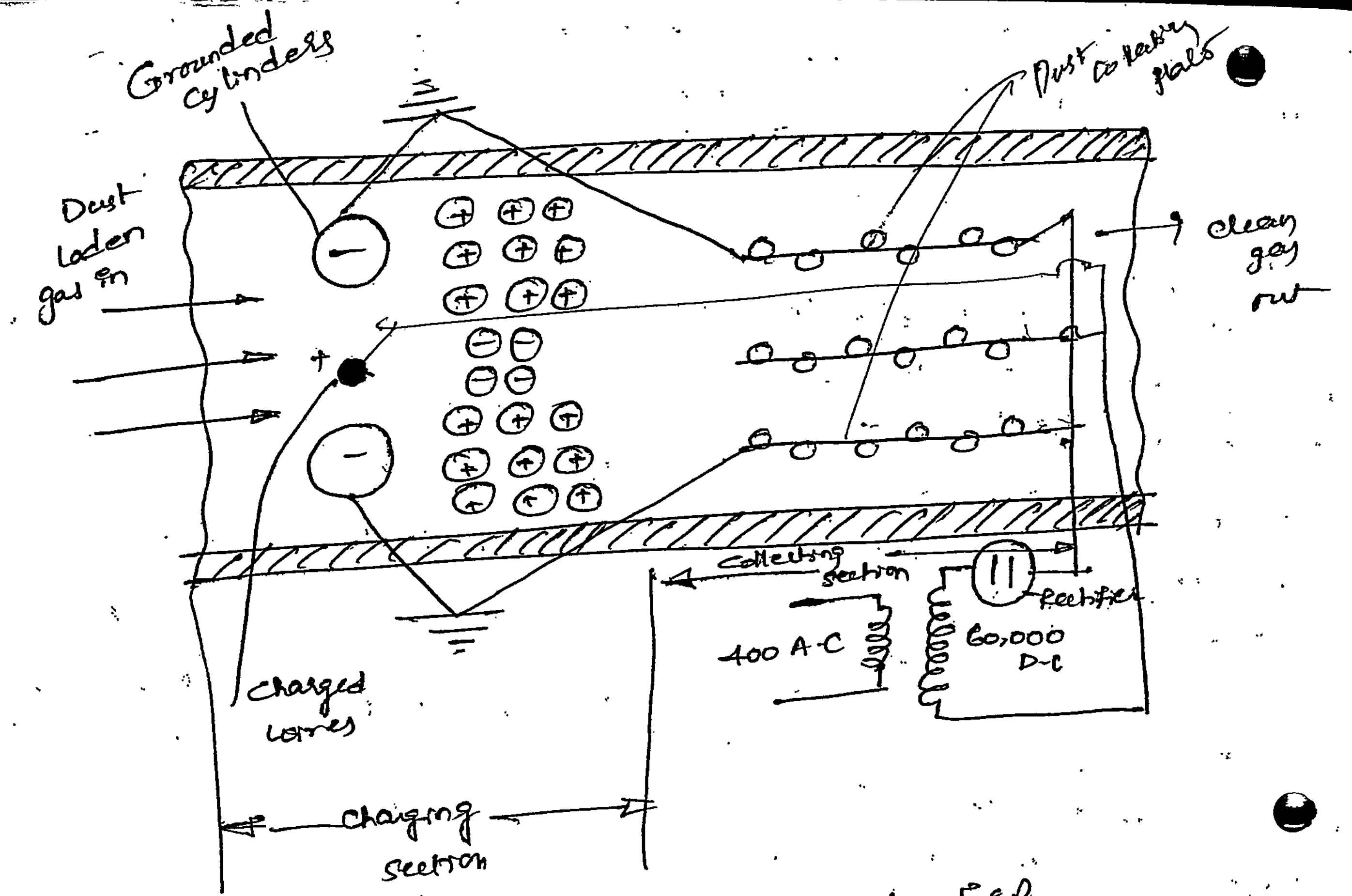
6. Collection η decreases as the fineness of dust particles increases.

Electrostatic precipitator:- (ESP)

These are extensively used in removal of fly ash from electric utility boiler emissions. The use of this collector is growing rapidly b/c of new, strict air quality codes. ESP can be designed to operate at any desired efficiency for use as a primary collector or as a supplementary unit to a cyclone collector.

Working principle:

The dust laden gas is passed b/w oppositely charged conductors and it becomes ionized as the voltage applied b/w the conductors is sufficiently large i.e. from 30,000 to 60,000 depending on electrode spacing. As dust laden gas is passed through these highly charged electrodes both -ve and +ve ions are formed, the latter being as high as 80%. The ionized gas is further passed through the collecting unit which consists of a set of vertical metal plates. Alternate plates are +vely



Lay out of different Components of ESP

charged & earthed. As alternate plates are grounded, high intensity electrostatic field exerts a force on positively charged dust particles and drives them towards the Ground plates. The deposited dust particles are removed from the plates by giving shaking motion with the help of cam driven by external means & it collected in dust hoppers. Care should be taken dust collected in hopper should not entrained in the clean gas.

Advantages: Draught loss is less (1cm of water head)

1. This is more effective to remove very small particles like smoke, mist and flyash. Its range of dust removal is sufficiently large 0.01 μ to 1 μ.
2. It is most effective for high dust loaded gas. Its efficiency is as high as 99.5%

3. The maintanance charges are least among all separators
4. The dust collected in dry form and can be removed either dry or wet

Dis advantages:

1. The direct current (D.C) is not available with the modern power plants, therefore considerable electric equipment is necessary to convert low voltage (400 V) A.C to high voltage 60,000 D.C. So capital cost is high

2. Running charges are high power required for charging is considerably large.

3. Space required is larger

4. Because of the closeness of (~~Sparking~~ Charging) plates & high potential used, it is necessary to protect the entire collector from sparking by providing a fine mesh before the ionising chamber. This is necessary b/c even a smaller piece of paper might cause sparking when it would carried across the adjacent plates or wires.

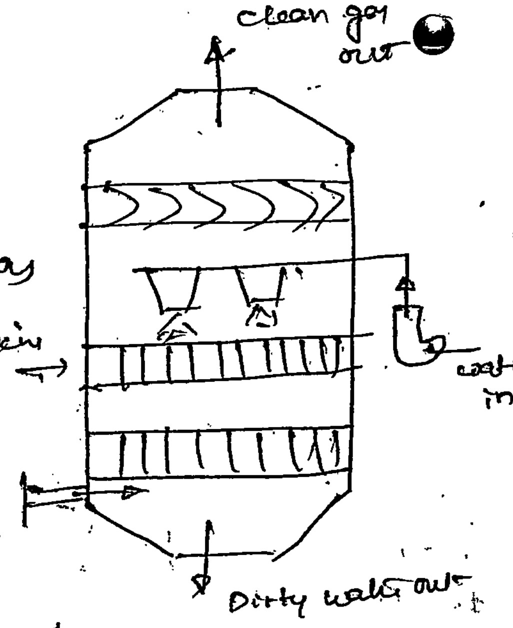
5. The efficiency of the collector is not maintained if gas velocity exceeds that for which the plant is designed.

A.C
230V
1 Amp
50 Hz — House hold

Wet collectors

Packed type wet collectors:

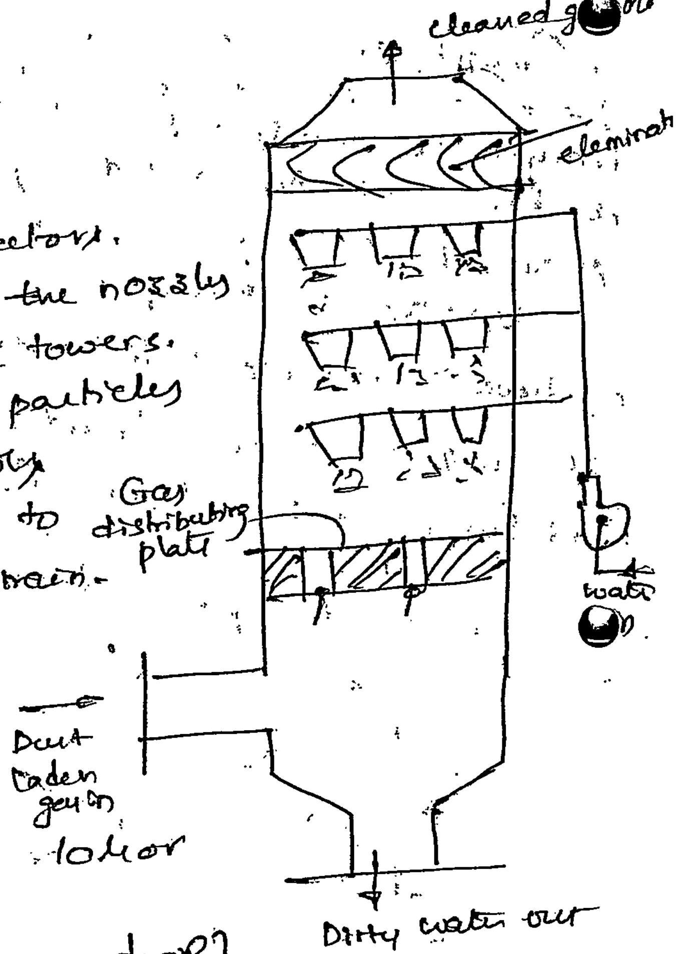
Scrubber is designed to make an intimate contact b/w slurry & gas. The slurry used may be broken into fine drops or particles by spray nozzles as in case of spray tower & may be devided into thin film by passing through a bed of tower packing. The slurry which comes out of tower becomes highly corrosive therefore it is necessary to construct the scrubber of high corrosion resistance material. (fibre reinforced plastic or high density polyethylene). The thickness of packing lies b/w 1 to 3 m.



Spray type Scrubber:

There are simplest wet collectors. The liquid is sprayed through the nozzles through the towers. into the gas stream The liquid particles wets dust particles which then drop out. Eleminators are provided at the outlet to avoid the spray drop lets entrainment & carry over. Eleminators are particularly essential when gas velocity exceeds 2 m/s. The use of spray towers is usually limited to particles of 10 μ or larger.

(They have no pressure drop)



Draught System,

The purpose of draught is to supply required quantity of air for combustion & to remove the burnt gases from the system.

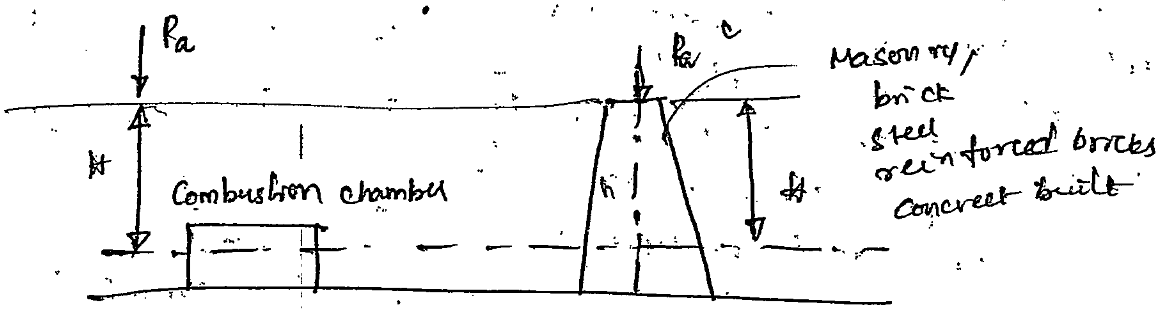
To remove air through fuel bed & to produce a flow of hot gases through the boiler, economizer, preheater & chimney require of a difference of pressure that is sufficient to accelerate the burnt gases to their final velocity & to overcome the pressure losses equivalent to pressure head.

✓ The difference of pressure required to maintain the constant flow of air & to discharge the gases through chimney to atmosphere is known as draught. ✓

Draught can be obtained by the use of chimney, fan, steam or air jet or combination of these. when the draught is produced with the help of chimney only it is known as Natural draught & when the draught is produced by any other means except chimney it is known as artificial draught.

→ Always there are losses in Air gas loop b/c $v^2/2g$ velocity head loss, head loss in equipments, fuel bed resistance, head loss in ducts & chimney (friction)

→ Natural draught & design of chimney (low cap plants)



The Natural draught is obtained with the use of tall chimney which may be sufficient to overcome the losses in the system.

$P_1 = P_a + w_g H$ (pressure acting on the grate from Chimney side)

$P_2 = P_a + w_a H$ (pressure acting on ~~Chimney~~ grate from atm side)

[Draught produced by the Chimney is due to the temp difference of hot gases in the Chimney & cold air out side Chimney].

$P_{Net} = P_2 - P_1$ $(w_a > w_g)$

$= H(w_a - w_g)$ kgf/cm²

The difference of pressure causes the flow of air through the combustion chamber & gases through the Chimney & is known as static draught.

The acting pressure can be increased by increasing the height of the Chimney or reducing the density of hot gases.

Advan:

1. It does not require any external force for producing draught.

2. Capital investment is less than Artificial Ad: The maintanance cost is less as it requires nil maintanance cost (bcz no mechanical part)

3. It keeps flue gases at a high place in Chimney & prevents the contamination of atmosphere atmosphere & maintains cleanliness.

4. It has long life.

Limit:

1. max pr available for producing natural draught is hardly 10 to 20 mm of water.

2. Draught decreases with increase of in outside air temperature. (So flue gases released at very high temp)

→ Artificial draught (Forced & Induced draught)

Draught produced by Chimney is affected by atmospheric conditions. It has no flexibility, poor efficiency & tall chimney is required.

The artificial draught used must be independent of atm condition, & it must have grater flexibility to take fluctuating loads on the plant. It reduces the height of chimney needed.

The draught required in actual power plant is sufficiently high (300 mm water) & to meet high draught requirement some other system must be used known as artificial draught. It is more economical when req draught is more than 40 mm of water. & It is draught produced by a fan known as mechanical draught.

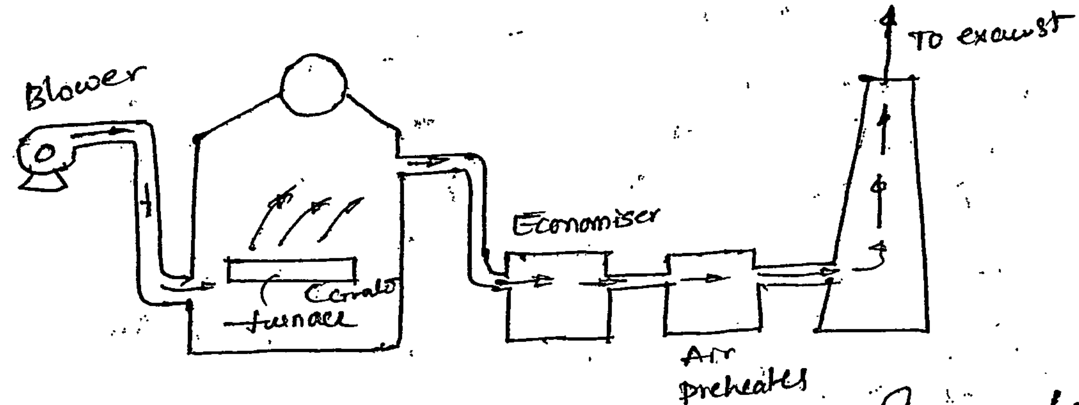
→ Forced draught

In forced draught system a blower is installed near the base of the boiler & air is forced to pass through the furnace, economiser, Air preheater & to the stack. This draught system is known as forced draught system or +ve draught system i.e. the pressure of air through out the system is above atm pressure & air is forced to flow through the system.

sde

hesic
ey

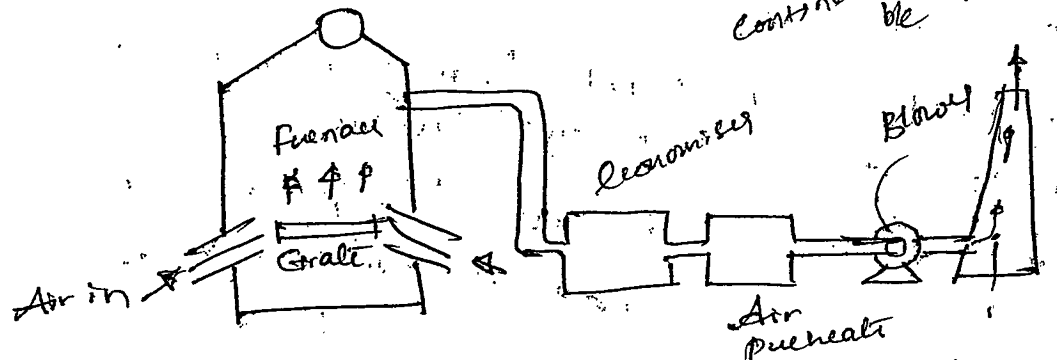
ghs



A stack or chimney is allowed in this system but its f^n is to discharge gases high in the atmosphere to prevent the contamination. It is not much significant for producing draught therefore height of the chimney may not be very much.

→ Induced draught:

(More required & b/c fan handles both gas & air) leakage of air continuous b/c pressure inside c atm pr



In this system the blower is located near the base of the chimney instead of near the grate. The air is sucked in the system by reducing the pr in the system below atmosphere. Induced draught fan sucks the burned gases from the furnace & pressure inside the furnace is reduced below atmosphere & induces atmospheric air to flow through the furnace. Its action of similar to the chimney. The draught produced is independent of the temperature of the hot gases therefore the gases may be discharged as cold as possible after recovering as much as heat possible in air preheater & economiser.

This draught is used generally when economiser & air preheater are incorporated in the system. The fan should be located at such a place that the temp of gases handled by fan is lowest. The chimney is also used in this system & its f^n is to discharge gases high in the atm to prevent the contamination. but total draught produced is the sum of the draughts produced by the fan & chimney.

→ comp of forced & Induced draught

1. power required in I.D is more (It handles air + fuel & volume of gas more)
2. water cooled bearings are required on I.D fo. with stand high temp of flue gases.
3. leakage of air in I.D b/c pressure inside furnace is less than atm pr
4. when doors are opend for firing in I.D there will be rush of cold air in to the furnace

↓ reduces — draught through system
— heat transmission η of the furnace.

→ Balanced draught :-

If the forced draught is used alone, then the furnace can't be opened either for firing or inspection b/c of high pressure inside air try to blow out suddenly & there is every chance of blowing out the fire completely and furnace stops.

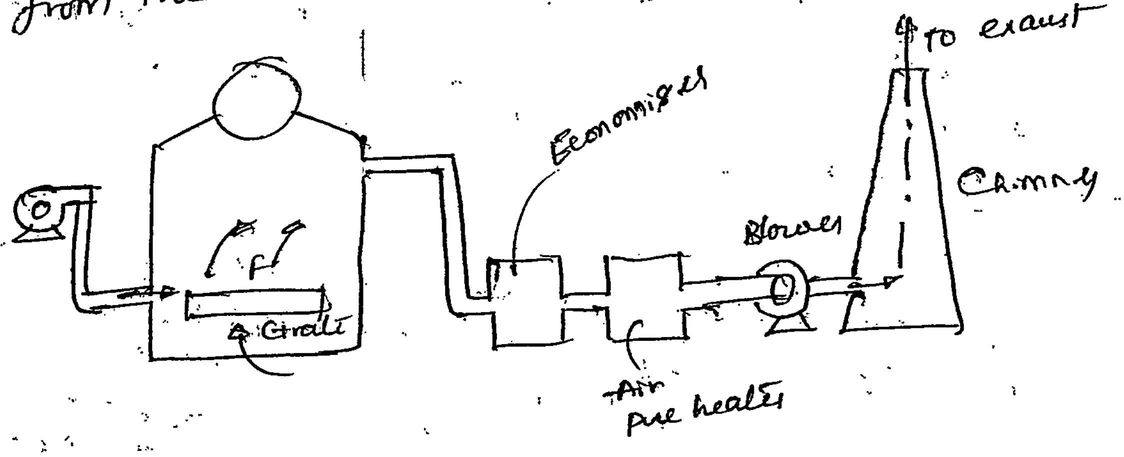
If the induced draught is also used alone, then also the furnace can't be opened for firing or inspection b/c the cold air will try to rush in to the furnace as the pressure inside the furnace is below atmospheric & dilutes the combustion. This reduces the effective draught pressure.

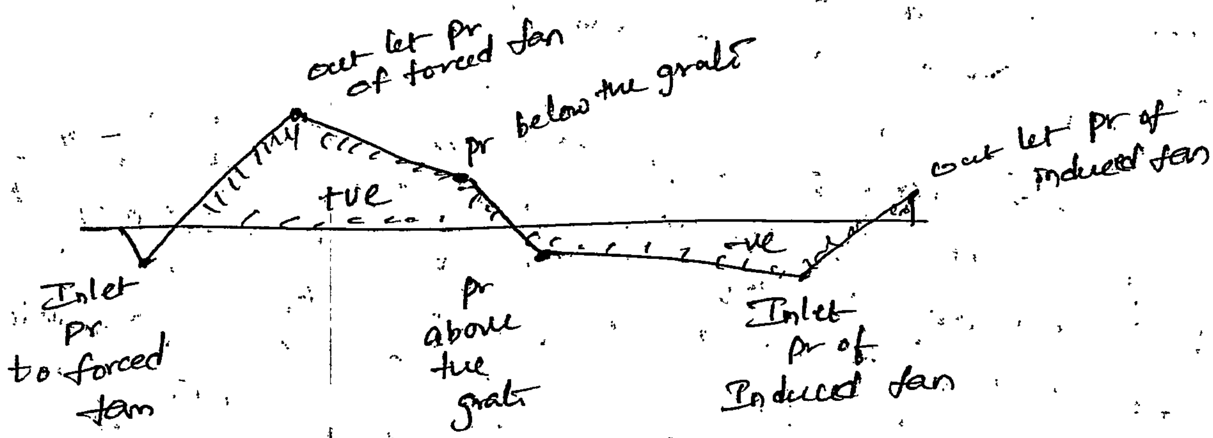
To overcome both difficulties a balanced draught is always preferred. It is a combination of forced draught and induced draught. The forced draught overcomes the resistance of fuel bed therefore sufficient air is supplied to the fuel bed for proper & complete combustion. The induced draught fan removes the gases from furnace maintaining the pressure in the furnace just below atmosphere. This helps to prevent the blow-off of flames when the doors are opened as the leakage of air is inwards.

It is obvious that the pressure inside the furnace is near atmospheric therefore there is no danger of blowout of flames or there is no inrushing of air into furnace when the doors are opened for inspection.

The pr of air below the grate is above atmosphere & it helps for proper & uniform combustion. The pr of air above the grate is below atmosphere & it

Helps to remove the exaust gases as quick as possible from the combustion zone





Pressure d.b

Cooling Towers

The cooling water takes latent heat of steam in the Condenser, the temperature of water increases.

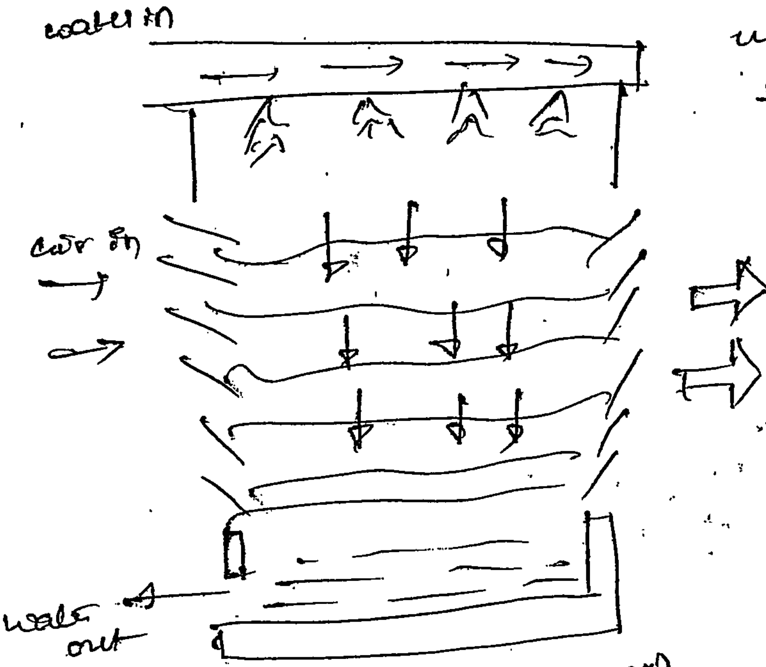
(I) : Atmospheric or Natural draft Cooling towers:

In natural draught cooling air flows naturally without fan through tower & provides required cooling

(1). Natural draft Spray filled tower

The air enters at left side & flows across the unit in transverse direction. The air circulation through the tower depends on wind velocity.

The capacity of this tower varies from 50 to 100 lit/m² min depending on air velocity



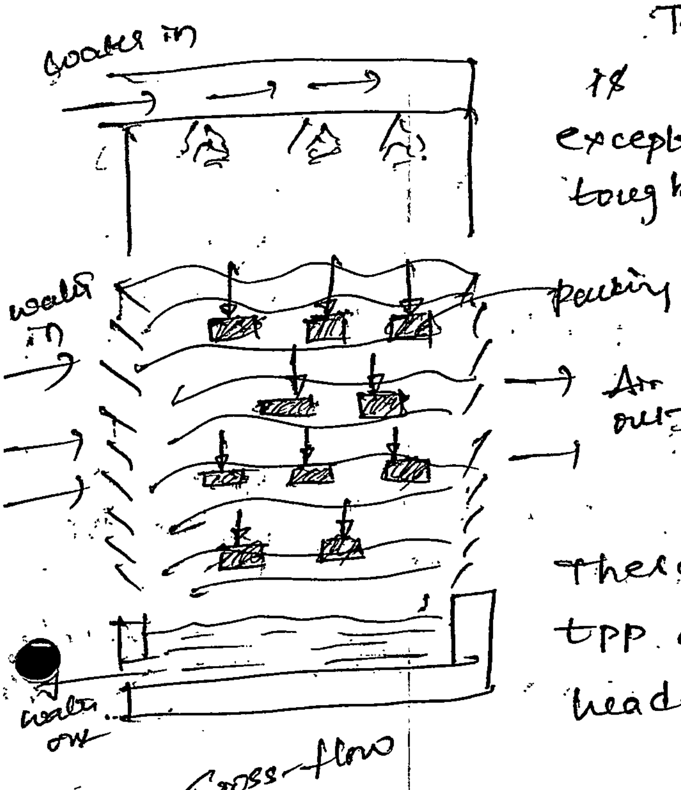
These towers are not used for high capacity thermal plants as cooling range is limited, wind losses are high & there is no control over outlet temperature of water.

These towers are used only for diesel P.P.

Cap 50 to 100 lit/minute/m²

Air : transverse direction

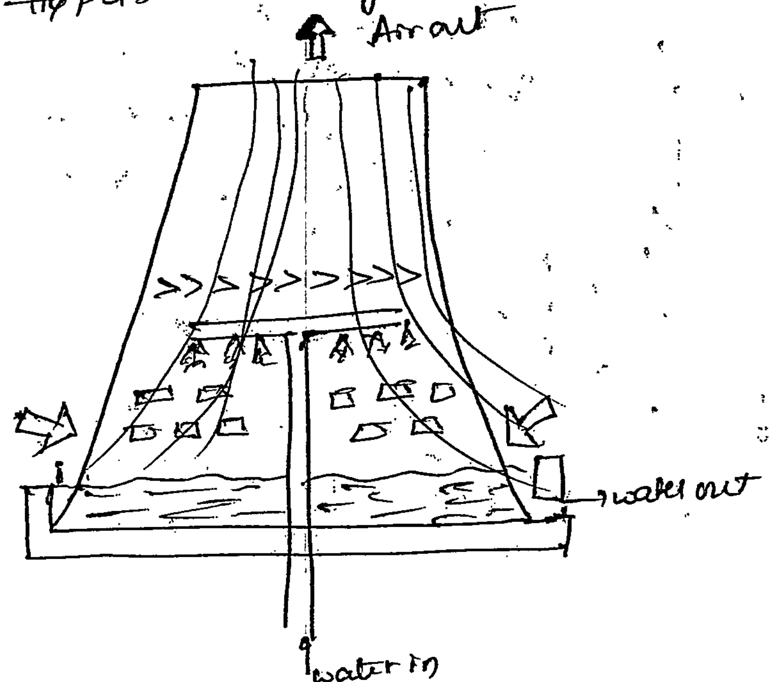
→ Natural draft packed type towers:



The construction of this tower is similar to spray filled tower except that water distributing troughs of fills are used which helps to break the water into small droplets. In this tower also the flow of air is cross wise to flow of water.

These towers also rarely used for TPP as original cost & pumping head required are high.

→ Hyperbolic cooling tower:



The cooling tower breaks the warm water into a spray or film of water & expose to flow of air. Some of heat in water is directly transferred to air stream & some of water evaporates providing sufficient cooling effect. Then the moist warm air goes to the atmosphere & cooled water is collected and returned to the power plant.

As natural cooling tower, there is no fan to create the flow of air in the hyperbolic cooling tower. But flow of air through is established by chimney action. The flow is created by the density difference b/w atm air & air inside the tower which has been warmed by the hot circulating air. Higher the relative humidity of air it contains more water vapour which lighter than air & the net density of high humidity air becomes lower than surrounding air. The difference in density creates necessary pressure head to create the flow. The diff in density is considerably small so the height of the cooling tower required to create +ve flow of air is considerably large compared with mechanical towers.

Mechanical draft cooling towers:-

They provide closer approach to WBT, give higher efficiency, reduce spray and windage losses & require reduced ground area. (i.e., less space & less piping)

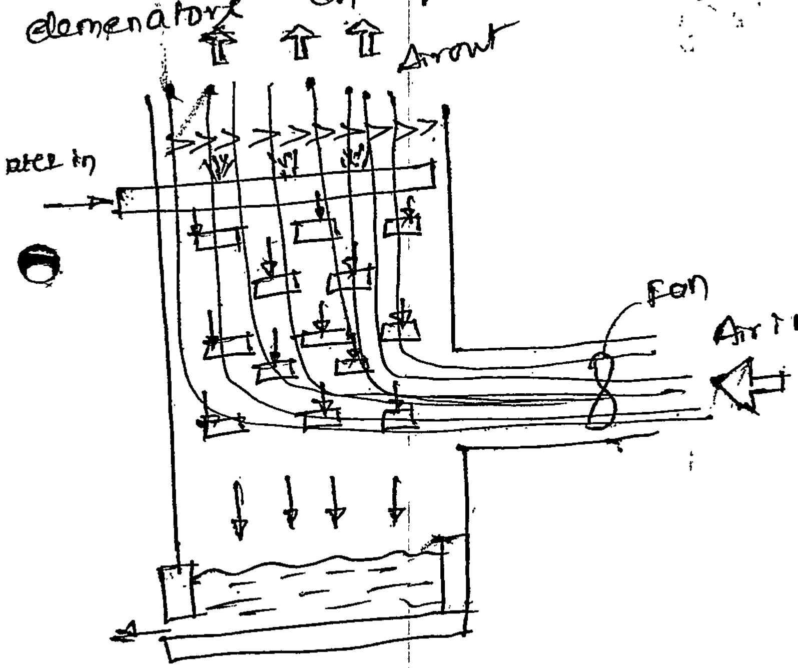
B/c of lower temperatures obtained by mechanical draft towers improves overall plant economy to cover the added operating charges & higher initial cost of installation.

They use fans to move air through the tower instead of depending on natural draft & wind velocity.

- Forced draft
- Induced draft
  - Counter flow
  - Cross flow

Forced draft tower:

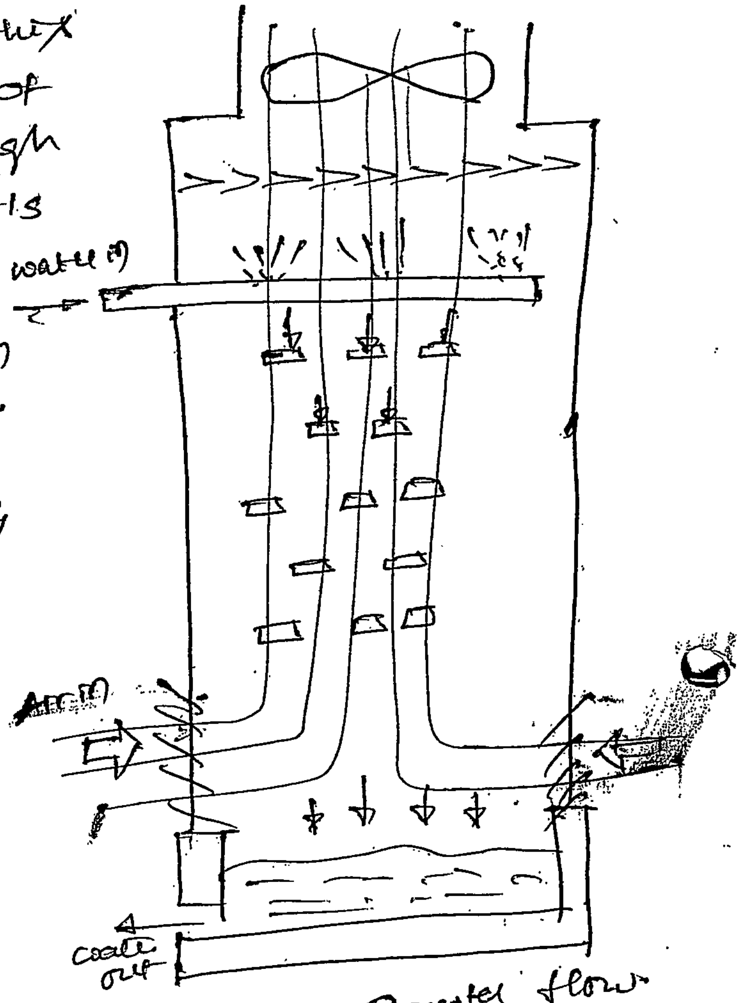
The fan is located at the base of the tower & air is blown up by the fan up through the descending water. The entrained water is removed by draft elemenators on top.



(2) Induced draft Counter flow tower:

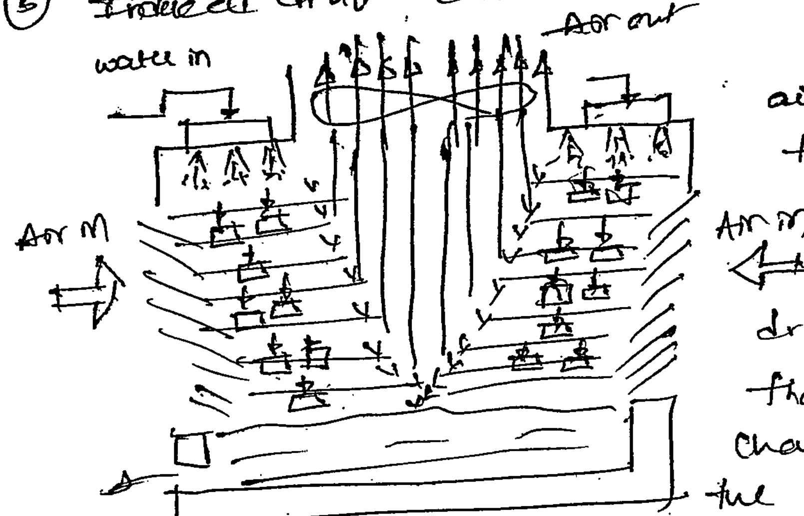
The difference lies only in supply of ~~water~~ air. In this fan is located at the top of tower & air enters through mesh located in the tower's side & is drawn up & discharged through the fan casing to the atmosphere.

M/L: Cooling tower - fibre glass, PVC & Stainless steel



Counter flow

(3) Induced draft cross flow tower

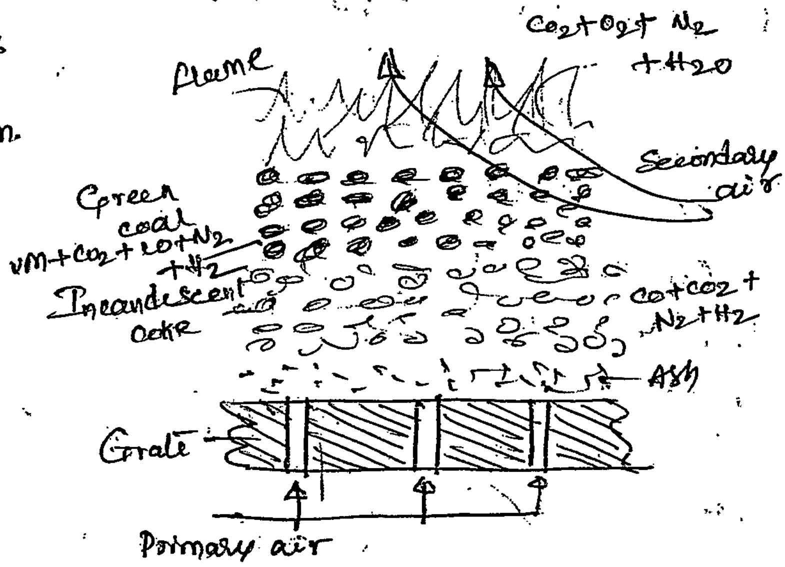


This tower provides horizontal air flow as water falls down the tower in the form of small droplets over filling. The fan centered at the top draws air through two cells that are paired to a suction chamber partitioned beneath the fan. The drift eliminators turn air toward outlet fan as air leaves the water sprays. The outstanding feature of this tower is lower air static pressure loss as there is less resistance to air flow.

Overfeed Supply of coal:

In case of overfeed stokers the coal is fed on to the grate above the point of air admission.

Mechanism of overfeed stoker—



overfeed Stoker

1) The pressurised air coming from the forced draught fan enters under the bottom of grate. The air passing through the grate heated by absorbing heat from ash & grate itself, where as ash & grate are cooled. As the hot air passes through incandescent coke, the O_2 reacts with C to form CO_2. Generally for a fuel bed of 8cm deep all the O_2 present in the air disappears in the incandescent region. The water vapour present in the air also reacts with C in incandescent zone & forms CO, CO_2, H_2. part of CO_2 formed reacts with C passing through incandescent zone & converts into CO. So the gases leaving incandescent zone consists of N_2, CO_2: CO, H_2 & H_2O.

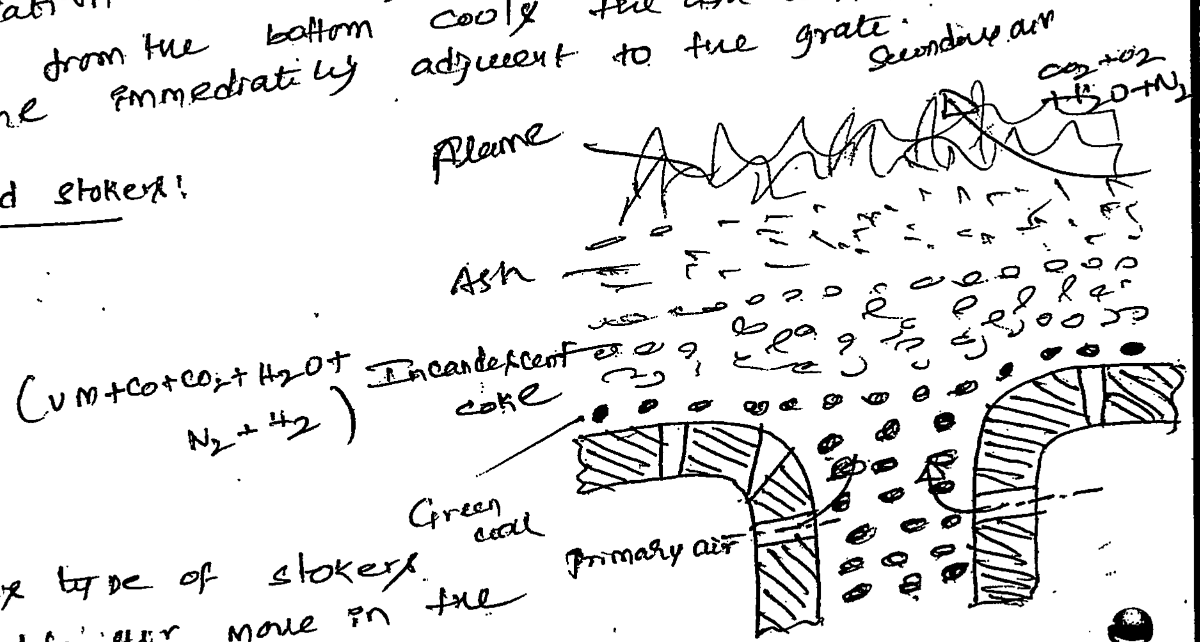
(2) The raw coal continuously supplied on the surface of the bed. Here it loses VM by distillation. The heat required for distillation is given by the incandescent coke below the fresh fuel, hot gases diffusing through the surface of the bed & hot gases & flame in the furnace above. The ignition zone lies directly below the raw fuel undergoing distillation.

The gases leaving the upper surface of the fuel bed contains combustible volatile matter from the raw fuel N_2, CO_2, CO, H_2, & H_2O. So additional secondary air is supplied to burn the remaining gases at very high speed to create turbulance which is required for complete combustion of unburned gases.

The burned gases entering the boiler contains N_2, CO_2, O_2 & H_2O & some CO if burning is incomplete.

During incandescence the fuel continuously losses its carbon by oxidation until only the ash remains. The primary air supplied from the bottom cools the ash until it rests on the plane immediately adjacent to the grate.

Under feed stokers:



In this type of stokers the fuel & air move in the same direction:

Mechanism :– The Air after passing through the holes in the grate meets raw coal. As it diffuses through the bed of raw coal, it meets the volatile matter generated by the raw coal. The heat for distillation comes by conduction from the mass of incandescent fuel bed which exist above the raw coal. The air mixes with the formed V.M & pass through ignition zone & then enters in to the region of incandescent coke.

The reactions which takes place in the incandescent zone of under feed stokes are exactly same as in over feed stokers except some breaking of the molecular structure of volatile matter takes place in incandescent zone & part of breaked volatile matter react with O_2 of air & the gases discharged to top of furnace. These gases contains V.M matter to some extent so supply of secondary air is required. The ash left in this is at higher temp than over feed stokers.

The rate of air supply has marked effect on speed of ignition as the rising of air cools the raw fuel prior to ignition. At low rate of air fuel, the heat flow by conduction from incandescent fuel bed downward is faster than the removal of heat by air. This pushes the ignition plane down below the bed surface & creates max depth of incandescent zone. As air flow rate increases it removes heat from the fuel bed at a rapid rate & raises the ignition zone nearer to fuel bed surface & reduces incandescent fuel. This can't takes place in over feed s/c the air has to pass through incandescent zone before reaching ignition plane..

suited → (semi bituminous & bituminous with ↑ V.M)

The V.M heated in incandescent zone & is at high temp before entering to the furnace burns quickly when mixed with secondary air.

In over feed V.M is some what cooler than furnace gases & requires long time for complete burning. This may create a tendency to form smoke.

→ Treatment of water

The available water must be pure before it is fed to the boiler.

Impurities — Suspended — mud, silt, clay, silica

Impurities — dissolved — calcium carbonate $CaCO_3$
calcium bicarbonate $Ca(HCO_3)_2$
calcium sulphate $(CaSO_4)$
magnesium bicarbonate $Mg(HCO_3)_2$
magnesium carbonate $MgCO_3$
mag sulphate
mag nitrate, calcium nitrate, $CaCl_2$
sodium sulphate & $MgCl_2$
$NaCl$
Bromoxides gases such as CO_2, O_2.

These impurities causes scales formation & decrease heat transfer & they restrict water flow through boiler tubes.

Troubles due to impurities are scales, corrosion, Embrittlement, carry over, gases.

Scale: these are hard or soft deposits on inner surface of boiler. They decrease heat transfer & causes boiler plate over heating.

Corrosion: This due to electrolytic action, water acidity, alkanity & due to gases. It produces pits, grooves, cracks on general wastage of material.

Embrittlement: This results in non uniform corrosion leading to accelerated cracks, in the edges of rivetted boiler plates, rivets & metal around openings in welded boilers & tube opening etc (where parts are highly stressed)

Carry over: The impurities ~~forms~~ separates as solids ~~impurities~~ from steam is called carry over. leads to priming & foaming.

Due to foaming steam ... a mass of frothy bubbles. | foaming occurs due to presence of alkalies, suspended organic | matter, oils, Sodium salts, Soda salts in water.

Priming is the discharge of slugs with steam.

(b/c of presence of | oil film on the boiler water
↓
excessive steam rate
↓
too high water level → improper circulation)

Gases: O_2 —induces→ corrosion, pitting of all m/c's parts with which it comes in contact especially at high temp

CO_2 → corrosion, scales by combining with other materials.

→ water hardness: | The scale forming property of water & its destroying power of a Standard soap test solution.

(Amount of scale forming materials — parts per million ppm)

Carbonate hardness — softened by heating & boiling → $CO_2 + CaCO_3 + MgCO_3$

non carbonate

pure water | — H^+ 10^{-7}
OH^- 10^{-7}

pH value: | pH < 7 — acidic; pH > 7 — alkaline

To limit corrosion boiler feed waters are generally maintained slightly alkaline.

Methods of water treatment

Mechanical	Thermal	Chemical
(a) sedimentation	(a) Distillation	(a) Lime treatment
(b) filteration	(b) Deaerative heating	(b) soda "
(c) Enterior painting		(c) Lime soda "
		(d) Zeolite "
		(e) Demineralisation

Sedimentation: allowing water stand still on flow with low velocity
↓
solid matter settles down
↓
Removing periodically

Filteration:
(dirty water + coagulants (gelatinous matter formed)
Aluminium sulphate
Na (sodium aluminate)
↓
(graded sand) filter (periodically filter cleaned)
↓
impurities adhere to filter
↓
clear water comes

→ **Distillation:** Raw water is evaporated with the help of steam. vapours are collected & condensed to give a supply of pure feed water

→ **Deaerative heating:** (dissolved gases removed by heating) deaerative
air + O_2 + CO_2 by using steam.

water is broken to fine droplets & heated to produce vapour with deaerator, air CO_2 & other gases separated.

Lime treatment: (Suitable for treatment of carr...

$$2CO_2 + 2Ca(OH)_2 \rightarrow 2CaCO_3\downarrow + H_2O$$

$$Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3\downarrow + 2H_2O$$

$$Mg(HCO_3)_2 + Ca(OH)_2 \rightarrow Mg(OH)_2 + 2CaCO_3\downarrow + 2H_2O$$

$$2NaHCO_3 + Ca(OH)_2 \rightarrow CaCO_3\downarrow + Na_2CO_3 + 2H_2O$$

Soda treatment: (Suitable for water containg non carbonate impurities)

$$CaSO_4 + Na_2CO_3 \rightarrow CaCO_3\downarrow + Na_2SO_4$$

$$CaCl_2 + Na_2CO_3 \rightarrow CaCO_3\downarrow + 2NaCl$$

Lime soda treatment: Suitable if both carbonate & non carbonate hardness present

$$MgSO_4 + Na_2CO_3 + Ca(OH)_2 \rightarrow CaCO_3\downarrow + Mg(OH)_2\downarrow + Na_2SO_4$$

$$MgCl_2 + Ca(OH)_2 + Na_2CO_3 \rightarrow Mg(OH)_2 + CaCO_3\downarrow + 2NaCl$$

Zeolite treatment: (It is green sand in granular form)

Zeolite treatment is one of ion-exchange process where cations of two or more +ve charges exchanged. Natural zeolite have Sodium & Hydrogen base.

$$CaSO_4 + Na_2Z \rightarrow Na_2SO_4 + CaZ$$

$$Mg(HCO_3)_2 + Na_2Z \rightarrow MgZ + 2NaHCO_3$$

$$CaSO_4 + H_2Z \rightarrow H_2SO_4 + CaZ$$

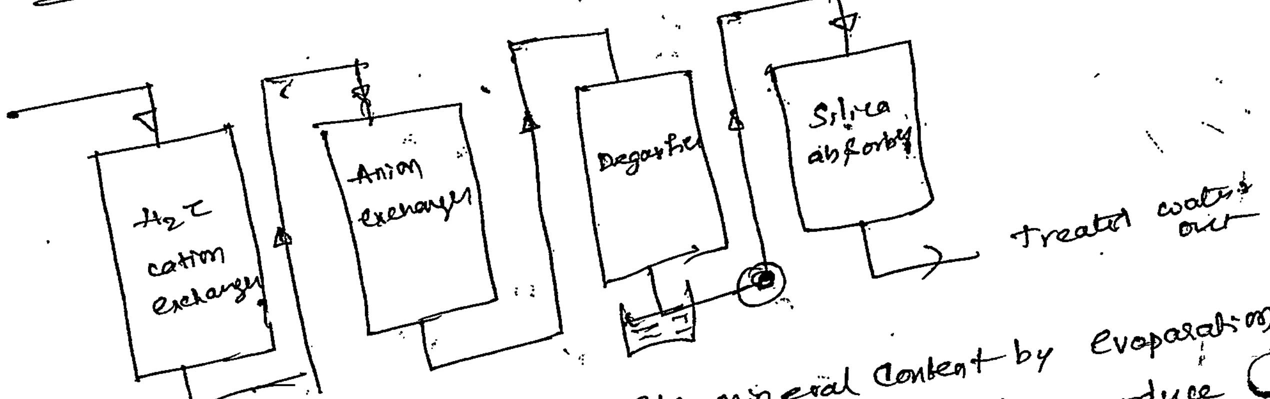
Sodium zeolite $(Na_2(Al_2SiO_2O_8))$

Na_2Z

Zeolite can be regenerated through back washing with sodium chloride

$CaZ + 2NaCl \rightarrow CaCl_2 + Na_2Z$
$MgZ + 2NaCl \rightarrow MgCl_2 + Na_2Z$
for $H_2Z \rightarrow H_2SO_4$

4) Demineralisation:



Water may be freed from its mineral content by evaporation or by series of cation & anion exchangers to produce distilled water. Then it is passed through degasifier & then the final exchanger absorb silica.

1\. Internal treatment: Even though feed to boiler is low in impurities continued operation causes build up of impurities in the boiler.

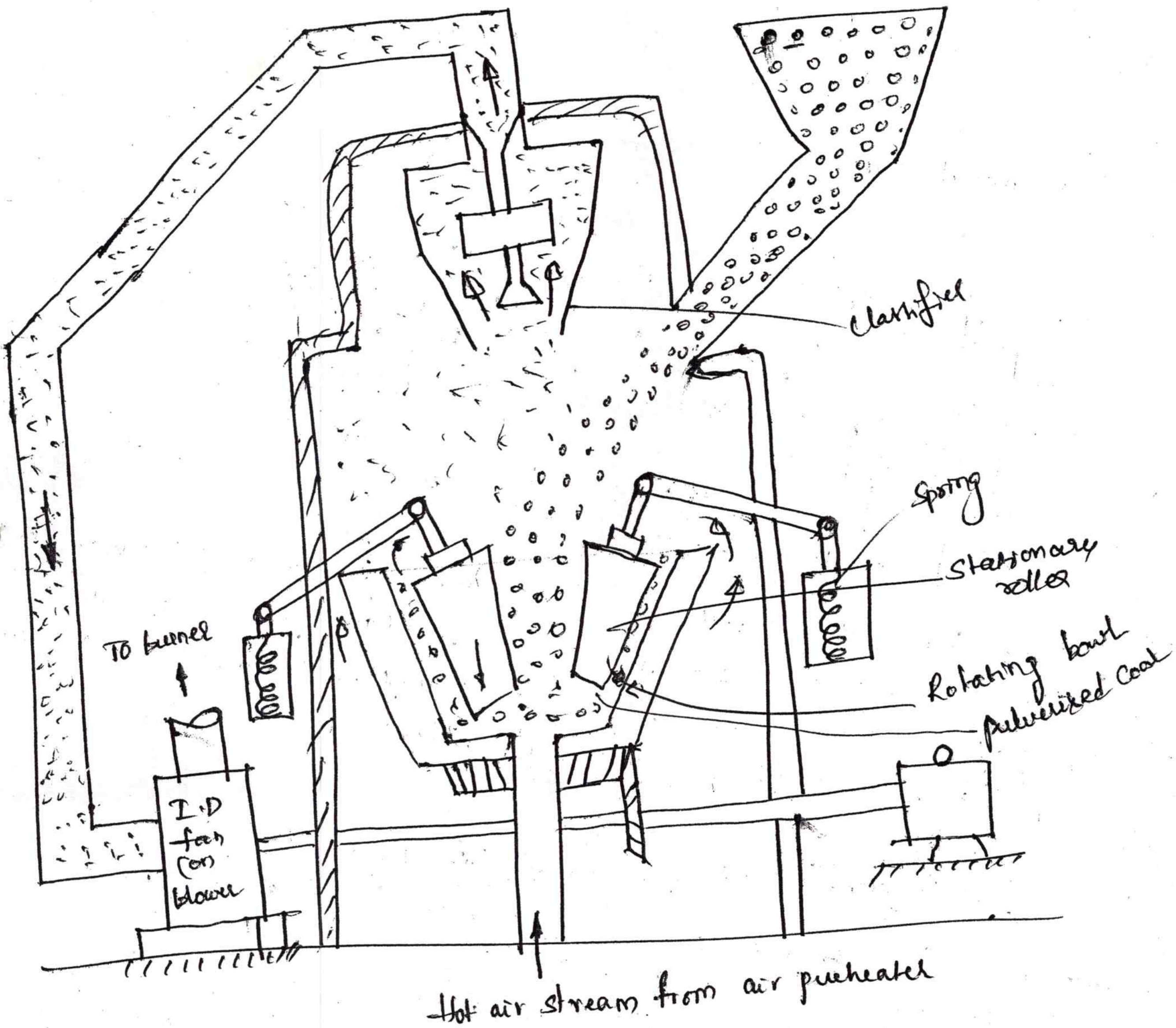
So internal treatment is applied includes
(i) Conversion of soluble scale forming & Mg salts to insoluble form
(2) The precipitated sludge in fluid form removed boiler blow down.

① phosphate is used (to remove cal salts) → tri sodium phosphate, increase alkaline; di sodium ph; mono " ; sodium meta phosphate, increase acidic nature

Trisodium + w → Tricalsalt ↓ Cps

② organic matter is added

Bowl mill.



classifier
Spring
Stationary roller
To burner
Rotating bowl
pulverized coal
I.D fan (or) blower
Hot air stream from air preheater

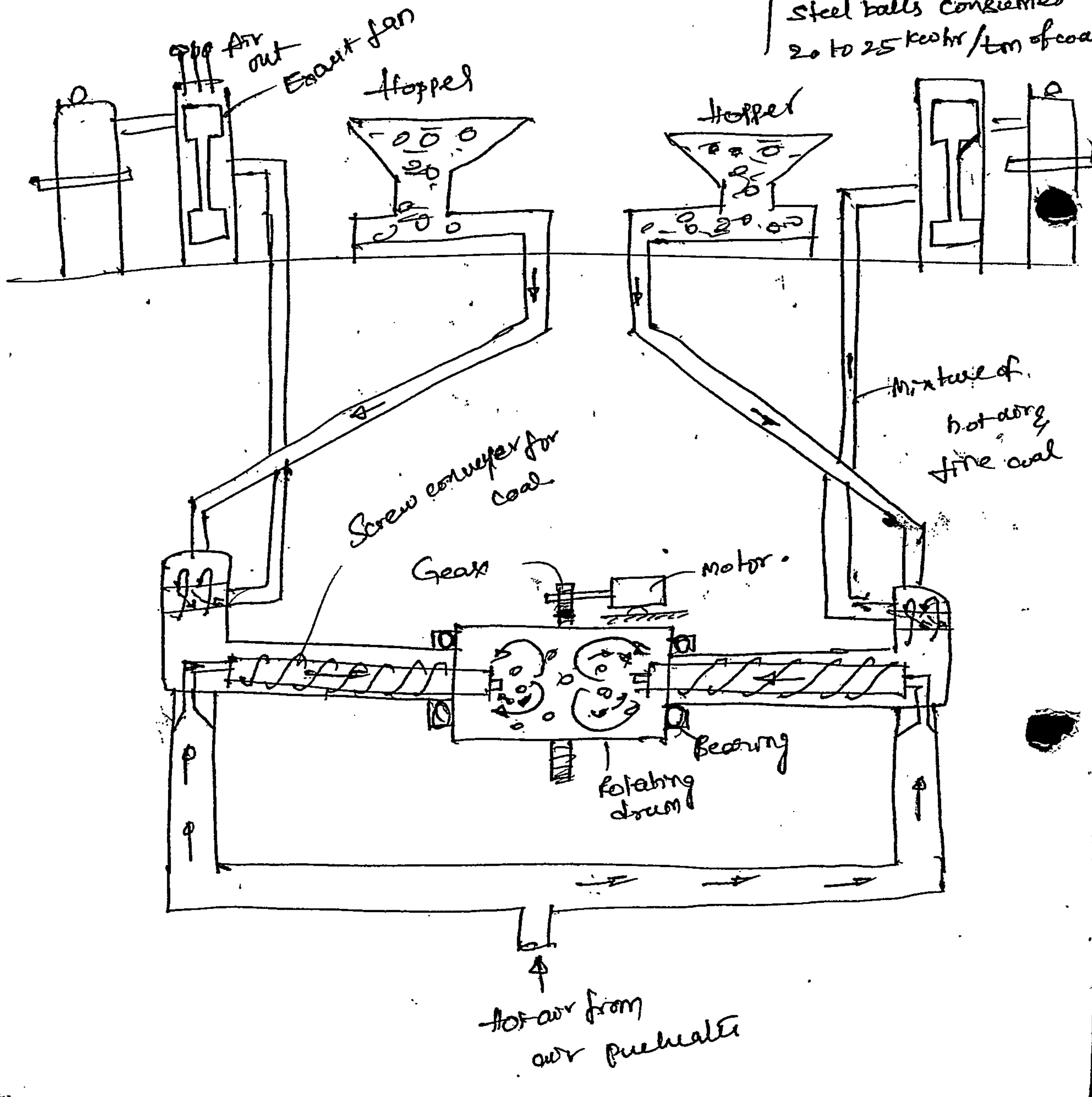
Energy content high heating value
low sulphur content
Good burning char (without agitation)
Grindability
weatherability
Ash softening temp

Steelballs -
2.5 to 5 cm dia
coal - 6mm
Cylinder vel
- 120 m/min
Peripheral vel

Pulveriser - 10 tons/hr
containing 4% moisture
required 28 tons of
steel balls consumes
20 to 25 kWhr/ton of coal

Coal

Double classifier Ball mill



NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

PREVIOUS QUESTION PAPERS

Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME4104

IV B.Tech I Semester Regular&Supple Examinations, January-2022

POWER PLANT ENGINEERING

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What are the advantages of artificial draught over natural draught[K1,CO2,2M]
   (b) Draw the layout of diesel power plant? [K2,CO4,2M]
   (c) Differentiate between dams and spillways used in hydroelectric power plants. [K2,CO5,2M]
   (d) Define radioactivity. [K1,CO3,2M]
   (e) What is a run-of-river plant? [K1,CO5,2M]
   (f) What are fixed and operating costs? [K1,CO6,2M]

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain with a simple sketch working of thermal power plant [K2,CO1,6M]
   (b) What are renewable and non - renewable energy sources? Discuss with reference to Indian scenario. [K1,CO1,6M]

3. (a) What are the advantages of mechanical draught in a boiler? [K1,CO2,6M]
   (b) Explain the site selection criterion of hydro power plant. [K2,CO5,6M]

4. (a) Describe the inplant coal handling with a neat diagram [K2,CO3,6M]
   (b) What are the advantages of forced draft over induced draft. [K1,CO3,6M]

5. (a) What methods are used to improve the efficiency of gas turbine power plant?[K1,CO4,6M]
   (b) Differentiate Boling water reactor with Pressurized water reactor. [K2,CO4,6M]

6. (a) Discuss with a simple sketch, thermostat cooling system in Diesel power plant. [K2,CO5,6M]
   (b) Draw a neat line diagram of a diesel power plant showing all the systems and explain the working [K2,CO5,6M]

7. (a) What is a load curve and its significance? [K2,CO6,6M]
   (b) Differentiate between fixed cost and running cost in an organization. [K2,CO6,6M]

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NARASARAOPETA ENGINEERING COLLEGE NARASARAOPET

(AUTONOMOUS)

IV B.TECH I SEM REGULAR AND SUPPLY EXAMINATIONS MARCH-2021

SUBJECT: **POWER PLANT ENGINEERING**

SBUJECT CODE: **R16ME4104**

ANSWER KEY

PART –A

1.a

Stoker, machine for feeding **coal** or other solid fuel into a furnace, usually supporting the fuel during combustion. A good **stoker** also supplies air for combustion and regulates the rate of burning and, in large installations, disposes of the ashes. **Use of stokers** affords substantial fuel savings over hand firing.

1b.

A super heater is a device used to convert saturated steam or wet steam into superheated steam or dry steam. Superheated steam is used in steam turbines for electricity generation, steam engines, and in processes such as steam reforming.

Function of the **super heater** is to increase the temperature of steam above its saturation temperature. As heat contained in unit mass of superheated steam is more than dry saturated or wet steam, it is extensively used in steam power plants.

1.c

Nuclear fission	Nuclear fusion
In fission reactions, a heavy nucleus is split into two nuclei with smaller mass numbers.	In fusion reactions, two light nuclei are combined to form a heavier, more stable nucleus.
High-speed neutrons are required in nuclear fission reactions.	Very high temperature is required for nuclear fusion reactions
The amount of energy required to split two atoms in a fission reaction is less as compared to fusion reaction.	A tremendous large amount of energy is required to bring two or more protons close enough to overcome their electrostatic force of repulsion.
Tremendous large amount of energy is released by fission reactions; but lower than the energy released by nuclear fusion.	The energy released by fusion reactions is three to four times greater than the energy released by fission reaction.
The energy produced by nuclear fission reactions is used in nuclear power plans for generation of electricity.	The energy produced by fusion reaction is not controlled as far and cannot be used for generation of electricity. It is used in Sun through which energy is created.

1d) 1. An electric motor or an I.C. engine is necessary for starting the plant. The starting motor must bring the compressor well towards the operating speed. So, starting is not simple as in the case of other power plants.

2. Gas turbine plants have less vibrations when compared with reciprocating engines of the same speed. However the high frequency noise from the compressor is objectionable.

3. High temperatures impose severe restriction on the servicing conditions of the plant.

4. Overall efficiency is low since two-thirds of the total power output is used for driving the compressor.

5. The blades of the turbine require special cooling methods due to the severity of operating temperatures and pressures. In practice, the temperatures at the entry of the turbine are as high as 1100°C - 1260°C. Hence they should be made of special metals and alloys.

1.e) Capacity factor is the measure of how often a power **plant** runs for a specific period of time. It's expressed as a percentage and calculated by dividing the actual unit electricity output by the maximum possible output. This ratio is important because it indicates how fully a unit's **capacity** is used

1.f) Diversity factor is defined as the ratio of the sum of the maximum demands of the various part of a system to the coincident maximum demand of the whole system. The maximum demands of the individual consumers of a group do not occur simultaneously. Thus, there is a diversity in the occurrence of the load. Due to this diverse nature of the load, full load power supply to all the consumers at the same time is not required.

The **utilization factor** or **use factor** is the ratio of the time that a piece of equipment is in use to the total time that it could be in use. It is often averaged over time in the definition such that the ratio becomes the amount of energy used divided by the maximum possible to be used. These definitions are equivalent.

PART -B

2.a)

Site selection and Factors Affecting the Location of Dam of Hydroelectric Power Plants

- Storage of water:
- Cost and type of land:
- Transportation facilities:
- Constituents of a **hydro-electric plant**.
- **Hydraulic** structure:
- A schematic arrangement of **hydro-electric power station** & its operation:

Following factors must be consider while selecting the site of the hydro generating station.

- The quantity of water available
- Storage of water
- Head of water
- The distance of power station site from load centers
- Accessibility of the site
- Water pollution
- Geological investigation
- Environmental effect

2b)

Hydroelectric Power Plant is classified based on:

- Availability of Water Head
- According to Load Type

Classification of Hydroelectric Power Plant Based on Availability of Water Head

They are of 3 types:

- Low Head Hydroelectric Power Plant
- Medium Head Hydroelectric Power Plant
- High Head Hydroelectric Power Plant

Low Head Hydroelectric Power Plant

The Propeller Turbines are used for the Low Head Power Plant. The dam is placed just ahead of the water resources such as the pond or the river. The water level is directed to the Turbine through the Penstock.

Medium Head Hydroelectric Power Plant

This power plant has a Fore bay created mainly to store water. They are the storage tank which taps the river water which goes to the Turbine through the Penstock. The Fore bay serves as a surge tank.

High Head Hydroelectric Power Plant

The dam constructed usually is for maximum reserve water level. The Surge tank stores the additional water which would be required during the peak load time with the supply to the Turbine.

Classification of Hydroelectric Power Plant Based on Load Supply

There are 3 types of load supply types mentioned below:

- Base Load Supply

- Peak Load Supply
- Pumped Storage

Base Load Supply
This type of Power Plant is a large capacity plant providing extensive supply. There is a Base portion to the load curve of the Power Plant. This sort of Power Plant is suitable for the constant load.

Peak Load Supply
As the name suggests, the Power Plant is suitable for the peak load curve. This needs a big capacity water storage facility.

Pumped Storage
The demand for the electricity is never on a decline. However, the consumption changes during the day and the night with the use of electricity. To match this demand the pumped storage method is utilized. Here, the water is kept in reserve for the high demand periods which comes from the Turbines to back up a storage pool which is situated above the power plant. This is done during the night when the consumption is low. The water is let back out when the demand is high usually during the day.

3a)

Coal delivery equipment is one of the major components of plant cost. The various steps involved in coal handling are as follows:

1. Coal delivery.
2. Unloading
3. Preparation
4. Transfer
5. Outdoor storage
6. Covered storage
7. In plant handling
8. Weighing and measuring
9. Feeding the coal into furnace.

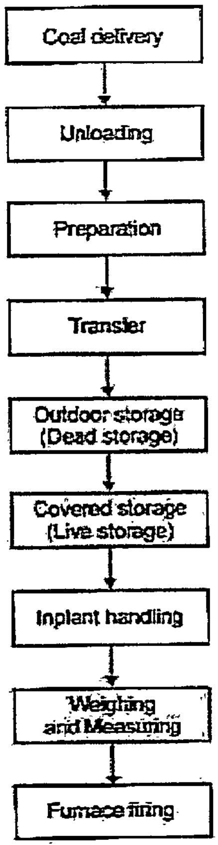


Figure: Steps involved in fuel handling system

3b)

Power generation industry studies have shown that coal pulveriser are an area where improved equipment reliability is badly needed. The Electric Research Institute (EPRI) has determined that 1% of plant availability is lost on average due to pulveriser related problems.1 EPRI also identified oil contamination and excessive leakage as two areas where pulveriser drive train failures account for 53% of pulveriser problems.

Description Pulverization is currently the favoured method of preparing coal for burning. Mechanically pulverizing coal into a fine powder enables it to be burned like a gas, thus allowing more efficient combustion. Transported by an air or an air/gas mixture, pulverized coal can be introduced directly into the boiler for combustion.

There are several pieces of equipment involved in processing coal to be burned in this fashion. Figure 1 is a simplified diagram detailing this equipment in a direct-fired coal burning system.

Combustion Engineering, Babcock & Wilcox, and Riley Stoker Corp. are major manufacturers of coal pulverizing equipment. The four most common types of coal pulveriser's are:

Ball-Tube Mills
This type of mill consists of a rotating tube filled with cast alloy balls. Coal is introduced through two hollow grunions on each side of the tube. As the tube rotates, the balls tumble onto the coal, crushing and pulverizing it.

Impact Mills
Grinding Action is carried out by a series of hinged or fixed hammers revolving in an enclosed chamber with wear resistant plates. The hammers impact on the coal, crushing it against the plates. Further pulverization is achieved as the smaller coal particles are ground through attrition against each other and the grinding face.

Vertical Roller Mills
This mill uses hydraulically loaded vertical rollers resembling large tires to pulverize raw coal fed down onto a rotating table. As the table rotates, the raw coal is pulverized as it passes underneath the rollers. Hot air forced through the bottom of the pulverizing chamber removes unwanted moisture and transports the pulverized coal dust up through the top of the pulveriser and out the exhaust pipes directly to the burner. The more recent coal pulveriser designs are Vertical Roller Mills. Figure 2 shows a cutaway view of a Babcock and Wilcox MPS Pulveriser.

Ring-Roll and Ball-Race Mills A ball or roller between two races or rings provides the grinding surfaces on which pulverization occurs. One or both of the races may rotate against a ball or roll (in a Ring-Roll Mill the rolls may rotate while the ring is stationary). Ring-Roll (Bowl-Mill) and Ball-Race Mills comprise the majority of coal pulveriser's currently in service at power generating facilities.

4a)

Various Nuclear Waste Disposal Methods
One of the most recent goals with nuclear waste is to try and reduce the overall amount produced. Mostly, these recommendations take the form of being careful where and how radioactive materials are handled, and using the least amount of nuclear materials possible to do the job needed.

However, when it comes to properly disposing nuclear waste, from low-level to high level, there are certain standard types of making sure it is handled and irradiated properly.

o **Incineration**: Burning radioactive waste is largely done through commercially-operated incinerators developed for this purpose, although certain large companies have the means to do this on their own. Incineration is common with low-level waste, as this material usually consists of clothing or other common items that have simply been contaminated.

- **Storage**: Over time, the radioactivity of nuclear material does decay, so storing this material until it is no longer radioactive is another way to deal with proper nuclear waste disposal. This process, called radioactive decay, depends on the amount of materials and the radioactivity level. Therefore, storage is typically only done with radioactive waste that has a shorter half-life, or the amount of time it takes for the material's radioactivity to be reduced by half. There are commercial storage facilities for this waste, while some approved companies have their own means of storage.
- **Shallow Burial**: Highly radioactive material is hard to bury, but when it comes to mill tailings, these remnants can often be buried in a specially-crafted spot nearby the mill itself. Often, this includes creating a pile of tailings, covering it with a non-permeable material like clay. The pile is often typically buttressed by a mix of rocks and soil so that it doesn't erode.
- **Deep Burial**: While shallow burials can be done with low-level waste, the most common way of disposing of high-level waste is in deep burial pits. Many countries with natural resources follow this procedure of geological disposal, which consists of burying the material deep within the earth. Oftentimes, underground laboratories are built to monitor usage and storage of the materials. However, as of now, there is *no* government that has a facility for this type of disposal, although one is being created in Finland.
- **In water**: At nuclear sites, a common way of storing material is in water. Nearly all of these sites have a special pond or have a special pool constructed, which is a place that they can store fuel that has already been used for the process of generating power.
- **Recycling**: For some radioactive material, such as previously used fuel, certain radioactive elements can be processed or extracted for reuse. Uranium and plutonium elements have long lives, so they can be separated and recycled.
- **The Ocean**: A very small amount of liquid waste that is common when waste is reprocessed to extract usable elements is released into the ocean. This process is highly controlled, and radiation levels are deemed to be so low that they are inconsequential. However, recent agreements between companies that rely on nuclear materials have phased out this procedure.

While these are commonly used ways to dispose nuclear waste, there have been some proposals for alternate methods, although none of have been seriously considered. Some of these alternate disposal forms include:

- **Space Disposal**: The expense related to this is far too prohibitive when compared with the positive effects.
- **Seabed Disposal**: Another proposal was to embed waste deep within the seabed. However, international powers decided that the risk was far greater than the benefits.

Long-term aboveground Storage Bunkers: While some nuclear companies *do* have storage facilities above-ground, these are temporary and meant to make the waste more accessible for reuse, or to have it decay enough for another form of disposal. However, permanent above ground storage has been discarded in favor of deeper burials within the ground.

4b)

Components of a nuclear reactor

There are several components common to most types of reactor:

Fuel
Uranium is the basic fuel. Usually pellets of uranium oxide (UO_2) are arranged in tubes to form fuel rods. The rods are arranged into fuel assemblies in the reactor core.* In a 1000 MWe class PWR there might be 51,000 fuel rods with over 18 million pellets.

* In a new reactor with new fuel a neutron source is needed to get the reaction going. Usually this is beryllium mixed with polonium, radium or other alpha-emitter. Alpha particles from the decay cause a release of neutrons from the beryllium as it turns to carbon-12. Restarting a reactor with some used fuel may not require this, as there may be enough neutrons to achieve criticality when control rods are removed.

Moderator
Material in the core which slows down the neutrons released from fission so that they cause more fission. It is usually water, but may be heavy water or graphite.

Control rods or blades
These are made with neutron-absorbing material such as cadmium, hafnium or boron, and are inserted or withdrawn from the core to control the rate of reaction, or to halt it.* In some PWR reactors, special control rods are used to enable the core to sustain a low level of power efficiently. (Secondary control systems involve other neutron absorbers, usually boron in the coolant – its concentration can be adjusted over time as the fuel burns up.) PWR control rods are inserted from the top, BWR cruciform blades from the bottom of the core.

* In fission, most of the neutrons are released promptly, but some are delayed. These are crucial in enabling a chain reacting system (or reactor) to be controllable and to be able to be held precisely critical.

Coolant
A fluid circulating through the core so as to transfer the heat from it. In light water reactors the water moderator functions also as primary coolant. Except in BWRs, there is secondary coolant circuit where the water becomes steam. (See also later section on primary coolant characteristics.) A PWR has two to four primary coolant loops with pumps, driven either by steam or electricity – China's Hualong One design has three, each driven by a 6.6 MW electric motor, with each pump set weighing 110 tonnes.

Pressure vessel or pressure tubes
Usually a robust steel vessel containing the reactor core and moderator/coolant, but it may be a series of tubes holding the fuel and conveying the coolant through the surrounding moderator.

Steam generator
Part of the cooling system of pressurised water reactors (PWR & PHWR) where the high-pressure primary coolant bringing heat from the reactor is used to make steam for the turbine, in a secondary circuit. Essentially a heat exchanger like a motor car radiator.* Reactors have up to six 'loops', each with a steam generator. Since 1980 over 110 PWR reactors have had their steam generators replaced after 20-30 years service, over half of these in the USA.

* These are large heat exchangers for transferring heat from one fluid to another – here from high-pressure primary circuit in PWR to sécondary circuit where water turns to steam. Each structure weighs up to 800 tonnes and contains from 300 to 16,000 tubes about 2 cm diameter for the primary coolant, which is radioactive due to nitrogen-16 (N-16, formed by neutron bombardment of oxygen, with half-life of 7 seconds). The secondary water must flow through the support structures for the tubes. The whole thing needs to be designed so that the tubes don't vibrate and fret, operated so that deposits do not build up to impede the flow, and maintained chemically to avoid corrosion. Tubes which fail and leak are plugged, and surplus capacity is designed to allow for this. Leaks can be detected by monitoring N-16 levels in the steam as it leaves the steam generator.

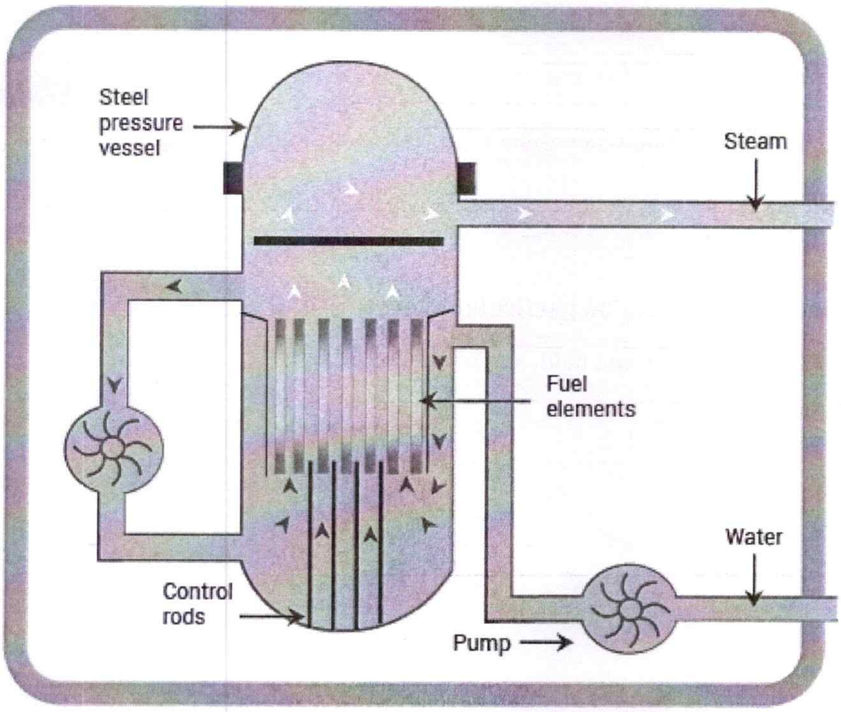
Containment
The structure around the reactor and associated steam generators which is designed to protect it from outside intrusion and to protect those outside from the effects of radiation in case of any serious malfunction inside. It is typically a metre-thick concrete and steel structure.

Newer Russian and some other reactors install core melt localisation devices or 'core catchers' under the pressure vessel to catch any melted core material in the event of a major accident.

* Zirconium is an important mineral for nuclear power, where it finds its main use. It is therefore subject to controls on trading. It is normally contaminated with hafnium, a neutron absorber, so very pure 'nuclear grade' Zr is used to make the zircaloy, which is about 98% Zr plus about 1.5% tin, also iron, chromium and sometimes nickel to enhance its strength.

A significant industry initiative is to develop accident-tolerant fuels which are more resistant to melting under conditions such as those in the Fukushima accident, and with the cladding being more resistant to oxidation with hydrogen formation at very high temperatures under such conditions.

Burnable poisons are often used in fuel or coolant to even out the performance of the reactor over time from fresh fuel being loaded to refuelling. These are neutron absorbers which decay under neutron exposure, compensating for the progressive build up of neutron absorbers in the fuel as it is burned, and hence allowing higher fuel burn-up (in terms of GW days per tonne of U)*. The best known is gadolinium, which is a vital ingredient of fuel in naval reactors where installing fresh fuel is very inconvenient, so reactors are designed to run more than a decade between refuellings (full power equivalent – in practice they are not run continuously). Gadolinium is incorporated in the ceramic fuel pellets. An alternative is zirconium diboride integral fuel burnable absorber (IFBA) as a thin coating on normal pellets.



Pressurised heavy water reactor (PHWR)

5a)

Supercharging of IC Engines - It is the process of increasing the mass (or in other words density) of the air fuel mixture (in spark ignition engines) or air (in compression ignition engines) induced into the engine cylinder. This is usually done with the help of a compressor or blower known as supercharger. It has been experimentally found that the supercharging increases the power developed by the engine. It is widely used in aircraft engines, as the mass of air sucked in the engine cylinder decreases at very high altitudes. This happens, because atmospheric pressure decreases with the increase in altitude.

Following are the objects of supercharging the engines:

1. To reduce mass of the engine per brake power (as required in aircraft engines).
2. To maintain power of air craft engines at high altitudes where less oxygen is available for combustion.
3. To reduce space occupied by the engine (as required in marine engines).
4. To reduce .consumption of lubricating oil (as required is all types of engines).
5. To increase the power output of an engine when greater power is required (as required in racing cars and other engines).

Factors that influence supercharging rates: (in no particular order)

Outside temperature (Extreme heat, extreme cold, see below)
Battery pack temperature. ...
Battery state **of** charge when you plug in. (...
Battery super low?

5b)

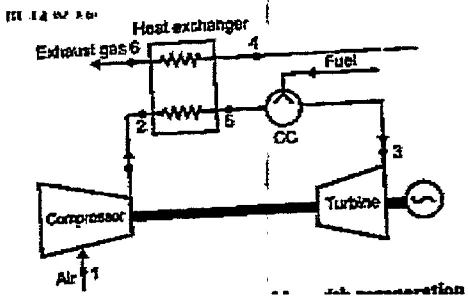
Advantages of Gas Turbine Power Plants over Diesel Plants

- **Work** developed **per kg of air** is more than diesel plant
- Less **vibrations** due to perfect balancing and no reciprocating parts
- Less **space** requirements
- Capital **cost** is less
- **Higher mechanical efficiency**
- Running **speed** of the turbine is large
- Lower installation and maintenance costs
- Torque characteristics of turbine plants are better than diesel plant
- **Ignition and lubrication** systems are **simpler**
- Specific Fuel Consumption **(SFC)** does **not increase** with **time** in gas turbine plant as rapidly in diesel plants
- **Poor quality fuel** can be used
- **Light weigh** with reference to Weight to power ratio is less for gas turbine power plants
- **Smoke less combustion** is achieved in gas power plants

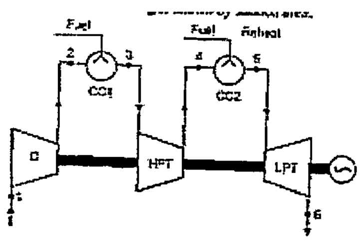
6a)

Methods to improve thermal efficiency of gas turbine

1) Regeneration – This is done by preheating the compressed air before entering to the combustion chamber with the turbine exhaust in a heat exchanger, thus saving fuel consumption.



2) Reheating : The whole expansion in the turbine is achieved in two or more stages & reheating is done after each stage. That increase in work done.



3) Intercooling –The compression is performed in two or more stages. But between two stage there is intercooler where cooling takes place at constant pressure.To increase net work of gas turbine by saving some compression work.

6b) Advantages of open cycle gas turbine power plants over closed cycle gas turbine power plants

1. Low weight and size: Open cycle gas turbine has lower specific weight and requires less space per unit power output.

2. Low capital cost: Since open cycle gas turbine has only minimum components and has low weight and size per unit power output.

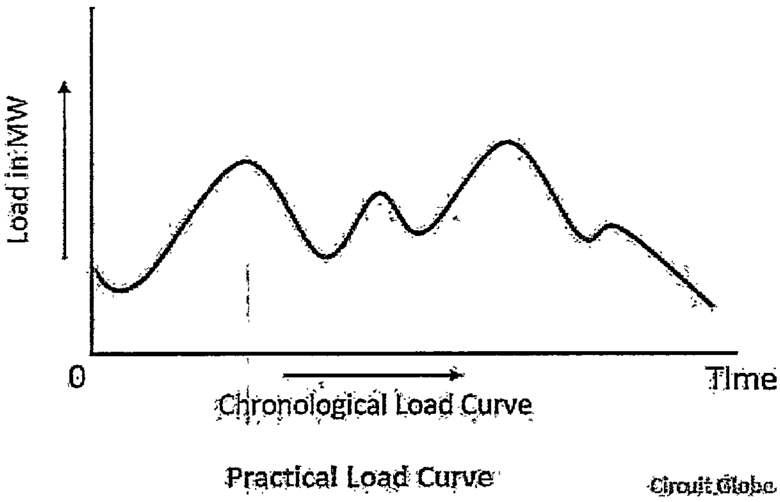
3. The capital cost is less compared to other plant

7)

Load Curve

Definition: Load curve or chronological curve is the graphical representation of load (in kW or MW) in proper time sequence and the time in hours. It shows the variation of load on the power station. When the load curve is plotted for 24 hours a day, then it is called daily load curve. If the one year is considered then, it is called annual load curve.

The load curve of the power system is not same all the day. It differs from day to day and season to season. The load curve is mainly classified into two types, i.e., the summer load curve and the winter load curve.



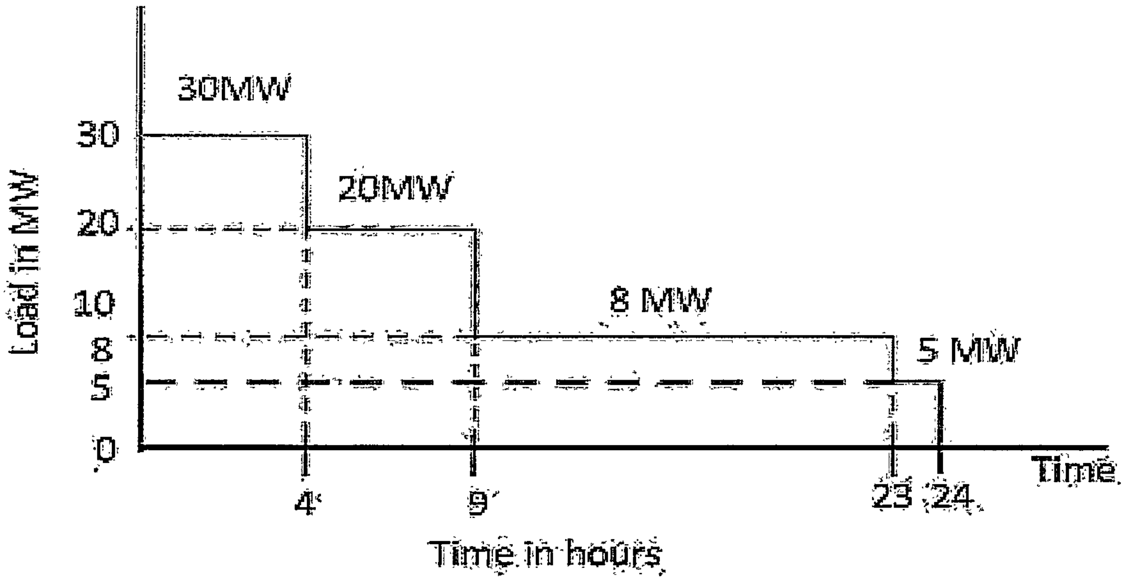
Information Obtained From Load Curve

The following are the information obtained from load curves.

1. Load duration curve determines the load variation during different hours of the day.
2. It indicates the peak load which determines the maximum demand on the power station.
3. The area under the load curve gives the total energy generated in the period under consideration.
4. The area under the curve divided by the total numbers of hours gives the load.
5. The ratio of the area under the load curve of the total area of the rectangle in which it is contained gives the load factor.

Load Duration Curve

Definition: The load duration curve is defined as the curve between the load and time in which the ordinates representing the load, plotted in the order of decreasing magnitude, i.e., with the greatest load at the left, lesser loads towards the rights and the lowest loads at the time extreme right. The load duration curve is shown in the figure below.



Load Duration Curve

Circuit Globe

This curve represents the same data as that of the load curve. The load duration curve is constructed by selecting the maximum peak points and connecting them by a curve.The load duration curve plotting for 24 hours of a day is called the daily load duration curve. Similarly, the load duration curve plotted for a year is called the annual load curve.

$$Average\ Demand = \frac{kWh\ (or\ MWh)\ consumed\ in\ a\ given\ period\ of\ time}{hours\ in\ the\ time\ period}$$

$$Average\ Demand = \frac{area\ under\ the\ load\ duration\ curve}{base\ of\ the\ load\ duration\ curve}$$

Procedure for Plotting the Load Duration Curve

1. From the data available from the load curve determines the maximum load and the duration for which it occurs.
2. Now take the next load and the total time during which this and the previous load occurs.
3. Plots the loads against the time during which it occurs.

The load duration curves can be drawn for any duration of time, for example, a day or a month or a year. The whole duration is taken as 100%.

Information Available Form Load Duration Curve

1. The load duration curve gives the minimum load present throughout the specified period.
2. It authorises the selection of base load and peak load power plants.
3. Any point on the load duration curve represents the total duration in hours for the corresponding load and all loads of greater values.
4. The area under the load duration curve represents the energy associated with the load duration curve.
5. The average demand during some specified time periods such as a day or a month can be obtained from the load duration curve.

Key prepared by

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Assistant professor

ME Dept

HOD-ME

5059984 — 40 ← Reg

(1) 5059983 — 40 —— Reg

(2) 5059989 ← 3 —— Supply

(3)

80
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1660

Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME4104

IV B.Tech I Semester Supple Examinations, August-2021

POWER PLANT ENGINEERING

(ME)

Time: 3 hours | Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) List the objectives of power plant engineering.
   (b) Define 'a Boiler' and 'a Steam Generating Unit'
   (c) List different grades of coal.
   (d) What is meant by fission reaction?
   (e) What are applications of Hydro-electric power plants?
   (f) What is load factor and diversity factor?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) What are the essential components of a simple open cycle gas turbine plant? [6M]
   (b) Difference between Gas power plants and thermal power plants [6M]

3. (a) Give the comparison between " Fire-tube and Water-tube" boilers. [6M]
   (b) Distinguish between forced draught and induced draught cooling towers. [6M]

4. (a) Why ash and dust handling is more difficult than coal handling? [6M]
   (b) What are the advantages of forced draft over induced draft. [6M]

5. (a) Explain with suitable sketches working of a nuclear reactor. [6M]
   (b) Discuss with relevant sketch working of regenerative gas turbine cycle. [6M]

6. (a) Explain with a simple sketch, working of high hydro electric power plant. [6M]
   (b) Discuss briefly the effects of supercharging on performance of Diesel power plant with relevant sketches. [6M]

7. (a) Discuss briefly the methods to reduce power generation costs. [6M]
   (b) Explain briefly the impact of pollution on environment. [6M]

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arasaraopeta Engineering College (Autonomous)

appakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME4104

IV B.Tech I Semester Regular Examinations, October - 2019

POWER PLANT ENGINEERING

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) List the factors of power plant performance.
(b) Name important high pressure boilers and indicate their main purpose of use?
(c) What are the advantages of burning the fuels in pulverized form?
(d) State the challenges of nuclear power plant.
(e) How the hydroelectric power plants are classified?
(f) State the methods of pollution control.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) What factors are considered in selecting on economical site for following power plants: Nuclear power plant and Steam power plant? [6M]
(b) Explain the working of reheat cycle with a schematic layout & h-s diagram. Derive the expression for efficiency of the cycle considering feed pump work. [6M]

3. (a) State the main difficulty experienced in the La Mont boiler and how it is prevented? Explain its advantages. [6M]
(b) What is a dry cooling tower? When it is recommended? What are the different types of dry cooling towers? Explain in brief. [6M]

4. (a) What are mechanical stokers? Explain with a neat sketch of chain grate stoker. [6M]
(b) What are different ash handling systems? Discuss the relative merits and demerits. [6M]

5. (a) Explain the working of a typical fast breeder nuclear power plant with neat diagram. [6M]
(b) With PV and TS diagram explain the effect of intercooling, reheating and regeneration in a gas turbine plant. [6M]

6. (a) Draw the line diagram and explain the working details of hydro power plant giving salient points. [6M]
(b) Describe the various methods used for starting diesel engine. Describe the correct sequence of steps for starting and stopping procedure. [6M]

7. (a) Draw the load curve for the power requirement in India and discuss the methods to fulfil the part load conditions. [6M]
(b) A power station has the installed capacity of 150 MW. Calculate the cost of generation. Capital cost = Rs.140×10^6. Rate of interest and depreciation = 20%; Annual cost of fuel oil, salaries and taxation = Rs.30×10^6; Load factor = 42%. [6M]

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Narasaraopeta Engineering college (Autonomous) (1)
NARASARAOPET

IV. B.Tech, I Sem Regular Examinations october-2019

Subject name: Power Plant Engineering

Max marks: 60

Subject code: R16ME4104

Time = 3H Date: 02-11-2019

KEY

PART-A 6 X 2 = 12M

1.(a) The following are the different factors for power plant performance

(i) Heat Rate (~~Energy~~ Energy Efficiency)
(ii) Thermal Efficiency
(iii) capacity factor
(iv) load factor
(V) operational Efficiency.

1. (b) High pressure Boilers (name & main purpose & uses)

(i) Lamont Boiler — These Boilers have been built to generate superheating steam (used for smaller size PL)
(ii) Loeffler Boiler — These qualities fit it for Land & sea transport power Generation
(iii) Benson Boiler — It can be erected in a comparatively small Area
(iv) Velox Boiler — It can be Quickly started

1.(c) Advantages of burning the fuels in pulverized form.

(i) Reduce fuel wastage
(ii) Increase combustion Efficiency
(iii) Reduce power Generation cost
(iv) Different variety of Coals ~~are~~ can be using
(V) Greater capacity to meet peak loads.

1.(d) challenges of nuclear power plant.

(I) Extraction of nuclear fuels
(ii) Radiation control (Nuclear Radiation)
(iii) cost of nuclear fuels.
(iv) Security considerations.
(V) Disposal of nuclear waste

1. (e) Classification of Hydroelectric power plants

(i) According to the availability of Head
(a) High head power plants
(b) Medium head "
(c) Low head "

(ii) According to the nature of load
(a) Base load plants
(b) Peak load plants.

1. (f) Methods of pollution control
(i) Desulphurization
(ii) Electrostatic precipitator (ESP)
(iii) Bag House filters (fabric filters)
(iv) Solid waste disposal
(v) Selective catalytic Reduction (SCR)
(vi) Flue Gas Desulfurization (FGD)

PART - B

2 (a) The following are the different factors in selecting an Economic site for power plants

Nuclear power plants:-

(i) Density population in the vicinity
(ii) Danger of Earthquakes.
(iii) Availability of nuclear fuels.
(iv) Disposal of nuclear waste
(v) Security considerations.
(vi) Distance from the centre of Gravity of load Demand
VII Used for peak load plants

Steam Power Plants.

1. Availability of fuel & cost of fuel transport
2. Distance from the centre of Gravity of load: Demand
3. Cost of Land
4. Availability of cooling water
5. Disposal of Ash
6. Character of soil
7. Nearer to River & Lake
8. Rail & Road connections.

2(b) Working of Reheat cycle

In the Reheat cycle the Expansion of steam from the Initial state (1) to the condenser pressure is carried out in Two or more steps depending upon the number of ~~Reheats~~ Reheaters Used.
In the first step, steam expands in the High pressure turbine (H.P.T) from the Initial state to some Intermediate pressure (process 1 – 2s). The steam is Resuperheated (or Reheated) in the Boiler (process 2s – 3) and the At constant pressure in the Remaining Expansion (process 3 – 4s) steam is carried out in The low pressure (L.P.T) Turbine.

for 1kg of steam

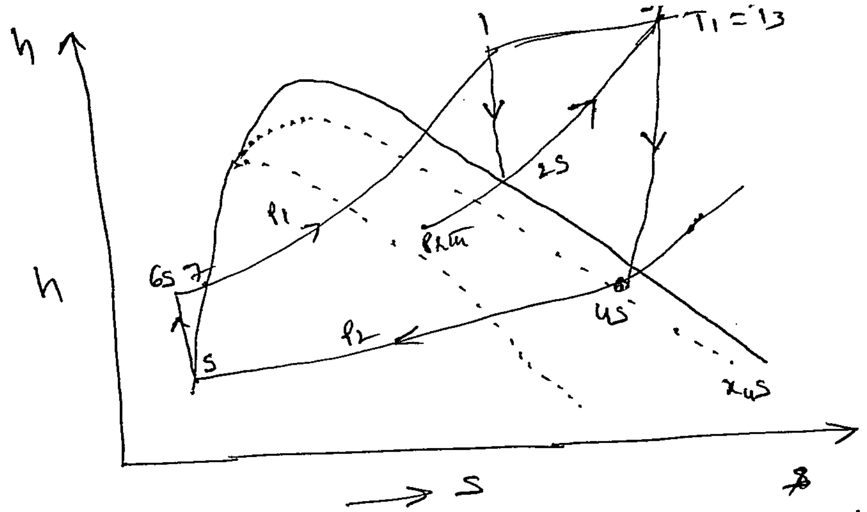
$$Q_1 = (h_1 - h_{6s}) + (h_3 - h_{2s})$$

$$Q_2 = (h_{4s} - h_5)$$

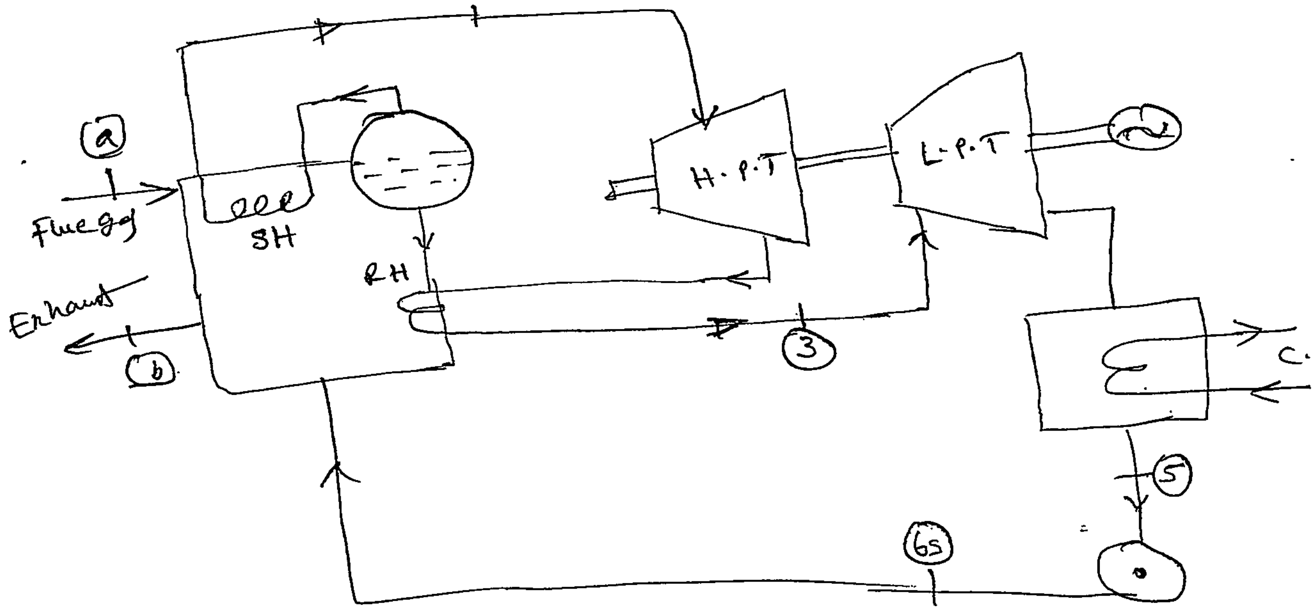
$$W_T = (h_1 - h_{2s}) + (h_3 - h_{4s})$$

$$W_P = (h_{6s} - h_5)$$

$$\eta = \frac{W_T - W_P}{Q_1} = \frac{(h_1 - h_{2s} + h_3 - h_{4s}) - (h_{6s} - h_5)}{h_1 - h_{6s} + h_3 - h_{2s}}$$



① Reheat cycle (h-s diagram)



Reheat cycle Layout

3 (a) The following are the difficulty experienced in the Lamont Boil

(i) This Boiler can carry higher salt concentrations than any other type

(ii) The deposition reduces the heat transfer and ultimately the generating capacity

(iii) This further increases the danger of overheating the tubes due to salt deposition as it high thermal resistance

→ This difficulty was solved in Loeffler boiler by preventing the flow of water into the boiler tubes.

Advantages of Lamont Boiler

(i) It can be erected in a comparatively smaller floor area
(ii) The heat of combustion is utilised more efficiently.
(iii) All the parts are uniformly heated, therefore the danger of overheating is reduced
(iv) Thermal stress problem is simplified.
(v) Use of high pressure & high temperature steam is economical.

3(b) Dry cooling Tower:

→ Dry cooling towers are employed where cooling water is not available in plenty, even for the use of makeup

→ In a dry cooling tower, warm water from the condenser flows through finned tubes over which the cooling air is passed. Heat is rejected to the air as water is cooled.

Types of Dry cooling Towers

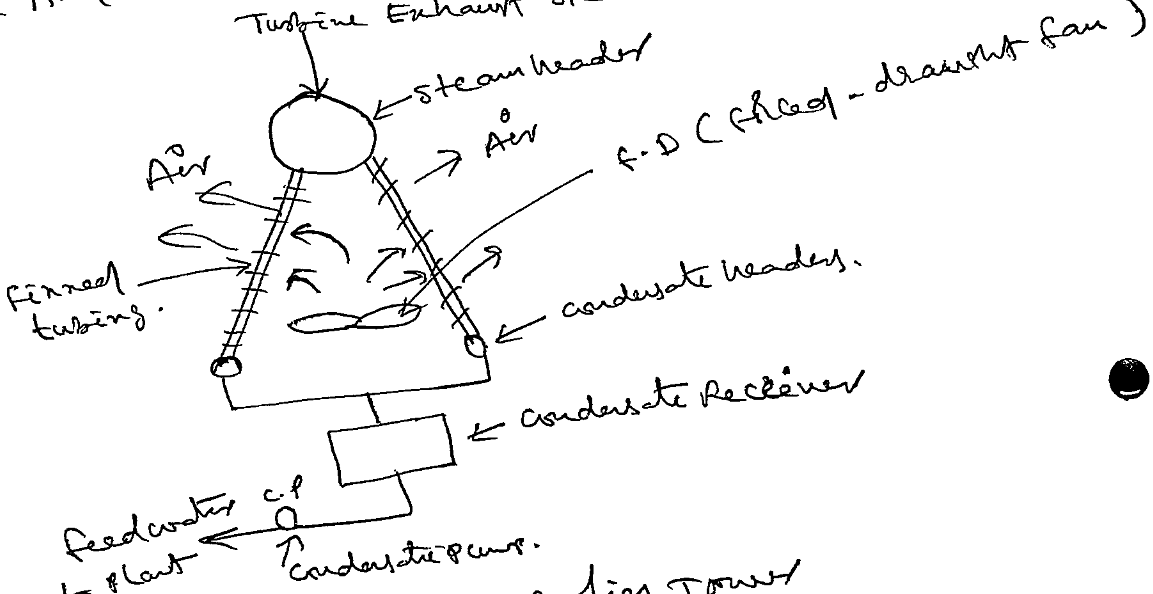
There are two basic types of dry cooling towers.
(i) Direct dry cooling tower
(ii) Indirect dry cooling tower.

→ In a Direct dry cooling tower, turbine exhaust steam flows into a large steam header and then to a large number of finned tubes which are cooled by atmospheric air blown over them by an FD fan

→ For an Indirect dry cooling tower there are three designs. The first uses a conventional surface condenser. Warm water from the condenser flows through finned tubes and is cooled by atmospheric air blown over the tubes. There are two heat exchangers in series, one between steam & water in the condenser and the other between water and air in the tower.

→ Dry cooling towers have attracted much attention nowadays. Typical sites are near the sources of abundant fuel where there is no sufficient water.

Their disadvantages are that they are not so efficient as evaporative cooling. & that there is an increase in turbine exhaust pressure and a decrease in cycle efficiency.



Direct – Dry Cooling Tower

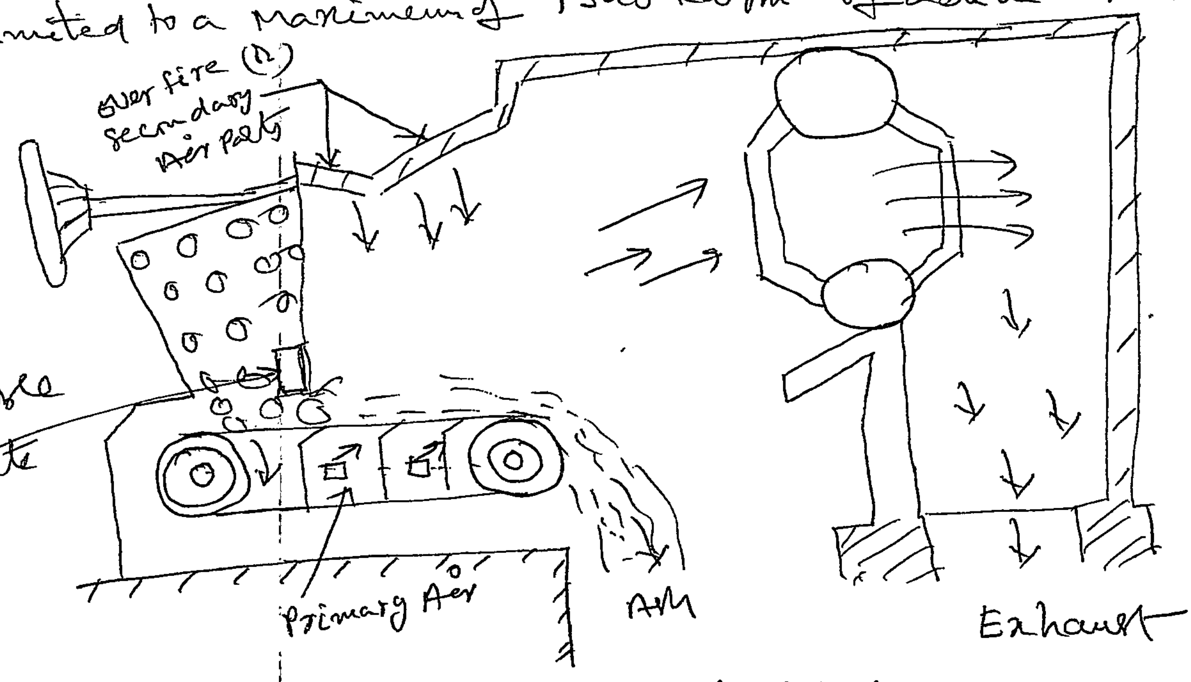
4 (a) Mechanical Stokers:.

Mechanical stokers may be of the following types

(i) Travelling grate stoker
(ii) chain grate stoker
(iii) spreader stoker
(iv) vibrating grate stoker
(v) underfeed stoker

Chain Grate stoker :- It is similar to the travelling grate stoker except that it is made up of series of CI links connected by bars (or) pins to form an endless chain. As the raw & green coal on the grate enters the furnace. The surface coal gets ignited from heat of the furnace flame and from radiant heat rays reflected by the ignition arch. The fuel bed becomes thinner toward the furnace end as the combustible matter burns off.

Overfeed stokers are suitable for Industrial Power Plants having steady Demand. The Grate heat ~~Realease~~ Release Rate should be limited to a maximum of 1340 kw/m² of active Grate Area (4)



Chain Grate stoker

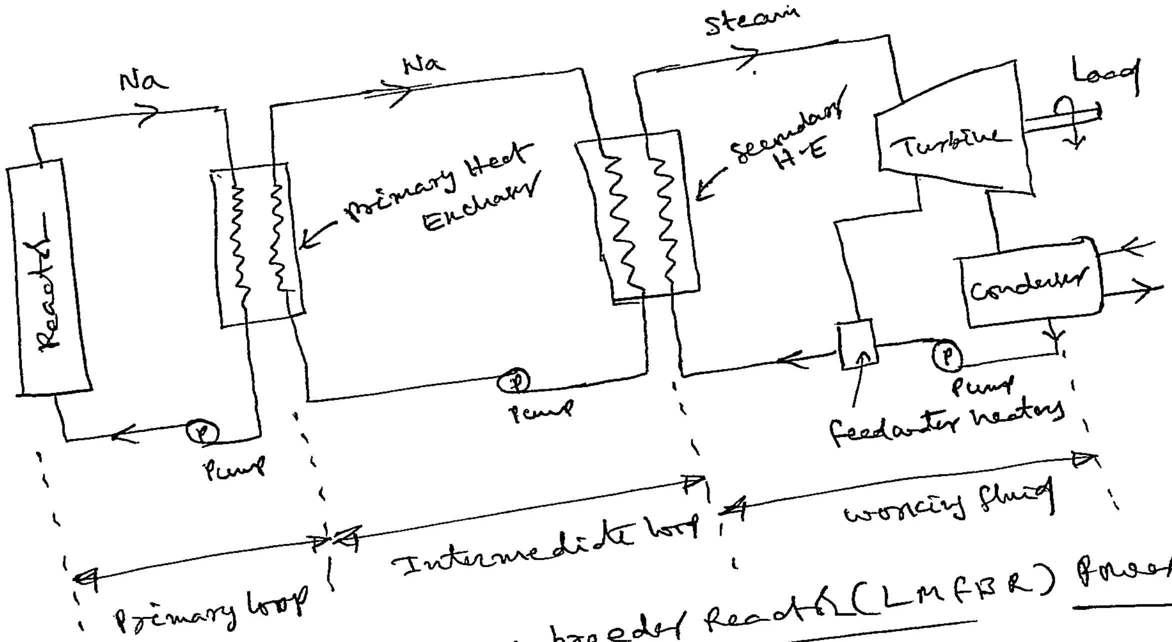
4(b) Different Ash handling systems :.

1. Sluice conveyor system
2. Hydraulic vacuum conveyor system
3. Bag house system
4. Electrostatic precipitator system
5. Pneumatic conveyor system

Merits & Demerits :.

1. The sluice conveyor system is the mostly (widely) used for bottom Ash handling
2. Hydraulic vacuum conveyor is the ~~mostly~~ most frequently used for fly ash system
3. Bottom ash & slag may be used for filling material for Road construction
4. Fly ash can be partly replace cement for making concrete
5. Bricks can be made with fly ash These are durable & ~~str~~ strong.
6. Ash storage & Disposal sites are guided by Environmental Regulations.

5 (a) Fast Breeder Nuclear Reactor Power Plant



Liquid metal fast breeder Reactor (LMFBR) Power Plant

Working Principle

Fast breeder Reactors are designed to create & breed new fissile material while producing useful electric power

A fast neutron Reaction with U-238 producing Pu-239

$$_{92}U^{238} + {}_{0}n^{1} \longrightarrow {}_{92}U^{239} + \gamma$$

$$_{92}U^{239} \xrightarrow[\beta]{23\,min} {}_{93}Np^{239} + {}_{-1}e^{0}$$

$$_{93}Np^{239} \xrightarrow[\beta]{23\,days} {}_{94}Pu^{239} + {}_{-1}e^{0}$$

The high concentration of fissile fuel and the absence of moderator makes the core of a fast reactor smaller than a thermal reactor of the same power.

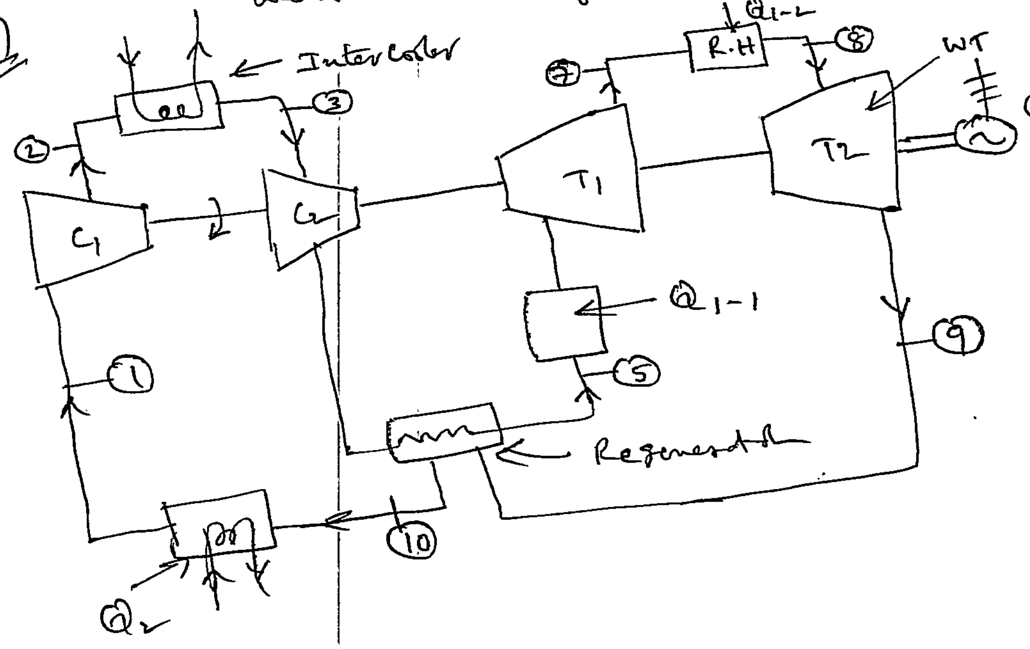
Because of the induced radioactivity of liquid sodium, an intermediate loop also using Na (or) NaK as coolant is used between primary radioactive coolant & the steam cycle.

The liquid sodium is discharged from the intermediate H-E

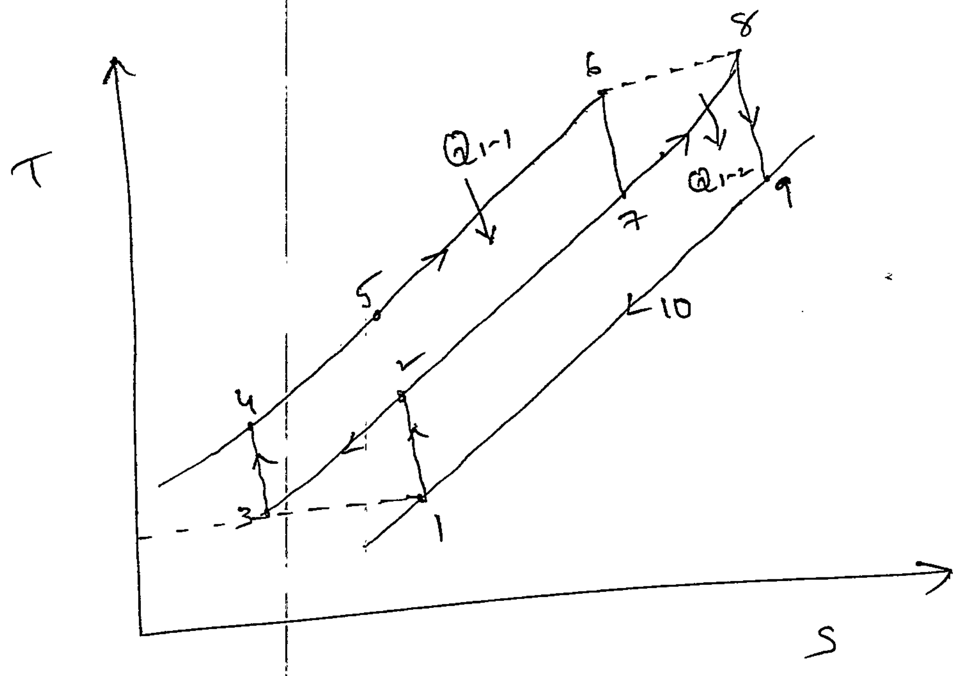
The pool type configuration is widely used in Europe, while the loop system is used in the USA.

5(b) Layout T S diagram for Gas Turbine Power Plant with Intercooling, Reheating & Regeneration.

5(b)



R.H = Reheater
C_1 & C_2 = Compressor
T_1 & T_2 H-P & L-P Turbine.



T-S diagram for Brayton cycle with Intercooling, Reheat & Regeneration.

→ Effect of Intercooling. → for minimum work of compression the Intercooler pressure $p_i = (p_1 p_2)^{1/2}$
where p_1 & p_2 are suction & discharge pressure.

→ Effect of Reheating: with the result of Reheating, Improvement in cycle efficiency.

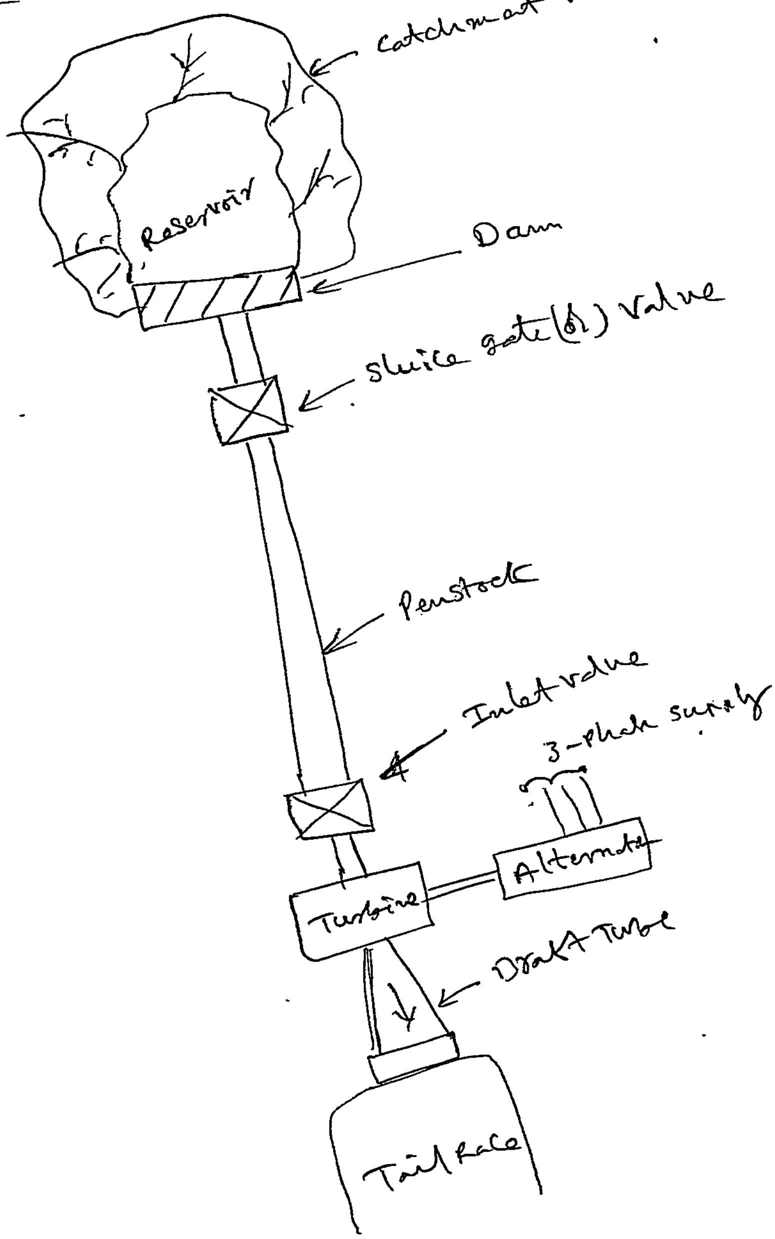
Effect of Regeneration:-

The Regenerative Efficiency (Effectiveness ϵ)

$$\epsilon = \frac{T_5 - T_2}{T_4 - T_2}$$

It Reduces fuel and Increase cycle Efficiency and Reduce power Generation cost.

6 (a) Line Diagram of Hydro electric power plant



Flow sheet of hydro electric power plant

Catchment Area :- The bigger the catchment, steeper is the slope higher is the altitude and Greater is the total Runoff water

• Reservoir! A Reservoir may be natural, like ... ... mountain & Artificially built by Erecting a dam across a river.

Dam!. A dam performs the following Two basic functions.
(i) It develops a Reservoir of the desired capacity to store water
(ii) It builds up a head for power Generation.

Hydraulic Turbines! .
1. Pelton wheel → Used for High heads & low discharge
2. Francis Turbine → Used for medium head & medium discharge
3. Kaplan Turbine → Used for low head & Large Discharge

Alternator: Generating Electric power. (Convert Turbine work Into electric power)

Draft Tube: . The main purpose of Draft Tube is By Diffuser action Regain the major portion of the K-E & velocity head at Runner outlet.

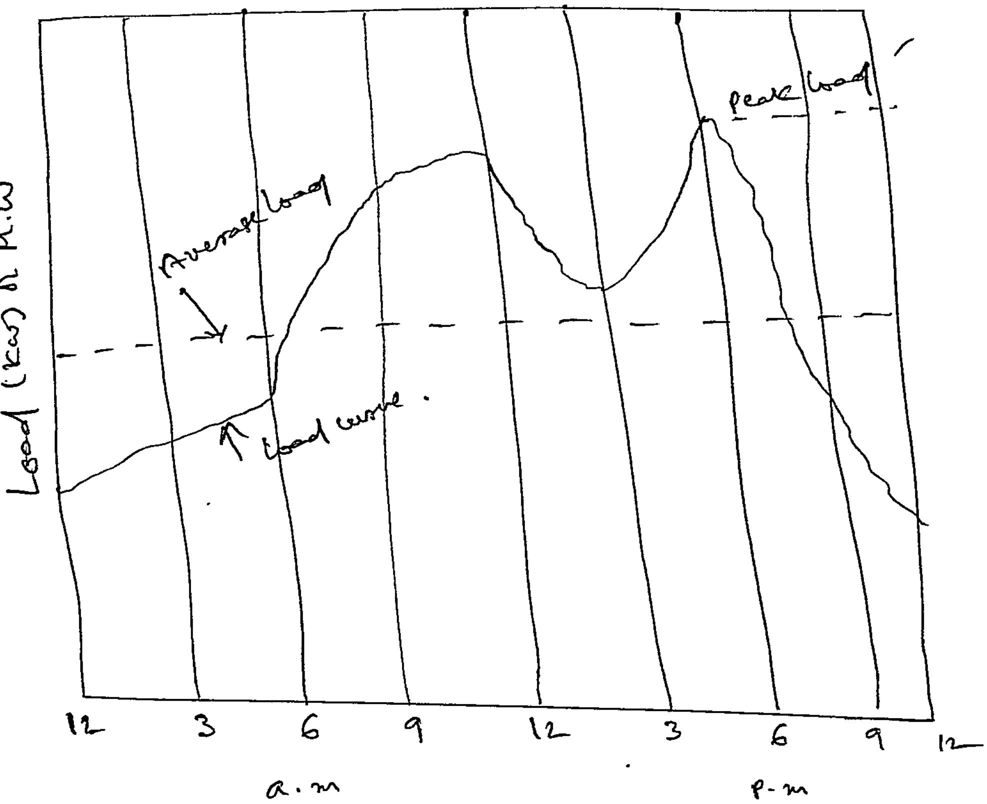
6(b) Various methods Used for starting Diesel Engine
following are the Three Common methods for starting of An Engine
(i) By An Auxiliary Engine
(ii) By using electric motor
(iii) By compressed Air system.

By An Auxiliary Engine! - which is mounted close to the main Engine and drives the Latter Through a clutch & gears.

By Using Electric motor! - In which a storage Battery of 12 to 36 Volts Is Used to supply power to an electric motor that drives the Engine.

By Compressed Air! . In which compressed Air at About 17 bar supplied from an Air tank is Admitted to a few engine cylinders making them work like Reciprocating Air motor To run the Engine shaft is commonly Used for starting Large Diesel Engines Employed for stationary plant service.

7(a) Load curve for the power Requirement



A curve showing the load demands variations of consumers with respect to time is known as load curve.

→ The peak load plant should be of smaller capacity to reduce the cost of Generation. It could be a Gas Turbine unit & a Diesel Engine depending on the size and scope of availability

Methods to full fill the part load conditions:

(I) A Gas Turbine Unit

(ii) Pumped hydro-system

(iii) Compressed Energy system

(IV) Diesel Engine system

7(b) Power station Installed capacity = 150 MW.

Calculate the cost of Generation (7)

7(b) Capital cost = Rs 140 × 10^6

Rate of Interest & Depreciation = 20% = 0.2

Annual cost of fuel oil & salaries & taxation = Rs 30 × 10^6

Load factor = 42% = 0.42

$$\text{Load factor} = \frac{\text{Average load}}{\text{Maximum Demand}}$$

$$0.42 = \frac{\text{Average load}}{150}$$

Average load = 150 × 0.42 = 63 MW

Energy Generation for year = $63 \times 10^3 \times 8760$ = 551880×10^3 (kwh)

= 55.188×10^6 kwh

Interest & Depreciation (fixed cost)

= $0.2 \times 140 \times 10^6$ = Rs. 28×10^6

Total Annual cost = $30 \times 10^6 + 0.2 \times 140 \times 10^6$ = Rs. 58×10^6

$$\text{cost per kwh} = \frac{\text{Total Annual cost}}{\text{Energy Generation per year}} = \text{Rs}$$

$$= \frac{\text{Rs } 58 \times 10^6}{55.188 \times 10^6} = \text{Rs } 1.05$$

= Rs 1.05

cost of Generation per unit (kwh) = Rs 1.05

Prepared by -

P. Srinivasarao 3/11/19

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NARASARAOPETA
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(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

CO-POs & CO-PSOs ATTAINMENT

Course Code: C415	Course Name: POWER PLANT ENGINEERING	Year/Sem: IV/I

External Examination Assessment

S.No	Q.No	1						2		3		4		5		6		7	
		a	b	c	d	e	f	a	b	a	b	a	b	a	b	a	b	a	b
	COs	I	II	III	IV	V	VI	I	I	II	II	III	III	IV	IV	V	V	VI	VI
	Max. Marks	**2**	**2**	**2**	**2**	**2**	**2**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
1		2	2	2	2	2	2		6			5		5		5			6
2		2	2	2	2	2	2		2		6			6			6		
3			2	2		2	2		6			5		5		5			
4		2		2	2				6			6		5		5			6
5		2	2	2	2				2			3		5		6			
6		2	2		2	2			6	2		6		6		6		6	
7		2	2	2	2	2			5	6		5		6		5		6	
8		2	2		2	2	2		6		6			6			6	2	
9		2	2	2	2			2	2			2		5		5			
10		2		2				6			6		5		5				
11		2	2	2				6			6		5		6				
12		2	2	2	2			5	6		5		2		5		6		
13		2	2		2	2		6		6			6			6	2		
14			2	2	2		2		6		6		6		3	6			
15			2	2	2	2	2		2		6		6			6			
16		2		2	2	2	2		6		6		6		3	6		2	
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18		2	2	2	2		2		2		6		6		3	6			
19			2	2				6			6		5		5				
20		2						6			6		5		6				
21		2	2	2	2			5	1		5		6		5		6		
22		2	2		2	2		6		2			6			6	2		
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27		2	2	2	2			5	6		5				2		6		
28		2	2	2	2	2		6		6			6			6	2		
29		2	2	2	2	2	2		6		6		2		3	6			
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32		2	2	2				6			6		1		6				
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34		2	2	2	2	2		6		6			6			2	2		
35		2		2	2	2	2		6		6		6		3	6			
36		2	2		2	2	2		2		6		1			6			
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38			2					6			6		5		6				
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40		2	2	2	2	2		6		1			6			2	2		
41		2	2	2	2	2	2		6		6		2		3	6			
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44		2	2	2				6			6		5		5				

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47		2	2	2	2	2		6		6			6			6	2		2
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50		2	2	2				6			6		5		5				
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53		2	2	2	2	2			1		6			6			6		2
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55		2	2	2	2				6			6		5		5			
56		2	2	2	2				1			6		5		6			
57		2	2	2	2	2			2	6		6		6		6		6	
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59		2	2	2	2	2	2		6		6			2			6	2	
60		2	2	2	2	2	2	2	1			5		5		5			
61		2	2	2				6			6		5		5				
62		2	2	2				6			6		5		2				
63		2	2	2	2			5	6		5		6		2		6		
64		2	2		2	2	2	6			6		6		4		3		
65		2	2	2	2	2	2		6			5		5		5			4
66		2	2	2	2	2	2		6		6			6			6		
67		2	2	2	2	2	2		6			5		5		5			
68		2	2	2	2				6			6		5		5			2
69		2	2	2	2				6			6		5		6			
70		2	2	2	2	2			6	6		6		1		6		6	
71		2	2	2	2	2			5	6		5		2		5		6	
72		2	2	2	2	2	2		6		6			1			6	2	
73		2	2	2	2	2	2	2	6			5		5		5			
74		2	2	2				6			6		5		5				
75		2	2	2				6			6		5		6				
76		2	2	2	2			5	6		5		6		5		6		6
77		2	2	2	2	2		6		6			6			6	2		
78		2	2		2	2	2	6			6		6		4		3		5
79		2	2	2	2	2	2		6			5		5		5			
80		2	2	2	2	2	2		6		6			6			6		5
81		2	2	2	2	2	2		6			5		5		5			6
82		2	2	2	2				6			6		5		5			
83		2	2	2	2				6			6		5		6		6	6
84		2	2	2	2	2			6	6		6		6		6		6	
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86		2	2	2	2	2	2		6		6			6			6	2	
87		2	2	2	2	2	2	2	6			5		5		5			
88		2	2	2				6			6		5		5			6	4
89		2	2	2				6			6		5		6				4
90		2	2	2	2			5	6		5		6		5		6		6
91		2	2	2	2	2		6		6			6			6	2		
92		2	2	2	2				6			6		5		6			
93		2	2	2	2	2			6	6		6		6		6		6	
94		2	2	2	2	2			5	6		5		6		5		6	
95		2	2	2	2	2	2		6		6			6			6	2	
96		2	2	2	2	2	2	2	6			5		5		5			
97		2	2	2				6			6		5		5				6

98		2	2	2				6			6		5		6				6
99		2	2	2	2			5	6		5		6		5		6	6	
100		2	2	2	2	2		6		6			6			6	2		
101		2	2		2	2	2	6			6		6		4		3		6
102		2	2	2	2	2	2		6			5		5		5			6
103		2	2	2	2	2	2		6		6			6			6		
104		2	2	2	2	2	2		6			5		5		5			
105		2	2	2	2				6			6		5		5			
106		2	2	2	2				6			6		5		6			
107		2	2	2	2	2			6	6		6		6		6		6	
108		2	2	2	2	2			5	6		5		6		5		6	
109		2	2	2	2	2	2		6		6			6			6	2	
110		2	2	2	2	2	2	2	6			5		5		5			
111		2	2	2				6			6		5		5			6	6
112		2	2	2				6			6		5		6			6	6
113		2	2		2			5	6		5		6		5		6		
114		2	2	2	2	2		6		6			6			6	2		
115		2	2	2	2				6			6		5		5		6	6
116		2	2		2				6			6		5		6		6	6
117		2	2	2	2	2			6	6		6		6		6		6	
118		2	2			2			5	2		5		6		5		6	
119		2	2	2	2	2	2		6		6			6			6	2	
120		2	2	2	2	2	2	2	6			5		5		5			
121		2	2	2				6			6		5		5				
122		2	2	2				6			6		5		6				
123		2	2	2	2			5	6		5		6		5		6		
124		2	2	2	2	2		6		6			6			6	2		
125		2	2		2	2	2		6		6		6		3	6			
126		2	2	2		2	2		6		1		6			6			
127		2	2	2	2	2	2		6		2		6		3	6		2	
128		2	2	2	2	2	2		6		2		6		3	6		5	
No. of Students answered		121	122	111	98	72	50	60	87	25	73	44	71	56	54	74	39	33	24
50% of Max.Marks		1	1	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3
No. of Students crossed 50% of Max Marks		121	122	111	98	72	50	53	72	20	70	43	64	51	50	71	28	23	21
% of Students crossed 50% of Max Marks		100	100	100	100	100	100	88	83	80	96	98	90	91	93	96	72	70	88
Attainment Level		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

No of times Co Attained	3	3	3	3	3	3
Attainment Level	**3**	**3**	**3**	**3**	**3**	**3**
CO	**I**	**II**	**III**	**IV**	**V**	**VI**

Rubrics:

If 50% of the students crossed 50% of the marks: Attainment Level 1

If 60% of the students crossed 50% of the marks: Attainment Level 2

If 70% of the students crossed 50% of the marks:Attainment Level 3

Internal Examination Assessment

S.No	Roll. No	Test	Mid1				Assignment		Quiz 1	Mid2						Assignment		Quiz 2	CO I	CO II	CO III	CO IV	CO V	CO VI
		Q.No	1		2	3	1	2		1		2		3		3	4		Max. Marks	Max. Marks	Max. Marks	Max. Marks	Max. Marks	Max. Marks
			1.a	1.b	2.a	3.a				1.a	1.b	2.a	2.b	3.a	3.b									
		COs	I	I	II	III	I	II		IV	IV	V	V	VI	VI	IV	V							
		Max. Marks	5	5	10	10	10	10	10	5	5	5	5	5	5	10	10	10	30	30	20	30	30	20
1	18471A0302		5	5	10	7	10	10	5	5	5	5	5	4	5	10		10	25	25	12	30	20	19
2	18471A0303		5	5	9	10	9	10	5	5		5	5	4	5	6	6	4	24	24	15	15	20	13
3	18471A0304		5	5		10	9	9	3		5	3	3	5	5	10	4	4	22	12	13	19	14	14
4	18471A0305		5	5	7	10	8	8	5	5	5	4	4	5	5	8	8	5	23	20	15	23	21	15
5	18471A0306		5		10	8	8	8	5	5		5	5	4	4	9	7	7	18	23	13	21	24	15
6	18471A0307		5	5	7	10	7	9	5	5		4	4	5	5	9	8	7	22	21	15	21	23	17
7	18471A0308		5		10	6	9	10	6			5	5	5		10	10	10	20	26	12	20	30	15
8	18471A0309		5	5	7	10	8	10	8	5	5	5	5	5	5	10	8	10	26	25	18	30	28	20
9	18471A0310		5	5	10	10	9	10	4	5	5	5	5	5	5	10	10	7	23	24	14	27	27	17
10	18471A0311		5	5	10	9	8	10	7	5	5	5	5	4	5	10	10	6	25	27	16	26	26	15
11	18471A0312		5		8	5	8		3	5	5	5					6	5	16	11	8	15	16	5
12	18471A0313		5		8	8	8	8	7	5	5	5	5			8	8	7	20	23	15	25	25	7
13	18471A0315		5	5	10	10	10	10	4	5	5	5	5	5	5	10	7	4	24	24	14	24	21	14
14	18471A0316		5	5	7	10	9		7							10		4	26	14	17	14	4	4
15	18471A0317		5		10	9	8	8	8	5	5	4	4	3		9	6	6	21	26	17	25	20	9
16	18471A0318				7	7	8	9	5	5	5	4	4			9	8	3	13	21	12	22	19	3
17	18471A0319		5	5	6	5	7	9	7	5	4	5	4	5	4	9	5	9	24	22	12	27	23	18
18	18471A0320				6	6	7	8	5	5		5	5			8	8	7	12	19	11	20	25	7
19	18471A0321		4	4	10		8	9	9	5		8		10		9	8	3	25	28	9	17	19	13
20	18471A0322		5	5	10	4	9	8	6		5	5	5	4	5	8		3	25	24	10	16	13	12
21	18471A0323		4	3	7	7	7	8	3	4	4	5	4	5	4	9	6	2	17	18	10	19	17	11
22	18471A0324		4	3	7		8	8	7		5	5	5	5		7	7	1	22	22	7	13	18	6
23	18471A0325		4	4	9	10	7	10	5	5	4	5	5	5	5	8	8	2	20	24	15	19	20	12
24	18471A0326		4	4	9	9	10	10	7	5	5	5	4	2		10	8	8	25	26	16	28	25	10
25	18471A0327			5	10		10	8	7			5		4		8	6	8	22	25	7	16	19	12
26	18471A0328				9		9	9	3	4	4	5	4	5	4	10	7	5	12	21	3	23	21	14
27	18471A0329		5		10		8	9	3	5	5	5	4	5		8	7	6	16	22	3	24	22	11
28	18471A0330					6	9		5	5	5	5	4	2		6	3	6	14	5	11	22	18	8
29	18471A0331		4	4	8	8	7	9	5	5	5	5	4	5		9	7	3	20	22	13	22	19	8
30	18471A0332		5	5	10	10	9		6		5	5	5	5	3	10	4	7	25	16	16	22	21	15

31	18471A0333		5	4	10	10	7		5	5	4	5	4	5	4	10	6	3	21	15	15	22	18	12
32	18471A0334		3	3	10	10	8	8	3	5	5	5	4	2		8	7	7	17	21	13	25	23	9
33	18471A0335		5	5	7	4	10	9	7		4	5				6	6	10	27	23	11	20	21	10
34	18471A0336		5	3	10	6	8		2								6		18	12	8	0	6	0
35	18471A0337		5	5	10	10		8	6	5	4	5	5	5	5		8	7	16	24	16	16	25	17
36	18471A0338		4	3	10	6	9		9	5	4	5	4	5	4	9	5	4	25	19	15	22	18	13
37	18471A0339		5	3	10	6	9		7	5	4	5	4	5	4	9		3	24	17	13	21	12	12
38	18471A0340		4	3	10	6			2	5	5	10		10		9		3	9	12	8	22	13	13
39	18471A0341		5	3	10	6	7	9	6	5	5	5	4	2		6	6	7	21	25	12	23	22	9
40	18471A0342		5	5	10	10	6		7	5	5	5	4	5		8	5	7	23	17	17	25	21	12
41	18471A0343		5	5	7	10	9		5		5	5	5	4	5	9	7	7	24	12	15	21	24	16
42	18471A0344		4	3	10	6	7		3		5	5	5	4	2	8	5	3	17	13	9	16	18	9
43	18471A0345		5	3	10	6	9	6	4		5	5	5	4	2	7	6	3	21	20	10	15	19	9
44	18471A0346		4	4	10	8	10	10	7	5	5	5	4	5		10	8	6	25	27	15	26	23	11
45	18471A0347		5	5	10	10	9	9	4	5	4	5	4	5	4	9	9	8	23	23	14	26	26	17
46	18471A0348		5	5	10	10	8	8	4	5	5	5	5	5	5	10	9	5	22	22	14	25	24	15
47	18471A0349		5	3	10	6	8	8	4	5	5	5	4	5		8	7	1	20	22	10	19	17	6
48	18471A0350		4	3	10	6	7	8	2		5	4	5	4		8	6	2	16	20	8	15	17	6
49	18471A0351		4	3	7	7	8	9	8		5	5	5	4	2	9	6	7	23	24	15	21	23	13
50	18471A0352		5	5	10	10	10	10	6		5	5	5	4	5	10	5	5	26	26	16	20	20	14
51	18471A0353		5	3	10	6	5		3	5	4	5	5	4				1	16	13	9	10	11	5
52	18471A0354		4	3	10	6	6		3	5	1					8	9	2	16	13	9	16	11	2
53	18471A0355		5	4	10	10	10	9	6	5	4	5	4	5	4		5	4	25	25	16	13	18	13
54	19475A0301		5	3	10	6	9	9	5	5	4	5	5	4		9	6	4	22	24	11	22	20	8
55	19475A0302		5	5	10	10	10	10	5	5	5	2	5			10	10	2	25	25	15	22	19	2
56	19475A0304		5	5	10	10			8	5	4	5	4	5	4	9		5	18	18	18	23	14	14
57	19475A0305		5	4	10	10	8	9	3	5	4	4	4	5	4	8	5	3	20	22	13	20	16	12
58	19475A0307		5	5	10	10	8		8	5	5	4	5	5		9	5	5	26	18	18	24	19	10
59	19475A0308		5	5	10	10	9	10	5	4	4	5	4	5	4	9	7	4	24	25	15	21	20	13
60	19475A0309		5	3	10	8	10	6	6		5		1			10	6	5	24	22	14	20	12	5
61	19475A0310		5	4	10	10	9	10	8	5	4	5	5	5	5	10		6	26	28	18	25	16	16
62	19475A0311		5	5	10	10		10	5	5	5	5	5	5	5	10	5	2	15	25	15	22	17	12
63	19475A0312		5	5	10	10	9	9	5	5	5	5	5	5	5	10		5	24	24	15	25	15	15
64	19475A0313		5	5	10	10	9	10	5	5	5	5	5	5	5	9	9	5	24	25	15	24	24	15
65	19475A0314		4	4	10	6	8	10	3	5	4	5	4	5	4		8	4	19	23	9	13	21	13
66	19475A0315		5	5	7	10	7		4	4	5	4	5			9	5	10	21	11	14	28	24	10
67	19475A0316		5	5	10	10	9	9	4	5	4	5	5	5	5	6	7	7	23	23	14	22	24	17
68	19475A0317		5	4	10	10	5		10	5	4	5	4	5	4		6	9	24	20	20	18	24	18

69	19475A0318		5	5	10	10	10	10	8	5	5	5	5	5	5	9	9	6	28	28	18	25	25	16
70	19475A0319		5	4	10	10	9	7	5	5	5	5	4	4	4	8	9	7	23	22	15	25	25	15
71	19475A0320		4	3	10	6			5	5	5	5	5				8	2	12	15	11	12	20	2
72	19475A0321		5	5	7	10	9	10	5		5	4	5	5	4	8		3	24	22	15	16	12	12
73	19475A0322		5	5	10	10	10	10	7	5	4	5	5	5	5	8	7	4	27	27	17	21	21	14
74	19475A0323		5	5	7	10	8		4	5	5	5	4	2		10	7	7	22	11	14	27	23	9
75	19475A0324		5	4	10	10	8	9	6	5	4	5	4	5	4	9	6	4	23	25	16	22	19	13
76	19475A0325		5	5	10	10	7		8	5	5	5	5	5	5		9	4	25	18	18	14	23	14
77	19475A0326		5	4	10	10		10	6	5	5	5	5	5	5		10	9	15	26	16	19	29	19
78	19475A0327		5	5	7	10	8	10	9	5	4	5	5	5	5	9	8	7	27	26	19	25	25	17
79	19475A0328		5	5	10	10	9	10	6	5	4	5	5	5	5	9	6	7	25	26	16	25	23	17
80	19475A0329						8			5	4	5	4	5	4	9	6	3	8	0	0	21	18	12
81	19475A0330		5	5	10	10	9	10	7	5	4	5	4	5	4	8	5	9	26	27	17	26	23	18
82	19475A0331		5	4	10	10	9	10	6	5	4	5	4	5	4	9	0	2	24	26	16	20	11	11
83	19475A0332						9	10		5	5	5	5	5	5		7	4	9	10	0	14	21	14
84	19475A0333		5	5	7	10		9	5	5	4	5	4	5	4	8	5	2	15	21	15	19	16	11
85	19475A0334		5	5	7	10	10	9	7	5	4	5	4	5	4	9	6	2	27	23	17	20	17	11
86	19475A0335		5	5	7	10	7	7	7	4	4	5	4	5	4	8	6	2	24	21	17	18	17	11
87	19475A0336		5	4	10	10	8	8	4	5	5	5	4	5		10		4	21	22	14	24	13	9
88	19475A0337		5	5	7	10	7		5	5	4	5	4	5	4	8	6	3	22	12	15	20	18	12
89	19475A0338		5	5	6	10	9	10	7	5	4	5	4	5	4	10	6	5	26	23	17	24	20	14
90	19475A0339		5	5	6	10	10		5	5	4	5	4	5	4	9	7	4	25	11	15	22	20	13
91	19475A0340		5	5	7	10	8	9	4	4	4	5	4	5	4	9	6	5	22	20	14	22	20	14
92	19475A0341		4	4	10	6	8	10	5	5	4	5	5	4		9	9	7	21	25	11	25	26	11
93	19475A0342		5	4	10	10		9	5	5	4	5	5	5	5	9	9	2	14	24	15	20	21	12
94	19475A0343		5	4	10	10	8	9	8	5	4	5	5	5	5	10		7	25	27	18	26	17	17
95	19475A0344		5	5	7	10	9	9	7	5	4	5	5	5	5		6	2	26	23	17	11	18	12
96	19475A0345		5	4	10	10	8		9	5	4	5	4	5	4	9	8	5	26	19	19	23	22	14
97	19475A0347		5	5	10	10	8	8	8	5	4	5	5	5	5	9	4	3	26	26	18	21	17	13
98	19475A0348		5		10	6	9	9	9	5	4	5	4	5	4	10		5	23	28	15	24	14	14
99	19475A0349		5		10		9	10	5				5	5	5	9	7	6	19	25	5	15	18	16
100	19475A0350		5	5	10	10	10		7	5	5	5	5	5	5	10		3	27	17	17	23	13	13
101	19475A0351		5		10	6	8	8	4		5	4	5	4			7	1	17	22	10	6	17	5
102	19475A0352		5	5	7	10	9	10	6	4	4	5	4	5	4		7	6	25	23	16	14	22	15
103	19475A0353		5	4	10	10	9	8	7	5	4	5	4	5	4	9		7	25	25	17	25	16	16
104	19475A0354		5	5	7	10	8	8	8	5	4	5	4	5	4	8	7	6	26	23	18	23	22	15
105	19475A0355		5	5	7	10	9	10	6	5	4	5	4	5	4	7	7	10	25	23	16	26	26	19
106	19475A0356		5	4	10	10	8	9	7		5	5	5	4	5	7	9		24	26	17	12	19	9

107	19475A0357		5	5	6	10	9	10	9	5	5	4	5	5		9	7	7	28	25	19	26	23	12
108	19475A0358		5	4	10	10	10		5	5	4	5	4	5	4	8	6	7	24	15	15	24	22	16
109	19475A0359		5	5	7	10	7		7	4	4	5	4	5	4	8	6	3	24	14	17	19	18	12
110	19475A0360		5	4	10	10	7	10	7		5	5	4	5	5	9	7	3	23	27	17	17	19	13
111	19475A0361		5	5	7	10	8	10	6	5	5	5	4	2		9	6	7	24	23	16	26	22	9
112	19475A0362		5	5	10	10	8	10	7	5	5	5	5	5	5	10	0	9	25	27	17	29	19	19
113	19475A0363		5	4	10	10	8	10	6	5	5	5	4	2		9	8	8	23	26	16	27	25	10
114	19475A0364		5	5	6	10	9	9	6	5	5	4	5	5		8	8	4	25	21	16	22	21	9
115	19475A0365		5	5	10	10	7		6	5	4	5	4	5	4	9	8	4	23	16	16	22	21	13
116	19475A0366		5	4	10	10	10		9	5	4	5	5	5	5	10	0	9	28	19	19	28	19	19
117	19475A0367		5	5	7	10	9	10	7		5	5	4	5	5	9	0	4	26	24	17	18	13	14
118	19475A0368		5	5	10	10	8		8	5	5	5	4	2		8		3	26	18	18	21	12	5
119	19475A0369		5	4	10	10	7		7	5	4	5	4	5	4	9	8	4	23	17	17	22	21	13
120	19475A0370		5	5	7	10	9	9	5	5	4	5	4	5	4		10	2	24	21	15	11	21	11
121	19475A0371		5	5	6	10	8	10	7	5	5	4	5	5		8	10	5	25	23	17	23	24	10
122	19475A0372		5	5	10	10	10	9	4	5	4	5	4	5	4	10		7	24	23	14	26	16	16
123	19475A0373		5	5	6	10	8	9	5		5	5	4	5	5	9	7	4	23	20	15	18	20	14
124	19475A0374		5	5	7	10	9	10	8	5	4	5	4	5	4	9	8	9	27	25	18	27	26	18
125	19475A0376		4	4	10	6	10	10	6	5	4	5	4	5	4	9	8	8	24	26	12	26	25	17
126	19475A0377							9		5	5	4	4				8	6	0	9	0	16	22	6
127	19475A0378		5	5	7	10		9	3	5	4	5	4	5	4		10	4	13	19	13	13	23	13
128	19475A0379		5	5	7	10	7	10	8	5	5	4	5	5		8		3	25	25	18	21	12	8
50% of maximum marks																			15	15	10	15	15	10
No. of Students crossed 50% of max. marks																			117	110	111	113	110	97
% of students crossed 50% of max. marks																			91	86	87	88	86	76
Attainment Level																			3	3	3	3	3	3

Course Code: C415	Course Name: POWER PLANT ENGINEERING	Year/Sem: IV/I

CO Attainment

	CO Attainment Level (Internal)	CO Attainment Level (External)	Direct CO Attainment Level (Internal * 30%) + (External * 70%)	Indirect CO Attainment Level	Total CO Attainment Level (Direct CO Attainment * 90% + Indirect CO Attainment * 10%)
C415.1	3	3	3.00	2.47	2.95
C415.2	3	3	3.00	2.45	2.95
C415.3	3	3	3.00	2.43	2.94
C415.4	3	3	3.00	2.44	2.94
C415.5	3	3	3.00	2.49	2.95
C415.6	3	3	3.00	2.36	2.94
C415					2.94

1. Copy the Direct CO Attaiment Level (Internal) and Diect CO Attaiment Level (External) from the previous sheets and then find the Direct CO Attainment Level.
2. Find Direct CO attainment level using the formula:
CO Attainment Level (Internal) * 30% + CO Attainment Level (External) * 70%
3. Copy Indirect CO Attainment Level.
4. Find the CO attainment level using the formula:
Direct CO Attainment Level *90% + Indirect CO Attainment Level * 10%

Course Code: C415	Course Name: POWER PLANT ENGINEERING	Year/Sem: IV/I

CO-PO & CO-PSO Mapping

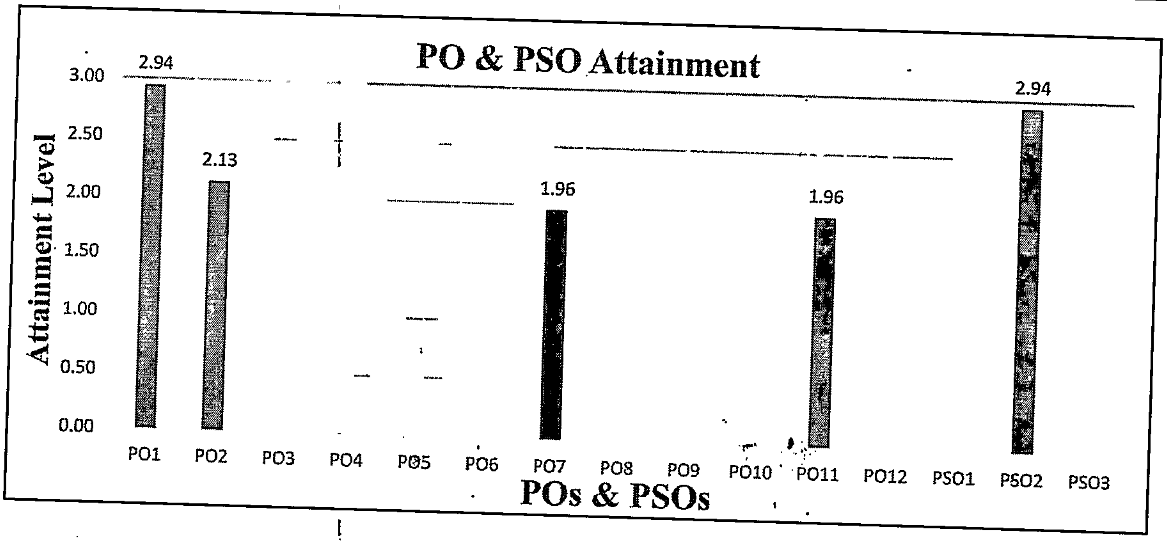
COs	POs & PSOs														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C415.1	3	2	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.2	3	1	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.3	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.4	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.5	3	1	-	-	-	-	-	-	-	-	-	-	-	3	-
C415.6	3	3	-	-	-	-	2	-	-	-	2	-	-	3	-
C415	3.00	2.17	-	-	-	-	2.00	-	-	-	2.00	-	-	3.00	-

Total CO Attainment through Direct & Indirect Assessment

CO Attainment	2.94

PO & PSO Attainment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PO Attainment	2.94	2.13	-	-	-	-	1.96	-	-	-	1.96	-	-	2.94	-



1. Copy CO - PO matrix and CO attainment matrix from previous pages and find PO attainment.
2. PO attainment is calculated as per the following formula:
   POi * Total CO attainment Level / 3 where 'i' ranges from 1 to 12

1. Copy CO - PSO matrix and CO attainment matrix from previous pages and find PSO attainment.
2. PSO attainment is calculated as per the following formula:
   PSOi * Total CO attainment Level / 3 where 'i' ranges from 1 to 3

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

MID & ASSIGNMENT EXAMINATION QUESTION PAPERS WITH SCHEME AND SOLUTIONS

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS): NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
(AUTONOMOUS)
IV B.TECH I-SEMESTER I-MID EXAMINATION,AUGUST- 2019

Subject:**POWER PLANT ENGINEERING** Date 08-08-2019

Duration : 90 Min Max Marks: 30M

Answer All Questions

Q.No	Questions	Course Outcome (CO)	Knowledge Level as Per Bloom's Taxonomy	Marks
1	a) **Explain** the working principle of closed cycle Gas power plant with neat sketch. b) **What** are the different methods used to improve Rankine cycle efficiency and explain Regenerative cycle with neat sketch.	(CO1)	Understanding (K2) & Remembering (K1)	5+5
2	a) **What** are the advantages and disadvantages of water tube boilers over fire tube boilers. b) **Explain** the working principle of Fluidized bed combustion boiler With neat sketch.	(CO2)	Remembering (K1) & Understanding (K2)	5+5
3	a)**What** is a Stoker. Explain working principle of Mechanical stoker with neat sketch. b) **Explain** the working principle of Cyclone furnace with neat sketch.	(CO3)	Remembering (K1) & Understanding (K2)	5+5

Scheme

1) a) working principle of CCGT Power Plant — 2M
diagram & working — 3M

b) Methods improve $\eta_{rankine}$ — 2M
Regenerative cycle — 3M

2) a) Advantages — 3M
Disadvantages — 2M

b) FBC boiler diagram — 3M
working — 2M

3) a) Stoker diagram — 3M
working — 2M

b) Cyclone furnace diagram — 3M
working — 2M

Scheme

1) a) working principle of CCGT Power Plant — 2M
diagram & working — 3M

b) Methods improve η rankine — 2M
Regenerative cycle — 3M

2) a) Advantages — 3M
Disadvantages — 2M

b) FBC boiler diagram — 3M
working — 2M

3) a) Stroker diagram — 3M
working — 2M

b) Cyclone furnace diagram — 3M
working — 2M

Professor & Head
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NARASARAOPETA ENGINEERING COLLEGE
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NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS): NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.TECH, I SEM, II MID EXAMINATION,OCTOBER-2019

Subject : POWER PLANT ENGINEERING(A&B) Date:10-10-2019

Duration : 90 Min Max Marks: 30M

Answer All Questions

Q.No	Questions	Course Outcome (CO)	Knowledge Level as Per Bloom's Taxonomy	Marks
1	a)**Explain** working principle of Pressurized water Reactor with neat sketch. b)**What** are the advantages and limitations of closed cycle Gas power plant..	CO4	Understanding (K2)	5+5
2	a)**Explain** the working principle of Governing of Reaction turbine with neat sketch. b)**What** is Supercharging and Explain the working principle of supercharging of Diesel engine.	CO5	Understanding (K2)	5+5
3	a) **Define** (i) Demand factor (ii) Diversity factor. b) **What** is Energy auditing, **what** are the different types of energy auditing methods **explain** any one.	CO6	Remembering(K1) & Understanding (K2)	5+5

Scheme

1) a) Pressurized Water reactor diagram — 4M
Process — 1M

b) Advantages of CCGT — 3M
Limitations of CCGT — 2M

2) a) Working Principle — 2M
diagram & working — 3M

b) Super charging principle — 2M
diagram & working — 3M

3) a) Demand factor — 2.5M
Diversity factor — 2.5M

b) Energy audit — 2M
Types & process — 3M

Scheme

1) a) Pressurized Water reactor diagram — 4M
Process — 1M

b) Advantages of CCGT — 3M
Limitations of CCGT — 2M

2) a) Working Principle — 2M
diagram & working — 3M

b) Super charging principle — 2M
diagram & working — 3M

3) a) Demand factor — 2.5M
Diversity factor — 2.5M

b) Energy audit — 2M
Types & process — 3M

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NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET
(AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.Tech II – SEM, I - Mid Examination, January– 2019
Subject: POWER PLANT ENGINEERING
Common to all sections

Date: 24-01-2019 **Time: 90 mins** **Max.Marks: 15 M**

Answer all the following questions

Q.No	Questions	Course outcome (CO)	Knowledge Level as per Bloom's Taxonomy	Marks
1	Explain with neat sketch of Pulverized fuel burning systems	CO1	Understanding(K2)	5
2	a) Explain supercharging in diesel power plant? b) With a neat sketch and explain gas turbine power plant?	CO2	Understanding(K2) & Understanding(K2)	5
3	a) Define dam and different types of dams b) What are the different types of spillways explain any one spillway.	CO2	Remembering (K1) & Remembering (K1)	5

Narasaraopeta Engineering College (Autonomous)
Department of Mechanical Engineering
IV-II Power Plant Engineering MID-I Scheme

Date: 24/1/19

1) for the sketch of Pulverized fuel burning System — 2 Marks
for Explanation — 2 Marks
for conclusion — 1 Mark.

2) a) for Super charging Explanation — 1 Mark
for applications / uses — 1 Mark
b) for the Sketch of Gas turbine power plant — 2 Marks
Explanation — 1 Mark.

3) a) for the Dam Defination — 1 Mark
for List of types — 1 Mark
b) for List of Spill ways — 1 Mark
for Explanation of one spillway — 2 Marks.

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NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET
(AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.Tech II – SEM, II - Mid Examination, March – 2019
Subject: POWER PLANT ENGINEERING
Common to all sections

Date: 27-03-2019 **Time: 90 mins** **Max.Marks: 15 M**

Answer all the following questions

Q.No	Questions	Course outcome (CO)	Knowledge Level as per Bloom's Taxonomy	Marks
1	A).Explain the essential components of a nuclear reactor. B).Explain about sodium-graphite reactor with a neat sketch	CO3	Remembering (K1) & Understanding(K2)	5
2	Explain the working of pump storage plant in coordination with nuclear power plant	CO4	Understanding(K2)	5
3	A).Define peak load, demand factor, load factor and plant use factor. B).Explain briefly various methods of pollution.	CO4	Remembering (K1) & Understanding(K2) 27	5

Narasaraopeta Engineering College (Autonomous)
Department of Mechanical Engineering
IV-II Power Plant Engineering MID-II Scheme

Date: 27/3/19

1) a) For List of Components in Nuclear Reactor — 1 Mark.
For Explanation — 2 Marks
For Sketch — 1 Mark

b) For the Sketch of Sodium graphite reactor — 1 Mark
For Explanation — 1 Mark.

2) For the sketch of Pump Storage plant — 2 Marks
For Explanation — 2 Marks
For the coordination with Nuclear Power Plant — 2 Marks

3) a) For the definations of Peak load, demand factor — 1 Mark
" of Load factor, Use factor — 1 Mark.

b) For the Explanation of various method of Pollution — 2 Marks
For Conclusion — 1 Mark.

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NARASARAOPET - 522 601, Guntur ...

NARASARSOPETA ENGINEERING COLLEGE (AUTONOMOUS): NARASARAOPET				
DEPARTMENT OF MECHANICAL ENGINEERING				
IV B.TECH I- SEM I – ASSIGNMENT TEST, JUNE - 2019.				
SUBJECT: POWER PLANT ENGINEERING (A & B SECTIONS)				
DATE:-27 -06- 2019				MAX.MARKS: 10
S.NO.	Question	Course out come	Knowledge level as per Blooms Taxonomy	Marks
1.	Explain the working principle of hydro-electric power plant with neat sketch	CO1	Understanding (K2)	10
2.	Describe the layout of nuclear power plant	CO1	Understanding (K2)	10
3.	What are the merits demerits of gas power plant over thermal power plant	CO1	Remembering (K1)	10
4.	Explain the working principle of steam power plant with neat sketch	CO1	Understanding (K2)	10
5.	Explain working principie of diesel power plant with neat sketch	CO1	Remembering (K1)	10

Scheme

1) hydro electric Power plant diagram — 5M
working — 5M

2) Layout of Nuclear Powerplant — 6M
working — 4M

3) Gas Power Plant Merits — 5M
Demerits — 5M

4) working principle of Steam Powerplant — 4M
diagram & working — 6M

5) Diesel power plant working principle — 4M
diagram & working — 6M

NARASARSOPETA ENGINEERING COLLEGE (AUTONOMOUS): NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.TECH I- SEM II – ASSIGNMENT TEST, JULY - 2019.
SUBJECT: POWER PLANT ENGINEERING (A & B SECTIONS)
DATE: 18 -07- 2019 MAX.MARKS: 10

S.NO.	Question	Course out come	Knowledge level as per Blooms Taxonomy	Marks
1.	**Explain** the working principle of Fluidized bed Boiler with neat sketch.	CO2	Understanding (K2)	10
2.	**What** Is a Super critical boiler? What are its merits and demerits?	CO2	Understanding (K2)	10
3.	**What** are the merits demerits of Water tube boilers over fire tube boilers and also explain any one type of water tube boiler with neat sketch.	CO2	Remembering (K1)	10
4.	**Enumerate** various methods of feed water treatment? Explain any one with neat sketch?	CO2	Understanding (K2)	10
5.	**Explain** the following boiler accessories with neat sketch i) Economiser. ii) Super heater.	CO2	Remembering (K1)	10

Scheme

1) FBC boiler diagram — 6M
working — 4M

2) Super critical boiler ~~working~~ & diagram — 6M
Merits & Demerits — 4M

3) Water tube boilers Merits & Demerits — 6M
Diagram — 4M

4) feed water treatment Methods — 5M
Any one working — 5M

5) Economiser working — 5M
Super heater working — 5M

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NARASARSOPETA ENGINEERING COLLEGE (AUTONOMOUS): NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.TECH, I- SEM III – ASSIGNMENT TEST, AUGUST - 2019.
SUBJECT: POWER PLANT ENGINEERING (A & B SECTIONS)
DATE:-29 -08- 2019 MAX.MARKS: 10

S.NO.	Question	Course out come	Knowledge level as per Blooms Taxonomy	Marks
1.	**Explain** the Working principle of pressurized water reactor with neat sketch.	CO4	Understanding (K2)	10
2.	**Explain** the working principle of Gas cooled reactor with neat sketch.	CO4	Understanding (K2)	10
3.	**Explain** the Working principle of Boling water reactor with neat sketch	CO4	Understanding (K2)	10
4.	**Explain** the Working principle of Liquid metal fast breeder reactor with neat sketch.	CO4	Understanding (K2)	10
5.	**Explain** the Working principle of Closed cycle Gas turbine power plant with neat sketch.	CO4	Understanding (K2)	10

Scheme

1) PWR diagram — 5M
working — 5M

2) GCR diagram — 5M
working — 5M

3) BWR diagram — 5M
working — 5M

4) LMFBR diagram — 5M
working — 5M

5) CCGTPP diagram — 5M
working — 5M

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NARASARSOPETA ENGINEERING COLLEGE (AUTONOMOUS): NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B.TECH, I- SEM IV – ASSIGNMENT TEST, SEPTEMBER - 2019.
SUBJECT: POWER PLANT ENGINEERING (A & B SECTIONS)
DATE:-19 -09- 2019 MAX.MARKS: 10

S.NO.	Question	Course out come	Knowledge level as per Blooms Taxonomy	Marks
1.	**Explain** the Working principle of Governing of Impulse turbine with neat sketch.	CO5	Understanding (K2)	10
2.	**Explain** the Working principle of Governing of Reaction turbine with neat sketch.	CO5	Understanding (K2)	10
3.	**What** are the advantages and limitations of Hydro-electric power plants and also **explain** its Applications	CO5	Remembering (K1) Understanding (K2)	10
4.	**Explain** the Working principle Super charging of Diesel engines with neat sketch.	CO5	Understanding (K2)	10
5.	**What** are the advantages and limitations of Diesel power plants and also **explain** its Applications	CO5	Remembering (K1) Understanding (K2)	10

Scheme

1) Governing of Impulse turbine — 5M
diagram & working — 5M

2) Governing of Reaction turbine — 5M
diagram & working — 5M

3) Advantages — 5M
Limitations & Applications — 5M

4) Super charging working — 5M
diagram — 5M

5) Advantages — 5M
Limitations & Applications — 5M

Professor & Head
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NARASARAOPET ENGINEERING COLLEGE (Autonomous) NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B. TECH I - SEMESTER ASSIGNMENT TEST-I September - 2022

SUBJECT: Power Plant Engineering	**DATE:** 03 -09-2022
DURATION: 30 MIN	**MAX MARKS:** 10M

Q. No	Questions	Course Outcome (CO)	Knowledge Level as Per Bloom's Taxonomy	Marks
1	**Explain** the working principle of modern coal power plant with neat sketch.	1	Evaluating(K5)	5
2	**Discuss** the working principle of Super critical Boiler with neat sketch.	1	Creating (K6)	5
3	**Compare** the advantages and disadvantages of Thermal power plants over other power plants.	1	Analyze (K4)	5
4	**Explain** the working principle of FBC Boiler with neat sketch.	1	Evaluating(K5)	5
5	**Explain** the working principle of Pneumatic Ash handling system with neat sketch.	1	Evaluating(K5)	5
6	**Discuss** any one type of feed water treatment method with neat sketch.	1	Creating (K6)	5

Scheme

1) Modern Coal Power Plant diagram — 3M
working — 2M

2) Super critical Boiler diagram — 3M
working — 2M

3) thermal Power Plants Advantages — 3M
Disadvantages — 2M

4) FBC Boiler diagram — 3M
working — 2M

5) Pneumatic Ash handling System diagram — 3M
working — 2M

6) Feed water treatment diagram — 3M
working — 2M

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NARASARAOPET ENGINEERING COLLEGE (Autonomous) NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B. TECH I - SEMESTER ASSIGNMENT TEST-II September - 2022

SUBJECT: Power Plant Engineering	**DATE:** 10 -09-2022
DURATION: 30 MIN	**MAX MARKS:** 10M

Q. No	Questions	Course Outcome (CO)	Knowledge Level as Per Bloom's Taxonomy	Marks
1	**Explain** the working principle of Diesel power plant with neat sketch.	2	Evaluating(K5)	5
2	**Discuss** the working principle of Closed cycle Gas turbine power plant with neat sketch.	2	Creating (K6)	5
3	**List out** the merits and demerits of Gas turbine power plants.	2	Analyze (K4)	5
4	**Explain** the working principle of Combined cycle power plant with neat sketch.	2	Evaluating(K5)	5
5	**Compare** the Diesel cycle with Brayton cycle with process diagram.	2	Analyze (K4)	5
6	**Discuss** the working principle of Integrated Gasifier Based Combined Cycle power plant.	2	Creating (K6)	5

Scheme

1) Diesel Power Plant diagram — 3M
working — 2M

2) Closed Cycle Gas turbine PP — 3M
working — 2M

3) Gas turbine PP Merits — 3M
Demerits — 2M

4) CC PP diagram — 3M
working — 2M

5) Diesel cycle diagram — 2.5M
Brayton cycle diagram — 2.5M

6) IGBCCPP diagram — 3M
working — 2M

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NARASARAOPETA ENGINEERING COLLEGE (Autonomous) NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B. TECH I - SEMESTER ASSIGNMENT TEST-III OCTOBER - 2022

SUBJECT: Power Plant Engineering	**DATE:**14 -10-2022
DURATION: 30 MIN	**MAX MARKS:** 10M

Q. No	Questions	Course Outcome (CO)	Knowledge Level as Per Bloom's Taxonomy	Marks
1	**Explain** the working principle of Boiling water Reactor Nuclear power plant with neat sketch.	3	Evaluating(K5)	5
2	**Discuss** the working principle of CANDU Reactor Nuclear power plant with neat sketch.	3	Creating (K6)	5
3	**List out** the merits and demerits of Nuclear power plants.	3	Analyze (K4)	5
4	**Explain** the working principle of hydroelectric power plant with neat sketch.	4	Evaluating(K5)	5
5	**Compare** Nonconventional power plants with conventional power plants.	4	Analyze (K4)	5
6	**Discuss** the working principle of Geothermal power plant with neat sketch.	4	Creating (K6)	5

Scheme

1) BWR working principle — 2M
diagram — 3M

2) CANDU Reactor diagram — 3M
working — 2M

3) NPP Merits — 3M
Demerits — 2M

4) HEPP working principle — 3M
diagram — 2M

5) NCPP & Conv. PP — 3M Merits
Demerits — 2M

6) Geothermal PP diagram — 3M
working — 2M

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NARASARAOPET ENGINEERING COLLEGE (Autonomous) NARASARAOPET
DEPARTMENT OF MECHANICAL ENGINEERING
IV B. TECH I - SEMESTER ASSIGNMENT TEST-IV OCTOBER - 2022

SUBJECT: Power Plant Engineering	**DATE:**29 -10-2022
DURATION: 30 MIN	**MAX MARKS:** 10M

Q. No	Questions	Course Outcome (CO)	Knowledge Level as Per Bloom's Taxonomy	Marks
1	**Explain** the working principle of Fuel cell with neat Sketch.	4	Evaluating(K5)	5
2	**Discuss** the working principle of Tidal power plant with Neat sketch.	4	Creating (K6)	5
3	**List out** the merits and demerits of Biogas power plants.	4	Analyze (K4)	5
4	**Explain** the terms Load factor, capacity factor and load Curve.	5	Evaluating(K5)	5
5	**Discuss** the various costs involved in power plants.	5	Creating (K6)	5
6	**Elaborate** the different factors which influence power plant Economy	5	Creating (K6)	5

Scheme

1) Fuel cell working principle — 3M
diagram — 2M

2) Tidal PP working principle — 2M
diagram — 3M

3) Biogas PP working Merits — 3M
Demerits — 2M

4) Load factor — 2M
Capacity factor — 1M
Load curve — 2M

5) List of costs — 5M

6) Factors influence Powerplant Economy — 5M

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NARASARAOPET - 522 601, Guntur (Dt.)

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 2018 BATCH IV B.TECH I SEM II MID AWARD LIST, JAN - 2022

Branch :ME - B **Subject CODE & NAME:** R16ME4104 & Power Plant Engg. **Date:** 21/1/2022

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	MID - 2 Total Marks (30M)	MID- 2 REDUCED MARKS (20M)	QUIZ - 2 MARKS (10)
		Max.Marks	5	5	5	5	5	5			
		Q.No.	1(a)	1(b)	2(a)	2(b)	3(a)	3(b)			
1	17471A0310		4	5	—	—	5	1	15	10	3
2	19475A0313		5	5	5	5	5	5	30	20	5
3	19475A0314		4	5	5	4	4	4	26	18	4
4	19475A0315		5	3	—	5	4	—	17	12	10
5	19475A0316		4	5	5	5	5	4	28	19	7
6	19475A0317		5	5	5	4	4	4	27	18	9
7	19475A0318		5	5	5	5	5	5	30	20	6
8	19475A0319		4	5	5	3	4	5	26	18	7
9	19475A0320		4	4	—	4	3	4	19	13	2
10	19475A0321		4	5	—	4	4	5	22	15	3
11	19475A0322		5	5	5	5	4	4	28	19	4
12	19475A0323		4	4	5	4	3	1	21	14	7
13	19475A0324		4	4	5	5	4	4	26	18	4
14	19475A0325		5	5	5	5	5	4	29	20	4
15	19475A0326		5	5	5	5	5	5	30	20	9
16	19475A0327		4	5	5	5	5	4	28	19	7
17	19475A0328		4	5	5	5	4	5	28	19	7
18	19475A0329		5	5	5	4	3	5	27	18	3
19	19475A0330		5	4	5	5	4	3	26	18	9
20	19475A0331		4	5	5	4	4	5	27	18	2
21	19475A0332		5	5	5	5	5	5	30	20	4
22	19475A0333		5	5	4	5	4	3	26	18	2
23	19475A0334		5	4	5	5	4	4	27	18	2
24	19475A0335		4	4	5	4	4	4	25	17	2
25	19475A0336		4	4	5	4	4	3	24	16	4
26	19475A0337		5	4	5	4	5	4	27	18	3
27	19475A0338		4	4	5	4	5	4	26	18	5
28	19475A0339		5	5	5	4	4	3	26	18	4
29	19475A0340		4	4	5	4	4	4	25	17	5
30	19475A0341		4	4	5	—	5	4	22	15	7
31	19475A0342		5	5	5	5	4	4	28	19	2
32	19475A0343		5	4	5	5	4	5	28	19	7
33	19475A0344		4	4	5	5	4	5	28	19	2
34	19475A0345		4	4	5	5	4	4	27	18	5
35	19475A0347		4	5	5	5	4	5	28	19	3
36	19475A0348		4	5	5	4	4	5	27	18	5
37	19475A0349		5	5	4	—	—	—	14	10	6
38	19475A0350		5	5	5	5	5	5	30	20	3
39	19475A0351		4	—	5	5	—	3	17	12	1
40	19475A0352		4	5	5	4	4	3	25	17	6
41	19475A0353		4	5	5	4	4	5	27	18	7

Branch :ME - B Subject CODE & NAME: RIGMEUIOY & Power Plant Engg. Date: 21/01/2022

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	MID - 2 Total Marks (30M)	MID- 2 REDUCED MARKS (20M)	QUIZ - 2 MARKS (10)
		Max.Marks	5	5	5	5	5	5			
		Q.No.	1(a)	1(b)	2(a)	2(b)	3(a)	3(b)			
42	19475A0354		4	4	5	5	5	4	27	18	6
43	19475A0355		4	5	4	4	5	4	26	18	10
44	19475A0356		4	5	5	5	5	—	24	16	3
45	19475A0357		4	4	5	4	4	3	24	16	7
46	19475A0358		5	5	5	4	4	3	26	18	7
47	19475A0359		4	4	4	5	3	5	25	17	3
48	19475A0360		4	5	4	5	3	3	24	16	3
49	19475A0361		4	4	5	4	2	2	21	14	9
50	19475A0362		5	5	5	5	4	5	29	20	9
51	19475A0363		4	5	4	5	3	—	21	14	8
52	19475A0364		4	5	4	4	3	3	23	16	4
53	19475A0365		4	4	5	4	5	4	26	18	4
54	19475A0366		4	4	5	5	5	5	28	19	9
55	19475A0367		4	3	4	4	4	4	23	16	4
56	19475A0368		4	3	4	4	3	3	21	14	3
57	19475A0369		4	5	4	5	4	5	27	18	4
58	19475A0370		4	4	5	5	4	4	26	18	2
59	19475A0371		4	4	5	4	3	4	24	16	5
60	19475A0372		5	4	5	4	4	5	27	18	7
61	19475A0373		4	4	4	4	4	4	24	16	6
62	19475A0374		4	4	5	4	4	5	26	18	9
63	19475A0376		4	4	5	4	4	5	26	18	8
64	19475A0377		1	4	—	4	4	4	17	12	6
65	19475A0378		4	4	5	4	4	5	26	18	4
66	19475A0379		4	3	5	4	4	4	24	16	3

P. Sravani
Name of the Staff Member

P. Sravani
Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 2018 BATCH IV B.TECH I SEM II MID AWARD LIST, JAN - 2022

Branch :ME - A   Subject CODE & NAME: R16ME4104 Power Plant Engg.   Date: 21/01/2022

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	MID - 2 Total Marks (30M)	MID- 2 REDUCED MARKS (20M)	QUIZ - 2 MARKS (10)
		Max.Marks	5	5	5	5	5	5			
		Q.No.	1(a)	1(b)	2(a)	2(b)	3(a)	3(b)			
1	17471A0337		5	5	4	4	—	—	18	12	AB
2	18471A0302		5	5	4	5	5	4	28	19	10
3	18471A0303		3	5	5	5	3	3	24	16	4
4	18471A0304		5	4	—	5	3	3	20	14	4
5	18471A0305		4	4	3	—	3	3	17	12	5
6	18471A0306		5	5	3	2	—	—	15	10	7
7	18471A0307		4	5	5	3	3	2	22	15	7
8	18471A0308		5	4	4	2	—	—	15	10	10
9	18471A0309		5	5	5	5	5	4	29	20	10
10	18471A0310		5	5	5	5	5	4	29	20	7
11	18471A0311		5	4	4	5	5	5	28	19	6
12	18471A0312		3	4	—	5	—	3	15	10	8
13	18471A0313		2	5	5	4	3	0	19	13	7
14	18471A0315		5	5	5	5	5	4	29	20	4
15	18471A0316		~~4~~	~~5~~	—	—	—	—	AB	AB	AB
16	18471A0317		4	5	—	5	4	3	21	14	6
17	18471A0318		5	5	2	—	5	—	17	12	3
18	18471A0319		4	5	5	5	3	4	26	18	9
19	18471A0320		—	4	2	4	3	2	15	10	7
20	18471A0321		4	5	3	5	5	—	22	15	3
21	18471A0322		5	5	3	5	5	—	23	16	3
22	18471A0323		4	4	5	5	4	3	25	17	2
23	18471A0324		—	5	3	5	3	3	19	13	1
24	18471A0325		4	5	5	5	5	4	28	19	2
25	18471A0326		5	4	4	4	2	2	21	14	8
26	18471A0327		4	5	—	0	—	—	09	06	8
27	18471A0328		4	5	5	5	3	3	25	17	5
28	18471A0329		4	5	5	4	4	2	24	16	6
29	18471A0330		4	5	3	5	3	—	20	14	6
30	18471A0331		4	5	4	5	3	2	23	16	3
31	18471A0332		3	5	01	5	5	3	22	15	7
32	18471A0333		5	5	5	5	4	3	27	18	3
33	18471A0334		4	4	4	4	1	3	20	14	7
34	18471A0335		4	4	—	0	—	—	08	06	10
35	18471A0336		-	-	-	-	-	-	AB	AB	AB

Branch :ME - A Subject CODE & NAME: R16ME4104 & Power Plant Engg. Date: 21/1/2022

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	MID - 2 Total Marks (30M)	MID- 2 REDUCED MARKS (20M)	QUIZ - 2 MARKS (10)
		Max.Marks	5	5	5	5	5	5			
		Q.No.	1(a)	1(b)	2(a)	2(b)	3(a)	3(b)			
36	18471A0337		5	5	5	5	4	4	28	19	7
37	18471A0338		4	5	5	5	4	3	26	18	4
38	18471A0339		5	5	5	5	4	3	27	18	3
39	18471A0340		5	5	5	5	5	4	29	20	3
40	18471A0341		4	5	5	5	2	—	21	14	7
41	18471A0342		5	4	1	5	5	4	24	16	7
42	18471A0343		4	4	5	4	4	3	24	16	7
43	18471A0344		4	5	—	4	4	4	21	14	3
44	18471A0345		4	4	—	5	4	3	20	14	3
45	18471A0346		5	5	—	5	3	5	23	16	6
46	18471A0347		4	5	5	5	4	4	27	18	8
47	18471A0348		5	5	5	5	5	4	29	20	5
48	18471A0349		2	4	5	5	3	4	23	16	1
49	18471A0350		4	5	—	4	4	1	18	12	2
50	18471A0351		5	5	5	4	—	2	21	14	7
51	18471A0352		5	5	5	5	4	—	24	16	5
52	18471A0353		4	5	5	5	3	—	22	15	1
53	18471A0354		4	2	—	—	—	—	06	04	2
54	18471A0355		5	4	5	4	4	4	26	18	4
55	19475A0301		4	4	5	5	—	4	22	15	4
56	19475A0302		5	—	5	—	3	3	16	11	2
57	19475A0304		5	5	5	5	4	3	27	18	5
58	19475A0305		5	5	4	3	5	3	25	17	3
59	19475A0307		4	5	—	4	5	5	23	16	5
60	19475A0308		4	5	5	5	3	3	25	17	4
61	19475A0309		4	—	1	—	—	—	05	04	5
62	19475A0310		5	4	5	5	4	5	28	19	6
63	19475A0311		5	5	5	5	5	5	30	20	2
64	19475A0312		5	5	5	5	4	5	29	20	5

P. Sravani
Name of the Staff Member

P. Sravani
Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET (AUTONOMOUS)

(R16) 2018 BATCH IV B.TECH I SEM I ASSIGNMENT TEST MARKS AWARD LIST OCT - 2021

Branch : ME - A SUBJECT: Power Plant Engineering DATE: 30/9/21

Sl.No.	H.T.NO	CO No.	1		Total (10M)	Sl.No.	H.T.NO	CO No.	1		Total (10M)
		Max. Marks	10					Max. Marks	10		
		Sub Q.No.	-	-				Sub Q.No.	-	-	
1	17471A0337	1	9		9	36	18471A0337	-	-		AB
2	18471A0302	3	10		10	37	18471A0338	3	9		9
3	18471A0303	5	9		9	38	18471A0339	1	9		9
4	18471A0304	4	9		9	39	18471A0340	-	-		AB
5	18471A0305	2	8		8	40	18471A0341	5	7		7
6	18471A0306	2	6		6	41	18471A0342	2	6		6
7	18471A0307	3	7		7	42	18471A0343	1	9		9
8	18471A0308	2	9		9	43	18471A0344	5	7		7
9	18471A0309	3	8		8	44	18471A0345	2	9		9
10	18471A0310	1	9		9	45	18471A0346	1	10		10
11	18471A0311	1	8		8	46	18471A0347	4	9		9
12	18471A0312	4	8		8	47	18471A0348	4	8		8
13	18471A0313	2	8		8	48	18471A0349	1	8		8
14	18471A0315	5	10		10	49	18471A0350	2	7		7
15	18471A0316	2	9		9	50	18471A0351	3	8		8
16	18471A0317	5	8		8	51	18471A0352	3	10		10
17	18471A0318	3	8		8	52	18471A0353	3	5		5
18	18471A0319	1	7		7	53	18471A0354	5	6		6
19	18471A0320	3	7		7	54	18471A0355	3	10		10
20	18471A0321	4	8		8	55	19475A0301	4	9		9
21	18471A0322	3	9		9	56	19475A0302	2	10		10
22	18471A0323	5	7		7	57	19475A0304	-	-		AB
23	18471A0324	2	8		8	58	19475A0305	3	8		8
24	18471A0325	1	7		7	59	19475A0307	4	8		8
25	18471A0326	1	10		10	60	19475A0308	2	9		9
26	18471A0327	4	10		10	61	19475A0309	5	10		10
27	18471A0328	5	9		9	62	19475A0310	1	9		9
28	18471A0329	1	8		8	63	19475A0311	-	-		AB
29	18471A0330	3	9		9	64	19475A0312	4	9		9
30	18471A0331	1	7		7	65					
31	18471A0332	5	9		9	66					
32	18471A0333	1	7		7	67					
33	18471A0334	5	8		8	68					
34	18471A0335	2	10		10	69					
35	18471A0336	4	8		8	70					

P. SRAVANI

NAME OF THE STAFF MEMBER

P. Sravani

SIGNATURE OF THE STAFF MEMBER

SIGNATURE OF THE HOD

NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET (AUTONOMOUS)

(R16) 2018 BATCH IV B.TECH I SEM I ASSIGNMENT TEST MARKS AWARD LIST OCT - 2021

Branch : ME - B SUBJECT: Power Plant Engg. DATE: 30/9/2021

Sl.No.	H.T.NO	CO No.	1		Total (10M)
		Max. Marks	10		
		Sub Q.No.	–		
1	17471A0310	5	6		6
2	19475A0313	5	9		9
3	19475A0314	2	8		8
4	19475A0315	4	7		7
5	19475A0316	2	9		9
6	19475A0317	2	5		5
7	19475A0318	1	10		10
8	19475A0319	1	10		10
9	19475A0320	–	–		AB
10	19475A0321	2	9		9
11	19475A0322	1	10		10
12	19475A0323	2	8		8
13	19475A0324	2	8		8
14	19475A0325	3	7		7
15	19475A0326	–	–		AB
16	19475A0327	5	8		8
17	19475A0328	3	9		9
18	19475A0329	2	8		8
19	19475A0330	5	9		9
20	19475A0331	1	9		9
21	19475A0332	2	9		9
22	19475A0333	–	–		AB
23	19475A0334	2	10		10
24	19475A0335	5	7		7
25	19475A0336	5	8		8
26	19475A0337	5	7		7
27	19475A0338	3	9		9
28	19475A0339	3	10		10
29	19475A0340	4	8		8
30	19475A0341	4	8		8
31	19475A0342	–	–		AB
32	19475A0343	2	8		8
33	19475A0344	5	9		9
34	19475A0345	4	8		8
35	19475A0347	4	8		8

Sl.No.	H.T.NO	CO No.	1		Total (10M)
		Max. Marks	10		
		Sub Q.No.	–		
36	19475A0348	5	9		9
37	19475A0349	3	9		9
38	19475A0350	4	10		10
39	19475A0351	2	8		8
40	19475A0352	3	9		9
41	19475A0353	5	9		9
42	19475A0354	3	8		8
43	19475A0355	3	9		9
44	19475A0356	3	8		8
45	19475A0357	5	9		9
46	19475A0358	1	10		10
47	19475A0359	4	7		7
48	19475A0360	1	7		7
49	19475A0361	2	8		8
50	19475A0362	4	8		8
51	19475A0363	3	8		8
52	19475A0364	4	9		9
53	19475A0365	5	7		7
54	19475A0366	1	10		10
55	19475A0367	4	9		9
56	19475A0368	3	8		8
57	19475A0369	5	7		7
58	19475A0370	4	9		9
59	19475A0371	1	8		8
60	19475A0372	3	10		10
61	19475A0373	4	8		8
62	19475A0374	1	9		9
63	19475A0376	2	10		10
64	19475A0377	–	–		AB
65	19475A0378	–	–		AB
66	19475A0379	2	7		7
67					
68					
69					
70					

P. SRAVANI

NAME OF THE STAFF MEMBER

P. Sravani

SIGNATURE OF THE STAFF MEMBER

SIGNATURE OF THE HOD

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 17 BATCH IV B.TECH I SEM I MID Examination Marks - Award List JANUARY -2021

Branch :ME-A Subject: Power Plant Engineering Date: 19-07-2020.

DESCRIPTIVE

Sl.No.	H.T.NO.	CO No. / Max.Marks / Q.No.	CO1 / 5 / 1 (a)	CO1 / 5 / 1 (b)	CO2 / 5 / 2 (a)	CO2 / 5 / 2 (b)	CO3 / 5 / 3 (a)	CO4 / 5 / 3 (b)	Total Marks (30M)	Total Marks (20M)
1	16471A0308		4	5	4	5	3	-	21	14
2	16471A0326		4	4	3	5	2	2	20	14
3	16471A0345		-	-	-	-	-	-	AB	AB
4	16471A0367		4	4	3	3	4	3	21	14
5	17471A0301		5	5	5	5	3	3	26	18
6	17471A0302		5	5	3	5	5	4	27	18
7	17471A0303		5	5	-	5	-	5	20	14
8	17471A0304		5	5	-	-	5	4	19	13
9	17471A0305		5	5	-	-	4	4	18	12
10	17471A0306		5	5	2	5	5	3	25	17
11	17471A0307		5	5	-	5	5	4	24	16
12	17471A0308		4	4	-	4	4	4	20	14
13	17471A0309		5	5	4	5	4	2	25	17
14	17471A0311		5	4	5	4	5	3	26	18
15	17471A0312		5	5	5	5	4	4	28	19
16	17471A0313		5	5	3	5	5	-	23	16
17	17471A0314		5	5	5	4	5	3	27	18
18	17471A0315		5	5	4	-	5	3	22	15
19	17471A0316		5	5	5	5	4	4	28	19
20	17471A0317		5	4	3	5	4	5	26	18
21	17471A0318		5	5	-	5	5	3	23	16
22	17471A0320		-	-	-	-	-	-	AB	AB
23	17471A0321		5	5	3	4	5	3	25	17
24	17471A0322		5	4	2	4	5	2	22	15
25	17471A0323		5	5	5	5	5	3	28	19
26	17471A0324		5	5	-	4	4	2	20	14
27	17471A0325		5	5	4	4	4	3	25	17
28	17471A0326		4	5	4	4	4	2	23	16
29	17471A0327		4	4	3	-	3	2	16	11
30	17471A0328		5	5	3	5	5	5	28	19
31	17471A0329		5	5	-	3	5	-	18	12

Sl.No.	H.T.NO.	CO No.	Co1	Co1	Co2	Co2	Co3	Co3	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
32	17471A0330		5	—	5	3	5	—	18	12
33	17471A0331		5	—	—	5	3	5	18	12
34	17471A0332		5	—	—	5	5	5	20	14
35	17471A0333		—	5	—	4	5	3	17	12
36	17471A0334		5	—	—	5	5	5	20	14
37	17471A0335		5	5	5	5	4	4	28	19
38	17471A0336		5	5	—	—	5	—	15	10
39	17471A0338		5	3	—	3	5	—	16	11
40	17471A0339		5	3	—	5	5	5	23	16
41	17471A0340		5	5	—	—	5	—	15	10
42	17471A0341		5	—	—	4	5	—	14	10
43	17471A0342		—	—	5	—	02	—	07	05
44	17471A0343		5	4	4	5	1	5	24	16
45	17471A0344		5	5	—	5	—	—	15	10
46	17471A0345		5	—	5	—	5	—	15	10
47	17471A0346		5	5	5	5	—	—	20	14
48	17471A0347		5	5	—	5	—	5	20	14
49	17471A0348		5	2	—	2	4	—	13	09
50	17471A0349		5	4	—	5	2	—	16	11
51	17471A0350		5	5	—	5	—	5	20	14

Name of the Staff Member P-SRINIVASARAO

Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)

(R16) 17 Batch IV B.Tech I Sem Online I MID OBJECT Test Marks - Award List (JANUARY-2021)

Branch :ME-A

Sub: Power plant Engineering.

Sl.No.	H.T.NO	Total (10M)	Sl.No.	H.T.NO	Total (10M)
1	16471A0308	09	28	17471A0326	09
2	16471A0326	09	29	17471A0327	09
3	16471A0345	AB	30	17471A0328	10
4	16471A0367	09	31	17471A0329	09
5	17471A0301	09	32	17471A0330	10
6	17471A0302	09	33	17471A0331	09
7	17471A0303	08	34	17471A0332	09
8	17471A0304	10	35	17471A0333	09
9	17471A0305	09	36	17471A0334	08
10	17471A0306	10	37	17471A0335	09
11	17471A0307	09	38	17471A0336	10
12	17471A0308	10	39	17471A0338	10
13	17471A0309	09	40	17471A0339	10
14	17471A0311	10	41	17471A0340	09
15	17471A0312	07	42	17471A0341	10
16	17471A0313	05	43	17471A0342	09
17	17471A0314	10	44	17471A0343	08
18	17471A0315	10	45	17471A0344	10
19	17471A0316	10	46	17471A0345	10
20	17471A0317	09	47	17471A0346	10
21	17471A0318	09	48	17471A0347	08
22	17471A0320	AB	49	17471A0348	07
23	17471A0321	10	50	17471A0349	08
24	17471A0322	10	51	17471A0350	10
25	17471A0323	08			
26	17471A0324	08			
27	17471A0325	09			

Name of the Staff Member P.SRINIVASARAO

Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 17 BATCH IV B.TECH I SEM II MID Examination Marks - Award List FEBRUARY -2021

Branch :ME-A

DESCRIPTIVE

Subject: Power plant Engineering Date: 11-02-2021

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
1	16471A0308		—	5	—	5	5	5	20	14
2	16471A0326		—	—	—	—	—	—	00	00
3	16471A0345		—	—	5	5	5	5	20	14
4	16471A0367	—	—	—	—	—	—	—	AB	AB
5	17471A0301		5	5	4	4	5	5	28	19
6	17471A0302		3	5	5	5	4	5	27	18
7	17471A0303		—	5	5	5	—	5	20	14
8	17471A0304		—	5	5	—	—	—	10	07
9	17471A0305		—	—	5	5	—	—	10	07
10	17471A0306		—	05	—	—	—	—	05	04
11	17471A0307		5	5	—	5	5	5	25	17
12	17471A0308		5	5	—	5	—	5	20	14
13	17471A0309		05	—	—	—	—	—	05	04
14	17471A0311		5	5	5	5	5	3	28	19
15	17471A0312		5	5	5	5	3	5	28	19
16	17471A0313		5	5	—	—	—	—	10	07
17	17471A0314		5	5	2	5	5	4	26	18
18	17471A0315		5	5	4	5	5	5	29	20
19	17471A0316		5	5	5	5	5	5	30	20
20	17471A0317		5	5	—	4	—	—	14	10
21	17471A0318		5	5	5	5	—	—	20	14
22	17471A0320		5	5	5	5	4	—	24	16
23	17471A0321		5	5	5	5	3	3	26	18
24	17471A0322		5	5	5	5	3	3	26	18
25	17471A0323		5	5	5	5	5	5	30	20
26	17471A0324		02	—	—	—	—	—	02	02
27	17471A0325		5	5	5	5	3	2	25	17
28	17471A0326		5	5	5	5	3	3	26	18
29	17471A0327		5	5	5	—	3	2	20	14
30	17471A0328		5	5	5	5	4	—	24	16
31	17471A0329		5	—	—	—	—	5	10	07

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
32	17471A0330		5	5	—	5	—	5	20	14
33	17471A0331		5	5	5	5	02	5	27	18
34	17471A0332		5	5	5	5	3	5	28	19
35	17471A0333		5	5	5	5	—	5	25	17
36	17471A0334		5	5	5	5	5	3	28	19
37	17471A0335		5	5	5	5	3	3	26	18
38	17471A0336		5	5	5	5	3	2	25	17
39	17471A0338		4	5	3	5	5	5	27	18
40	17471A0339		5	5	5	5	3	4	27	18
41	17471A0340		4	5	—	5	4	4	22	15
42	17471A0341		—	4	5	5	3	3	20	14
43	17471A0342		5	5	5	5	—	—	20	14
44	17471A0343		5	5	5	5	3	3	26	18
45	17471A0344		5	5	5	5	4	3	27	18
46	17471A0345		—	—	5	5	5	5	20	14
47	17471A0346		5	5	5	5	5	—	25	17
48	17471A0347		5	5	5	5	5	—	25	17
49	17471A0348		5	5	5	5	2	3	25	17
50	17471A0349		5	5	5	—	—	—	15	10
51	17471A0350		5	5	5	5	5	—	25	17

Name of the Staff Member P. Sreenivasarao

Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)

(R16) 17 Batch IV B.Tech I Sem II MID OBJECT Test Marks - Award List (FEBRUARY-2021)

Branch :ME-A   Power plant Engineering

Sl.No.	H.T.NO	Total (10M)
1	16471A0308	10
2	16471A0326	05
3	16471A0345	04
4	16471A0367	AB
5	17471A0301	10
6	17471A0302	09
7	17471A0303	08
8	17471A0304	09
9	17471A0305	09
10	17471A0306	05
11	17471A0307	07
12	17471A0308	10
13	17471A0309	08
14	17471A0311	08
15	17471A0312	06
16	17471A0313	00
17	17471A0314	09
18	17471A0315	10
19	17471A0316	10
20	17471A0317	09
21	17471A0318	02
22	17471A0320	03
23	17471A0321	10
24	17471A0322	06
25	17471A0323	09
26	17471A0324	03
27	17471A0325	08
28	17471A0326	09
29	17471A0327	09
30	17471A0328	08
31	17471A0329	10
32	17471A0330	09
33	17471A0331	10
34	17471A0332	09
35	17471A0333	10
36	17471A0334	10
37	17471A0335	08
38	17471A0336	10
39	17471A0338	10
40	17471A0339	08
41	17471A0340	10
42	17471A0341	08
43	17471A0342	09
44	17471A0343	09
45	17471A0344	09
46	17471A0345	10
47	17471A0346	08
48	17471A0347	08
49	17471A0348	09
50	17471A0349	09
51	17471A0350	10

Name of the Staff Member P-SRINIVASARAO   Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 17 BATCH IV B.TECH I SEM I MID Examination Marks - Award List JANUARY -2021

Branch :ME-B' Subject: Power plant Engineering Date: 19-01-2021

DESCRIPTIVE

Sl.No.	H.T.NO.	CO No.	CO1	CO1	CO2	CO2	CO3	CO3	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
1	17471A0351		5	—	—	5	—	—	10	07
2	17471A0352		5	5	5	5	—	—	20	14
3	17471A0353		5	—	5	5	—	—	15	10
4	17471A0354		5	5	3	5	—	—	18	12
5	17471A0355		5	5	3	5	—	—	18	12
6	17471A0356		5	5	—	5	5	0	20	14
7	17471A0357		5	5	5	5	—	—	20	14
8	17471A0358		5	2	5	4	—	—	16	11
9	17471A0359		5	—	5	5	01	—	16	11
10	17471A0360		5	—	5	5	—	—	15	10
11	17471A0361		5	—	—	—	—	3	08	06
12	17471A0362		5	—	—	5	3	3	16	11
13	17471A0363		5	5	—	2	5	3	20	14
14	17471A0364		5	5	—	—	5	5	20	14
15	17471A0365		5	3	—	5	5	4	22	15
16	17471A0366		5	5	5	4	5	5	29	20
17	17471A0367		—	5	—	—	—	—	05	04
18	17471A0368		5	5	5	—	—	—	15	10
19	17471A0369		5	5	5	5	5	3	28	19
20	17471A0370		—	5	—	5	—	—	10	07
21	17471A0371		—	5	—	5	—	—	10	07
22	17471A0372		—	5	—	5	—	—	10	07
23	17471A0373		5	5	5	4	—	—	19	13
24	17471A0374		—	5	5	5	—	—	15	10
25	17471A0376		5	01	5	5	—	—	16	11
26	17471A0377		5	—	5	5	—	—	15	10
27	17471A0378		5	3	01	5	—	—	14	10
28	17471A0379		—	—	—	5	—	—	05	04
29	17471A0380		5	5	5	5	—	—	20	14
30	17471A0381		5	—	—	3	—	—	08	06
31	17471A0382		5	5	—	5	—	—	15	10

Sl.No.	H.T.NO.	CO No.	CO1	CO1	CO2	CO2	CO3	CO3	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
32	18475A0301		5	5	5	–	–	–	15	10
33	18475A0302		5	5	–	5	–	–	15	10
34	18475A0303		5	5	–	5	5	5	25	17
35	18475A0304		5	5	–	5	3	–	18	12
36	18475A0305		5	5	5	5	3	–	23	16
37	18475A0306		5	5	–	3	–	–	13	09
38	18475A0307		5	5	–	5	–	–	15	10
39	18475A0308		5	5	–	5	–	–	15	10
40	18475A0309		5	5	3	5	5	5	28	19
41	18475A0310		5	5	–	5	5	5	25	17
42	18475A0311		5	5	5	5	5	3	28	19
43	18475A0312		5	5	4	5	5	3	27	18
44	18475A0313		5	5	5	5	4	5	29	20
45	18475A0315		5	5	5	5	5	3	28	19
46	18475A0316		5	5	–	5	3	2	20	14
47	18475A0317		5	5	–	5	5	3	23	16
48	18475A0318		5	5	–	5	4	2	21	14
49	18475A0319		5	5	5	5	5	3	28	19
50	18475A0320		–	–	–	–	–	–	AB	AB

Name of the Staff Member P-SRINIVASARAO

P-Srinivasarao
Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)
(R16) 17 Batch IV B.Tech I Sem Online I MID OBJECT Test Marks - Award List (JANUARY-2021)

Branch :ME-B   Sub:- Power Plant Engineering

Sl.No.	H.T.NO	Total (10M)	Sl.No.	H.T.NO	Total (10M)
1	17471A0351	10	27	17471A0378	05
2	17471A0352	10	28	17471A0379	06
3	17471A0353	10	29	17471A0380	05
4	17471A0354	10	30	17471A0381	06
5	17471A0355	09	31	17471A0382	07
6	17471A0356	08	32	18475A0301	06
7	17471A0357	09	33	18475A0302	03
8	17471A0358	08	34	18475A0303	08
9	17471A0359	08	35	18475A0304	09
10	17471A0360	07	36	18475A0305	08
11	17471A0361	07	37	18475A0306	05
12	17471A0362	08	38	18475A0307	05
13	17471A0363	10	39	18475A0308	03
14	17471A0364	06	40	18475A0309	08
15	17471A0365	08	41	18475A0310	07
16	17471A0366	09	42	18475A0311	09
17	17471A0367	08	43	18475A0312	10
18	17471A0368	08	44	18475A0313	07
19	17471A0369	09	45	18475A0315	08
20	17471A0370	07	46	18475A0316	06
21	17471A0371	08	47	18475A0317	02
22	17471A0372	02	48	18475A0318	09
23	17471A0373	03	49	18475A0319	09
24	17471A0374	02	50	18475A0320	AB
25	17471A0376	07			
26	17471A0377	08			

Name of the Staff Member P-SRINIVASARAO   Signature of the Staff Member P-Sri

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 17 BATCH IV B.TECH I SEM II MID Examination Marks - Award List FEBRUARY -2021

Branch :ME-B' | Subject: Power Plant Engineering | Date: 11-02-2021

DESCRIPTIVE

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
1	17471A0351	3	5	5	5	3	4	4	26	18
2	17471A0352		5	5	5	5	3	3	26	18
3	17471A0353		4	5	5	5	3	2	24	16
4	17471A0354		5	4	5	5	4	4	27	18
5	17471A0355		4	5	5	2	3	5	24	16
6	17471A0356		5	5	4	5	5	3	27	18
7	17471A0357		4	5	3	5	4	4	25	17
8	17471A0358		4	5	5	5	4	4	27	18
9	17471A0359		5	5	5	5	5	—	25	17
10	17471A0360		5	5	5	5	3	2	25	17
11	17471A0361		5	5	4	4	4	3	25	17
12	17471A0362		5	5	4	5	3	5	27	18
13	17471A0363		5	4	5	5	3	2	24	16
14	17471A0364		5	5	5	5	3	4	27	18
15	17471A0365		4	5	5	5	5	5	29	20
16	17471A0366		4	5	3	5	4	4	25	17
17	17471A0367		4	5	2	5	4	—	20	14
18	17471A0368		4	5	3	5	5	—	22	15
19	17471A0369		5	5	4	4	—	5	23	16
20	17471A0370		4	5	5	5	4	—	23	16
21	17471A0371		2	5	3	5	5	3	23	16
22	17471A0372		5	5	3	5	5	4	27	18
23	17471A0373		4	4	5	—	2	5	20	14
24	17471A0374		4	5	4	5	—	-	18	12
25	17471A0376		4	5	5	—	3	4	21	14
26	17471A0377		5	5	5	4	3	2	24	16
27	17471A0378		5	5	—	5	—	—	15	10
28	17471A0379		4	5	—	3	2	3	17	12
29	17471A0380		4	5	5	3	4	4	25	17
30	17471A0381		5	5	5	5	2	—	22	15
31	17471A0382		5	5	5	5	2	—	22	15

Sl.No.	H.T.NO.	CO No.	4	4	5	5	6	6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
32	18475A0301		5	5	5	5	4	4	28	19
33	18475A0302		4	5	4	5	4	–	22	15
34	18475A0303		5	5	5	5	4	2	26	18
35	18475A0304		5	5	5	5	3	3	26	18
36	18475A0305		4	5	5	5	3	5	27	18
37	18475A0306		4	5	2	5	4	4	24	16
38	18475A0307		5	5	5	5	–	–	20	14
39	18475A0308		5	4	5	5	–	–	19	13
40	18475A0309		4	5	5	5	3	3	25	17
41	18475A0310		–	–	–	–	–	–	AB	AB
42	18475A0311		–	–	–	–	–	–	AB	AB
43	18475A0312		5	5	5	5	3	–	23	16
44	18475A0313		5	5	5	5	2	–	22	15
45	18475A0315		5	5	3	4	4	4	25	17
46	18475A0316		4	5	5	5	3	4	26	18
47	18475A0317		5	5	5	5	3	3	26	18
48	18475A0318		5	5	4	3	–	–	17	12
49	18475A0319		4	5	5	3	3	3	23	16
50	18475A0320		–	5	–	5	4	4	18	12

Name of the Staff Member P. Srinivasarao

Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET

(AUTONOMOUS)

(R16) 17 Batch IV B.Tech I Sem II MID OBJECT Test Marks - Award List (FEBRUARY-2021)

Branch :ME-B Sub: - Power Plant Engineering

Sl.No.	H.T.NO	Total (10M)	Sl.No.	H.T.NO	Total (10M)
1	17471A0351	10	27	17471A0378	10
2	17471A0352	10	28	17471A0379	08
3	17471A0353	10	29	17471A0380	09
4	17471A0354	10	30	17471A0381	09
5	17471A0355	10	31	17471A0382	09
6	17471A0356	10	32	18475A0301	10
7	17471A0357	10	33	18475A0302	10
8	17471A0358	09	34	18475A0303	10
9	17471A0359	09	35	18475A0304	10
10	17471A0360	09	36	18475A0305	09
11	17471A0361	09	37	18475A0306	09
12	17471A0362	09	38	18475A0307	09
13	17471A0363	09	39	18475A0308	10
14	17471A0364	09	40	18475A0309	09
15	17471A0365	10	41	18475A0310	AB
16	17471A0366	09	42	18475A0311	AB
17	17471A0367	08	43	18475A0312	09
18	17471A0368	07	44	18475A0313	09
19	17471A0369	07	45	18475A0315	10
20	17471A0370	10	46	18475A0316	10
21	17471A0371	10	47	18475A0317	10
22	17471A0372	10	48	18475A0318	07
23	17471A0373	10	49	18475A0319	10
24	17471A0374	09	50	18475A0320	09
25	17471A0376	10			
26	17471A0377	09			

Name of the Staff Member P. SRINIVASARAO Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 16 Batch IV B.TECH I SEM I MID Examination Marks-Award List(Aug-2019)

Branch/Sec : ME/A Subject: Power Plant Engineering Date: 08/08/19

DESCRIPTIVE

Sl.No.	H.T.NO.	CO No.	Co1	Co1	Co2	Co2	Co3	Co3	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
1	15471A0316		5	4	5	4	5	4	27	18
2	15471A0394		5	4	5	4	3	5	26	18
3	15471A03C3		5	3	4	5	4	4	25	17
(4)	15471A03C4	—	—	—	—	—	—	—	ABSENT	AB
5	15471A03D0		5	3	5	5	4	4	26	18
6	15471A03D2		5	4	5	—	4	4	22	15
(7)	16471A0301	—	—	—	—	—	—	—	ABSENT	AB
8	16471A0302		5	4	5	5	5	4	28	19
9	16471A0303		5	4	5	5	4	4	27	18
10	16471A0304		4	5	5	5	5	5	29	20
11	16471A0305		5	4	5	5	5	5	29	20
12	16471A0306		5	3	5	5	5	5	28	19
13	16471A0307		5	5	5	4	5	4	28	19
14	16471A0309		—	—	—	—	—	—	00	00
15	16471A0311		—	3	5	5	5	2	20	14
16	16471A0312		5	3	5	5	5	5	28	19
17	16471A0315		5	5	5	5	5	5	30	20
18	16471A0316		5	5	5	5	2	2	24	16
19	16471A0317		5	5	5	4	5	4	28	19
20	16471A0318		5	4	5	4	5	3	26	18
21	16471A0319		2	4	5	4	5	4	24	16
22	16471A0320		3	4	5	4	5	2	23	16
23	16471A0321		5	5	5	5	5	5	30	20
24	16471A0322		5	4	5	5	3	4	26	18
25	16471A0323		5	5	5	4	4	5	28	19
26	16471A0324		5	5	5	4	2	4	25	17
27	16471A0325		4	4	5	5	4	5	27	18
28	16471A0327		5	5	5	5	5	5	30	20
29	16471A0328		4	4	5	5	4	4	26	18

Sl.No.	H.T.NO.	CO No.	Co1	Co1	Co2	Co2	Co3	Co3	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
30	16471A0329		5	5	5	3	5	5	28	19
31	16471A0330		5	5	5	5	5	5	30	20
32	16471A0331		5	5	5	5	5	3	28	19
33	16471A0332		5	5	5	5	2	—	22	15
34	16471A0333		5	4	5	5	5	4	28	19
35	16471A0334		5	—	—	—	—	—	05	04
36	16471A0335		—	—	5	5	—	—	10	07
37	16471A0336		—	—	5	5	5	3	18	12
38	16471A0337		5	5	5	—	5	—	20	14
39	16471A0338		—	—	5	—	—	—	05	04
40	16471A0339		2	—	5	5	5	4	21	14
41	16471A0340		5	5	5	5	5	5	30	20
42	16471A0341		4	4	3	4	3	4	22	15
43	16471A0342		5	—	5	5	5	—	20	14
44	16471A0343		5	5	5	—	3	—	18	12
45	16471A0344		4	5	5	5	4	4	27	18
46	16471A0346	—	—	—	—	—	—	—	ABSENT	AB
47	16471A0347		4	5	5	5	4	4	27	18
48	16471A0348		5	5	5	4	5	3	27	18
49	16471A0349		—	—	5	5	4	4	18	12
50	16471A0350		—	05	—	—	—	—	05	04

Name of the Staff Member P. SRINIVASARAO.

Signature of the Staff Member P.S.

Signature of the HOD 10/8/19

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

(R16) 16 Batch IV B.TECH I SEM I MID Examination Marks-Award List(Aug-2019)

Branch/Sec : ME/B Subject: Powerplant Engineering Date: 08-08-2019

DESCRIPTIVE

Sl.No.	H.T.NO.	CO No.	Co1	Co1	Co2	Co2	Co3	Co3	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
1	16471A0351		4	5	5	5	4	4	27	18
2	16471A0352		4	4	5	4	5	4	26	18
3	16471A0353		5	4	5	4	4	3	25	17
4	16471A0354		4	4	5	5	5	5	28	19
5	16471A0355		4	4	5	3	3	4	23	16
6	16471A0356		4	4	3	5	5	—	21	14
7	16471A0358		4	4	5	5	5	4	27	18
8	16471A0359		—	5	5	—	5	5	20	14
9	16471A0360		—	5	5	5	—	—	15	10
10	16471A0361		5	5	5	5	5	5	30	20
11	16471A0362		5	—	5	—	4	4	18	12
12	16471A0363		5	5	5	5	5	5	30	20
13	16471A0364		5	—	5	5	4	4	23	16
14	16471A0365		5	5	5	5	5	5	30	20
15	17475A0301		5	5	5	5	5	5	30	20
16	17475A0303		5	5	5	5	5	5	30	20
17	17475A0304		5	5	5	5	5	5	30	20
18	17475A0305	—	—	—	—	—	—	—	ABSENT	AB
19	17475A0306		5	5	5	5	5	4	29	20
20	17475A0307		4	5	5	5	3	4	26	18
21	17475A0308		5	5	5	4	2	5	26	18
22	17475A0309		4	5	5	5	4	5	28	19
23	17475A0310		5	5	5	5	3	5	28	19
24	17475A0311		—	—	—	—	—	—	ABSENT	AB
25	17475A0312		5	5	4	5	5	5	29	20
26	17475A0313		4	5	5	4	5	5	28	19
27	17475A0314		5	5	4	5	5	4	28	19
28	17475A0315		5	5	5	5	5	3	28	19
29	17475A0316		3	5	5	—	3	4	20	14

Sl.No.	H.T.NO.	CO No.	Co1	Co1	Co2	Co2	Co3	Co3	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
30	17475A0317		5	4	5	5	5	5	29	20
31	17475A0318		4	3	5	5	5	4	26	18
32	17475A0319		5	5	5	5	5	4	29	20
33	17475A0320		4	4	3	5	5	4	25	17
34	17475A0321		4	5	5	4	5	4	27	18
35	17475A0322		5	2	5	4	5	4	25	17
36	17475A0323		5	5	5	5	5	5	30	20
37	17475A0324		5	5	5	5	5	5	30	20
38	17475A0325		5	5	5	5	5	5	30	20
39	17475A0326		—	—	—	—	—	—	ABSENT	A
40	17475A0327		5	4	5	5	5	5	29	20
41	17475A0328		4	5	5	4	5	5	28	19
42	17475A0329		5	5	5	5	5	5	30	20
43	17475A0330		4	3	5	5	—	5	22	15
44	17475A0331		4	3	5	5	—	5	22	15
45	17475A0332		4	5	4	4	3	5	25	17

Name of the Staff Member P. SRINIVASARAO

Signature of the Staff Member

Signature of the HOD

10/8/19

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

16 Batch IV B.Tech I Sem (R16) II MID Examination Marks-Award List(Oct-2019)

Branch/Sec : ME/A Subject: Power plant Engineering Date: 10-10-2019

DESCRIPTIVE

Sl.No.	H.T.NO.	CO No.	CO4	CO4	CO5	CO5	CO6	CO6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
1	15471A0316		—	—	—	—	—	—	AB	AB
2	15471A0394		—	—	—	—	—	—	AB	AB
3	15471A03C3		4	4	1	3	5	4	21	14
4	15471A03C4		5	5	2	4	5	5	26	18
5	15471A03D0		5	5	4	4	5	4	27	18
6	15471A03D2		3	4	—	—	5	3	15	10
7	16471A0301		5	5	4	4	5	5	28	19
8	16471A0302		4	4	4	4	5	3	24	16
9	16471A0303		4	3	—	4	5	4	20	14
10	16471A0304		5	5	—	—	—	5	15	10
11	16471A0305		5	5	5	—	—	5	20	14
12	16471A0306		5	4	—	4	5	5	23	16
13	16471A0307		5	3	5	4	5	4	26	18
14	16471A0309		—	—	—	—	—	—	AB	AB
15	16471A0311		—	—	—	—	—	—	AB	AB
16	16471A0312		4	4	—	5	4	—	17	12
17	16471A0315		5	5	—	—	5	5	20	14
18	16471A0316		—	—	—	—	—	—	AB	AB
19	16471A0317		5	4	4	3	5	4	24	16
20	16471A0318		4	3	3	2	5	4	21	14
21	16471A0319		4	4	—	—	5	4	17	12
22	16471A0320		5	5	1	4	5	4	24	16
23	16471A0321		4	5	4	5	5	4	27	18
24	16471A0322		4	5	3	4	5	2	23	16
25	16471A0323		—	—	—	—	—	—	AB	AB
26	16471A0324		5	5	—	5	5	5	25	17
27	16471A0325		5	5	2	—	5	5	22	15
28	16471A0327		5	5	5	4	5	4	28	19
29	16471A0328		4	3	3	5	5	5	25	17

Sl.No.	H.T.NO.	CO No.	CO4	CO4	CO5	CO5	CO6	CO6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
30	16471A0329		4	3	3	4	5	4	23	16
31	16471A0330		5	5	4	5	5	4	28	19
32	16471A0331		5	5	5	5	5	5	30	20
33	16471A0332		—	—	—	—	—	—	AB	AB
34	16471A0333		5	5	5	4	5	4	28	19
35	16471A0334		—	—	—	—	—	—	AB	AB
36	16471A0335		5	3	—	—	5	5	18	12
37	16471A0336		4	4	3	—	5	4	20	14
38	16471A0337		5	—	4	—	5	5	19	13
39	16471A0338		—	02	—	—	—	—	02	02
40	16471A0339		5	5	5	5	5	—	25	17
41	16471A0340		5	5	5	5	5	5	30	20
42	16471A0341		5	5	4	3	4	3	24	16
43	16471A0342		4	3	5	5	5	5	27	18
44	16471A0343		4	4	4	—	—	4	16	11
45	16471A0344		3	5	5	4	5	3	25	17
46	16471A0346		5	4	5	4	5	5	28	19
47	16471A0347		5	5	3	—	5	5	23	16
48	16471A0348		5	5	5	5	5	5	30	20
49	16471A0349		5	5	—	5	2	5	22	15
50	16471A0350		5	5	5	4	5	4	28	19

Name of the Staff Member P.SRINIVASARAO.

P.Srinivasarao
Signature of the Staff Member

Signature of the HOD
15/10

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS) : : NARASARAOPET

16 Batch IV B.Tech I Sem (R16) II MID Examination Marks-Award List(Oct-2019)

Branch/Sec : ME/B Subject: Power plant Engineering Date: 10-10-2019

DESCRIPTIVE

Sl.No.	H.T.NO.	CO No.	Co4	Co4	Co5	Co5	Co6	Co6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
1	16471A0351	—	—	—	—	—	—	—	AB	AB
2	16471A0352		5	5	5	4	5	3	27	18
3	16471A0353		5	5	—	—	4	4	18	12
4	16471A0354		5	4	4	4	5	4	26	18
5	16471A0355		5	4	4	3	5	3	24	16
6	16471A0356		5	5	—	—	5	5	20	14
7	16471A0358		—	—	—	—	—	—	AB	AB
8	16471A0359		—	5	—	—	—	5	10	07
9	16471A0360		—	5	—	5	5	5	20	14
10	16471A0361		5	5	5	5	5	5	30	20
11	16471A0362		5	5	4	4	5	5	28	19
12	16471A0363		5	5	5	4	5	4	28	19
13	16471A0364		5	3	—	4	5	5	22	15
14	16471A0365		5	5	5	5	5	5	30	20
15	17475A0301		5	4	5	4	5	5	28	19
16	17475A0303		5	5	5	5	4	5	29	20
17	17475A0304		5	5	5	4	5	—	24	16
18	17475A0305		4	5	4	5	5	5	28	19
19	17475A0306		5	5	5	5	5	5	30	20
20	17475A0307		5	5	4	4	5	4	27	18
21	17475A0308		5	5	4	—	5	—	19	13
22	17475A0309		5	5	4	5	5	5	29	20
23	17475A0310		5	3	3	5	5	5	26	18
24	17475A0311		4	5	4	4	5	4	26	18
25	17475A0312		5	5	4	4	5	5	28	19
26	17475A0313		5	5	4	4	5	4	27	18
27	17475A0314		4	5	4	4	5	2	24	16
28	17475A0315		—	—	—	—	—	—	AB	AB
29	17475A0316		3	—	5	3	5	5	21	14

l.No.	H.T.NO.	CO No.	Co4	Co4	Co5	Co5	Co6	Co6	Total Marks (30M)	Total Marks (20M)
		Max.Marks	5	5	5	5	5	5		
		Q.No.	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)		
30	17475A0317		5	5	4	5	5	4	28	19
31	17475A0318		5	3	3	4	5	4	24	16
32	17475A0319		5	4	4	4	—	4	21	14
33	17475A0320		5	4	3	—	5	4	21	14
34	17475A0321		4	5	4	5	5	4	27	18
35	17475A0322		5	5	2	4	5	5	26	18
36	17475A0323		—	—	—	—	—	—	AB	AB
37	17475A0324		—	-	—	—	—	—	AB	AB
38	17475A0325		5	3	5	4	5	4	26	18
39	17475A0326		5	2	4	—	4	5	20	14
40	17475A0327		—	—	—	—	—	—	AB	AB
41	17475A0328				5	—	5	5	15	10
42	17475A0329		—	—	—	—	—	—	AB	AB
43	17475A0330		5	—	—	5	5	5	20	14
44	17475A0331		—	—	—	—	—	—	AB	AB
45	17475A0332		5	4	—	4	4	4	21	14

P SRINIVASARAO

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P Srinivasarao

Signature of the Staff Member

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NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)

16 Batch IV B.Tech I Sem (R16) I Assignment Test Marks - Award List (June-2019)

Branch :ME-A

Subject: Power Plant Engineering Date: 27-06-2019

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	1	(10)	Total (10M)
1	15471A0316	4		07	07
2	15471A0394	–	–	–	AB
3	15471A03C3	5	–	08	08
4	15471A03C4	3	–	09	09
5	15471A03D0	–	–	–	AB
6	15471A03D2	–	–	–	AB
7	16471A0301	1		07	07
8	16471A0302	1		08	08
9	16471A0303	–	–	–	AB
10	16471A0304	3		08	08
11	16471A0305	3		09	09
12	16471A0306	4		09	09
13	16471A0307	–	–	–	AB
14	16471A0309	2		08	08
15	16471A0311	5		09	09
16	16471A0312	3		08	08
17	16471A0315	4		08	08
18	16471A0316	3		09	09
19	16471A0317	5		08	08
20	16471A0318	1		09	09
21	16471A0319	4		08	08
22	16471A0320	2		08	08
23	16471A0321	5		08	08
24	16471A0322	1		08	08
25	16471A0323	3		09	09

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	1	(10)	Total (10M)
26	16471A0324	2		08	08
27	16471A0325	4		08	08
28	16471A0327	4		09	09
29	16471A0328	2		08	08
30	16471A0329	4		07	07
31	16471A0330	3		08	08
32	16471A0331	1		08	08
33	16471A0332	5		08	08
34	16471A0333	3		09	09
35	16471A0334	2		08	08
36	16471A0335	2		08	08
37	16471A0336	–	–	–	AB
38	16471A0337	–	–	–	AB
39	16471A0338	1		09	09
40	16471A0339	4		08	08
41	16471A0340	2		09	09
42	16471A0341	5		09	09
43	16471A0342	–	–	–	AB
44	16471A0343	2		09	09
45	16471A0344	5		08	08
46	16471A0346	4		08	08
47	16471A0347	5		09	09
48	16471A0348	1		09	09
49	16471A0349	–	–	–	AB
50	16471A0350	1		09	09

Name of the Staff Member P. SRINIVASARAO

Signature of the Staff Member

Signature of the HOD 1/7/19

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET

(AUTONOMOUS)

16 Batch IV B.Tech I Sem (R16) I Assignment Test Marks - Award List (June-2019)

Branch :ME-B Subject: Power plant Engineering Date: 27-06-2019

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	1	(10)	Total (10M)
1	16471A0351	5		08	08
2	16471A0352	2		08	08
3	16471A0353	2		09	09
4	16471A0354	2		09	09
5	16471A0355	4		07	07
6	16471A0356	4		07	07
7	16471A0358	2		08	08
8	16471A0359	—	—	—	AB
9	16471A0360	2		09	09
10	16471A0361	3		10	10
11	16471A0362	—	—	—	AB
12	16471A0363	—	—	—	AB
13	16471A0364	1		09	09
14	16471A0365	2		09	09
15	17475A0301	4		08	08
16	17475A0303	1		08	08
17	17475A0304	—	—	—	AB
18	17475A0305	3		08	08
19	17475A0306	3		09	09
20	17475A0307	1		09	09
21	17475A0308	3		08	08
22	17475A0309	—	—	—	AB
23	17475A0310	3		07	07
24	17475A0311	4		08	08
25	17475A0312	5		09	09

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	1	(10)	Total (10M)
26	17475A0313	1		08	08
27	17475A0314	—	—	—	AB
28	17475A0315	—	—	—	AB
29	17475A0316	3		07	07
30	17475A0317	5		08	08
31	17475A0318	—	—	—	AB
32	17475A0319	5		10	10
33	17475A0320	3		09	09
34	17475A0321	1		09	09
35	17475A0322	2		09	09
36	17475A0323	—	—	—	AB
37	17475A0324	5		10	10
38	17475A0325	4		09	09
39	17475A0326	5		09	09
40	17475A0327	—	—	—	AB
41	17475A0328	4		08	08
42	17475A0329	4		09	09
43	17475A0330	4		06	06
44	17475A0331	—	—	—	AB
45	17475A0332	1		09	09

Name of the Staff Member P. SRINIVASARAO Signature of the Staff Member

Signature of the HOD 1/7/19

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)

16 Batch IV B.Tech I Sem (R16) II Assignment Test Marks - Award List (July-2019)

Branch :ME-A Subject: Powerplant Engineering Date: 18-07-2019

Sl. No	H.T.NO	CO No.	2	[illegible]	Total (10M)
		Max. Marks		10	
		Sub Q.No.			
1	15471A0316	5		08	08
2	15471A0394	—		AB	AB
3	15471A03C3	—		AB	AB
4	15471A03C4	—		AB	AB
5	15471A03D0	2		08	08
6	15471A03D2	4		09	09
7	16471A0301	3		09	09
8	16471A0302	—		AB	AB
9	16471A0303	5		09	09
10	16471A0304	—		AB	AB
11	16471A0305	2		09	09
12	16471A0306	2		09	09
13	16471A0307	5		10	10
14	16471A0309	4		00	00
15	16471A0311	—		AB	AB
16	16471A0312	—		AB	AB
17	16471A0315	5		09	09
18	16471A0316	2		10	10
19	16471A0317	1		10	10
20	16471A0318	4		08	08
21	16471A0319	3		08	08
22	16471A0320	5		09	09
23	16471A0321	2		10	10
24	16471A0322	5		09	09
25	16471A0323	1		10	10
26	16471A0324	5		09	09
27	16471A0325	—		AB	AB
28	16471A0327	1		10	10
29	16471A0328	1		09	09
30	16471A0329	1		09	09
31	16471A0330	3		10	10
32	16471A0331	3		10	10
33	16471A0332	4		09	09
34	16471A0333	4		10	10
35	16471A0334	5		09	09
36	16471A0335	1		10	10
37	16471A0336	5		09	09
38	16471A0337	4		08	08
39	16471A0338	—		AB	AB
40	16471A0339	2		09	09
41	16471A0340	3		10	10
42	16471A0341	3		10	10
43	16471A0342	3		08	08
44	16471A0343	2		09	09
45	16471A0344	3		10	10
46	16471A0346	2		09	09
47	16471A0347	2		09	09
48	16471A0348	5		10	10
49	16471A0349	2		09	09
50	16471A0350	1		09	09

Name of the Staff Member P. SRINIVASARAO

Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)
[illegible] Batch IV B.Tech I Sem (R16) II Assignment Test Marks - Award List (July-2019)

Branch :ME-B Subject: Power plant Engineering Date: 18-07-2019

Sl. No.	H.T.NO	CO No.	2		Total (10M)
		Max. Marks		10	
		Sub Q.No.			
1	16471A0351	5		09	09
2	16471A0352	—		AB	AB
3	16471A0353	—		AB	AB
4	16471A0354	—		AB	AB
5	16471A0355	2		09	09
6	16471A0356	1		09	09
7	16471A0358	1		10	10
8	16471A0359	2		09	09
9	16471A0360	3		09	09
10	16471A0361	1		10	10
11	16471A0362	—		AB	AB
12	16471A0363	4		09	09
13	16471A0364	3		09	09
14	16471A0365	—		AB	AB
15	17475A0301	5		09	09
16	17475A0303	3		10	10
17	17475A0304	—		AB	AB
18	17475A0305	—		AB	AB
19	17475A0306	4		09	09
20	17475A0307	1		09	09
21	17475A0308	4		09	09
22	17475A0309	2		08	08
23	17475A0310	5		08	08
24	17475A0311	4		08	08
25	17475A0312	—		AB	AB
26	17475A0313	—		AB	AB
27	17475A0314	1		09	09
28	17475A0315	2		09	09
29	17475A0316	—		AB	AB
30	17475A0317	4		09	09
31	17475A0318	3		08	08
32	17475A0319	5		09	09
33	17475A0320	5		09	09
34	17475A0321	4		08	08
35	17475A0322	3		09	09
36	17475A0323	3		10	10
37	17475A0324	2		10	10
38	17475A0325	1		10	10
39	17475A0326	2		09	09
40	17475A0327	4		09	09
41	17475A0328	1		10	10
42	17475A0329	3		10	10
43	17475A0330	2		09	09
44	17475A0331	5		09	09
45	17475A0332	4		08	08

Name of the Staff Member P. SRINIVASARAO

Signature of the Staff Member

Signature of the HOD

19/8/19

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)

16 Batch IV B.Tech I Sem (R16) III Assignment Test Marks - Award List (Aug-2019)

Branch :ME-A   Subject: Power Plant Engineering   Date: 03-09-2019

Sl. No.	H.T.NO	CO No.	Co3		Total (10M)
		Max. Marks		10	
		Sub Q.No.			
1	15471A0316	02	Co3	10	10
2	15471A0394	—		AB	AB
3	15471A03C3	05		09	09
4	15471A03C4	02		09	09
5	15471A03D0	04		09	09
6	15471A03D2	—		AB	AB
7	16471A0301	04		10	10
8	16471A0302	—		AB	AB
9	16471A0303	05		09	09
10	16471A0304	—		AB	AB
11	16471A0305	01		10	10
12	16471A0306	03		09	09
13	16471A0307	03		08	08
14	16471A0309	—		AB	AB
15	16471A0311	—		AB	AB
16	16471A0312	03		09	09
17	16471A0315	05		10	10
18	16471A0316	—		AB	AB
19	16471A0317	—		AB	AB
20	16471A0318	03		09	09
21	16471A0319	01		10	10
22	16471A0320	—		AB	AB
23	16471A0321	—		AB	AB
24	16471A0322	—		AB	AB
25	16471A0323	01		09	09

Sl. No.	H.T.NO	CO No.	Co3		Total (10M)
		Max. Marks		10	
		Sub Q.No.			
26	16471A0324	—	Co3	AB	AB
27	16471A0325	—		AB	AB
28	16471A0327	—		AB	AB
29	16471A0328	—		AB	AB
30	16471A0329	01		09	09
31	16471A0330	01		10	10
32	16471A0331	02		10	10
33	16471A0332	—		AB	AB
34	16471A0333	—		AB	AB
35	16471A0334	—		AB	AB
36	16471A0335	05		09	09
37	16471A0336	—		AB	AB
38	16471A0337	04		09	09
39	16471A0338	—		AB	AB
40	16471A0339	01		10	10
41	16471A0340	—		AB	AB
42	16471A0341	02		10	10
43	16471A0342	—		AB	AB
44	16471A0343	—		AB	AB
45	16471A0344	—		AB	AB
46	16471A0346	04		09	09
47	16471A0347	02		10	10
48	16471A0348	04		09	09
49	16471A0349	01		10	10
50	16471A0350	01		09	09

Name of the Staff Member P. SRINIVASARAO   Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)
16 Batch IV B.Tech I Sem (R16) III Assignment Test Marks - Award List (Aug-2019)

Branch :ME-B Subject: Power Plant Engineering Date: 03-09-2019

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	CO3	10	Total (10M)
1	16471A0351	03	CO3	09	09
2	16471A0352	03		10	10
3	16471A0353	—		AB	AB
4	16471A0354	02		09	09
5	16471A0355	04		10	10
6	16471A0356	03		08	08
7	16471A0358	—		AB	AB
8	16471A0359	04		09	09
9	16471A0360	—		AB	AB
10	16471A0361	02		10	10
11	16471A0362	—		AB	AB
12	16471A0363	01		09	09
13	16471A0364	02		09	09
14	16471A0365	—		AB	AB
15	17475A0301	05		10	10
16	17475A0303	01		10	10
17	17475A0304	—		AB	AB
18	17475A0305	—		AB	AB
19	17475A0306	—		AB	AB
20	17475A0307	—		AB	AB
21	17475A0308	04		09	09
22	17475A0309	04		08	08
23	17475A0310	—		AB	AB
24	17475A0311	02		09	09
25	17475A0312	—		AB	AB

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	CO3	10	Total (10M)
26	17475A0313	05	CO3	10	10
27	17475A0314	—		AB	AB
28	17475A0315	03		10	10
29	17475A0316	—		AB	AB
30	17475A0317	02		09	09
31	17475A0318	—		AB	AB
32	17475A0319	—		AB	AB
33	17475A0320	—		AB	AB
34	17475A0321	01		10	10
35	17475A0322	—		AB	AB
36	17475A0323	—		AB	AB
37	17475A0324	—		AB	AB
38	17475A0325	—		AB	AB
39	17475A0326	03		09	09
40	17475A0327	—		AB	AB
41	17475A0328	01		10	10
42	17475A0329	—		AB	AB
43	17475A0330	03		09	09
44	17475A0331	—		AB	AB
45	17475A0332	—		AB	AB

Name of the Staff Member P.SRINIVASARAO Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)

16 Batch IV B.Tech I Sem (R16) IV Assignment Test Marks - Award List (Sep-2019)

Branch :ME-A Subject: Power plant Engineering Date: 19-09-2019

Sl. No.	H.T.NO	CO No.	CO5		Total (10M)
		Max. Marks		10	
		Sub Q.No.			
1	15471A0316	3		09	09
(2)	15471A0394	—		AB	AB
3	15471A03C3	4		10	10
4	15471A03C4	5		10	10
5	15471A03D0	4		09	09
6	15471A03D2	5		10	10
(7)	16471A0301	—		AB	AB
(8)	16471A0302	—		AB	AB
9	16471A0303	4		10	10
(10)	16471A0304	—		AB	AB
11	16471A0305	2		10	10
12	16471A0306	1		09	09
13	16471A0307	1		09	09
14	16471A0309	4		10	10
15	16471A0311	4		09	09
16	16471A0312	2		10	10
17	16471A0315	1		10	10
18	16471A0316	5		10	10
19	16471A0317	2		09	09
20	16471A0318	1		09	09
21	16471A0319	3		10	10
22	16471A0320	5		10	10
(23)	16471A0321	—		AB	AB
(24)	16471A0322	—		AB	AB
25	16471A0323	4		10	10

Sl. No.	H.T.NO	CO No.	CO5		Total (10M)
		Max. Marks		10	
		Sub Q.No.			
26	16471A0324	1		10	10
27	16471A0325	3		09	09
28	16471A0327	5		10	10
29	16471A0328	3		10	10
30	16471A0329	3		09	09
31	16471A0330	3		10	10
32	16471A0331	2		10	10
33	16471A0332	4		10	10
34	16471A0333	5		10	10
35	16471A0334	1		10	10
36	16471A0335	1		10	10
37	16471A0336	2		09	09
38	16471A0337	2		09	09
39	16471A0338	2		09	09
40	16471A0339	4		10	10
41	16471A0340	5		10	10
42	16471A0341	1		09	09
43	16471A0342	1		10	10
44	16471A0343	4		09	09
45	16471A0344	4		09	09
46	16471A0346	5		10	10
47	16471A0347	2		10	10
48	16471A0348	3		10	10
49	16471A0349	3		10	10
50	16471A0350	3		09	09

Name of the Staff Member P-SRINIVASARAO

Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE : NARASARAOPET
(AUTONOMOUS)
16 Batch IV B.Tech I Sem (R16) IV Assignment Test Marks - Award List (Sep-2019)

Branch :ME-B Subject: Power Plant Engineering Date: 19 - 09 - 2019

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	CO5 / ~~10~~	10	Total (10M)
1	16471A0351	1		09	09
2	16471A0352	3		09	09
3	16471A0353	—		AB	AB
4	16471A0354	5		10	10
5	16471A0355	—		AB	AB
6	16471A0356	2		08	08
7	16471A0358	1		09	09
8	16471A0359	1		08	08
9	16471A0360	1		09	09
10	16471A0361	3		10	10
11	16471A0362	4		09	09
12	16471A0363	4		09	09
13	16471A0364	3		10	10
14	16471A0365	2		10	10
15	17475A0301	4		09	09
16	17475A0303	5		10	10
17	17475A0304	3		09	09
18	17475A0305	3		09	09
19	17475A0306	5		09	09
20	17475A0307	2		09	09
21	17475A0308	1		10	10
22	17475A0309	2		08	08
23	17475A0310	5		10	10
24	17475A0311	5		10	10
25	17475A0312	4		08	08

Sl. No.	H.T.NO	CO No. / Max. Marks / Sub Q.No.	CO5	10	Total (10M)
26	17475A0313	4		09	09
27	17475A0314	3		10	10
28	17475A0315	—		AB	AB
29	17475A0316	2		05	05
30	17475A0317	2		10	10
31	17475A0318	2		10	10
32	17475A0319	4		08	08
33	17475A0320	3		10	10
34	17475A0321	—		AB	AB
35	17475A0322	4		05	05
36	17475A0323	5		10	10
37	17475A0324	4		10	10
38	17475A0325	2		10	10
39	17475A0326	1		09	09
40	17475A0327	—		AB	AB
41	17475A0328	5		10	10
42	17475A0329	3		10	10
43	17475A0330	5		00	00
44	17475A0331	1		10	10
45	17475A0332	1		10	10

Name of the Staff Member P. SRINIVASARAO Signature of the Staff Member

Signature of the HOD

NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET

IV B.Tech II Sem (15 batch) II MID Award List 2018-19

Branch: ME-B Date: 27/3/19 Subject: Power Plant Engineering

		Marks Awarded for		
Sl.No.	H.T. NO.	(15) MID	(5) ASSIGN MENT	(20) TOTAL
1	15471A0354	13	4	17
2	15471A0355	AB	0	AB
3	15471A0356	AB	0	AB
4	15471A0357	AB	0	AB
5	15471A0358	13	4	17
6	15471A0359	13	4	17
7	15471A0360	AB	0	AB
8	15471A0361	10	0	10
9	15471A0362	AB	0	AB
10	15471A0363	13	4	17
11	15471A0365	AB	0	AB
12	15471A0366	AB	0	AB
13	15471A0367	12	4	16
14	15471A0368	AB	0	AB
15	15471A0369	AB	0	AB
16	15471A0370	AB	0	AB
17	15471A0372	12	4	16
18	15471A0373	AB	0	AB
19	15471A0374	AB	0	AB
20	15471A0375	AB	0	AB
21	15471A0376	AB	0	AB
22	15471A0377	AB	0	AB
23	15471A0378	13	5	18
24	15471A0379	13	5	18
25	15471A0380	AB	0	AB
26	15471A0381	13	4	17
27	15471A0382	13	4	17
28	15471A0383	AB	0	AB
29	15471A0384	AB	0	AB
30	15471A0385	AB	0	AB
31	15471A0386	AB	0	AB
32	15471A0387	AB	0	AB
33	15471A0388	13	5	18
34	15471A0389	AB	0	AB
35	15471A0392	13	4	17
36	15471A0395	AB	0	AB
37	15471A0396	12	4	16
38	15471A0398	AB	0	AB
39	15471A0399	AB	0	AB
40	15471A03A0	AB	0	AB
41	15471A03A1	AB	0	AB
42	15471A03A2	12	4	16
43	15471A03A3	AB	0	AB
44	15471A03A4	AB	0	AB
45	15471A03A5	13	4	17
46	15471A03A6	AB	0	AB
47	15471A03A7	13	4	17
48	15471A03A8	13	4	17
49	15471A03A9	AB	0	AB
50	15471A03B0	AB	0	AB
51	15471A03B1	AB	0	AB
52	15471A03B2	AB	0	AB
53	15471A03B3	9	5	14
54	15471A03B4	7	0	07
55	15471A03B5	8	5	13
56	15471A03B6	12	4	16
57	15471A03B7	AB	0	AB
58	15471A03B8	AB	0	AB
59	15471A03B9	AB	0	AB
60	15471A03C0	AB	0	AB

K. Kiran Chand
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NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET

IV B.Tech II Sem (15 batch) II MID Award List 2018-19

Branch: ME-C Date: 27-03-2019 Subject: Power Plant Engineering

Sl.No.	H.T. NO.	Marks Awarded for (15) MID	(5) ASSIGN MENT	(20) TOTAL	Sl.No.	H.T. NO.	Marks Awarded for (15) MID	(5) ASSIGN MENT	(20) TOTAL
1	13471A03H4	14	5	19	31	15471A03F0	8	0	8
2	14471A0303	8	4	12	32	15471A03F1	AB	0	AB
3	14471A0329	12	4	16	33	15471A03F3	AB	0	AB
4	14471A0343	AB	0	AB	34	15471A03F4	AB	0	AB
5	14471A0348	10	4	14	35	15471A03F5	AB	0	AB
6	14471A0357	8	4	12	36	15471A03F6	AB	0	AB
7	14471A0382	12	0	12	37	15471A03F7	AB	0	AB
8	15471A03C1	AB	0	AB	38	15471A03F8	12	4	16
9	15471A03C2	AB	0	AB	39	15471A03F9	13	4	17
10	15471A03C5	13	4	17	40	15471A03G0	13	3	16
11	15471A03C6	AB	0	AB	41	15471A03G1	AB	0	AB
12	15471A03C7	13	4	17	42	15471A03G2	13	4	17
13	15471A03C8	AB	0	AB	43	15471A03G3	12	3	15
14	15471A03C9	AB	0	AB	44	15471A03G5	14	5	19
15	15471A03D1	AB	0	AB	45	15471A03G6	AB	0	AB
16	15471A03D3	AB	0	AB	46	15471A03G7	11	4	15
17	15471A03D4	AB	0	AB	47	15471A03G8	14	4	18
18	15471A03D5	AB	0	AB	48	15471A03G9	AB	0	AB
19	15471A03D6	AB	0	AB	49	15471A03H0	AB	0	AB
20	15471A03D7	AB	0	AB	50	15471A03H1	AB	0	AB
21	15471A03D8	AB	0	AB	51	15471A03H2	AB	0	AB
22	15471A03D9	AB	0	AB	52				
23	15471A03E1	14	5	19	53				
24	15471A03E3	AB	0	AB	54				
25	15471A03E4	13	4	17	55				
26	15471A03E5	AB	0	AB	56				
27	15471A03E6	AB	0	AB	57				
28	15471A03E7	14	4	18	58				
29	15471A03E8	12	4	16	59				
30	15471A03E9	12	4	16	60				

K. Kiran Chand
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NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET

IV B.Tech II Sem (15 batch) II MID Award List 2018-19

Branch: ME-D Date: 27-03-2019 Subject: Power Plant Engineering

Sl.No.	H.T. NO.	Marks Awarded for (15) MID	(5) ASSIGN MENT	(20) TOTAL	Sl.No.	H.T. NO.	Marks Awarded for (15) MID	(5) ASSIGN MENT	(20) TOTAL
1	16475A0301	AB	0	0	31	16475A0332	12	0	12
2	16475A0302	AB	0	0	32	16475A0333	13	5	18
3	16475A0303	12	5	17	33	16475A0334	12	5	17
4	16475A0304	AB	0	0	34	16475A0335	12	4	16
5	16475A0305	AB	0	0	35	16475A0336	12	5	17
6	16475A0306	11	4	15	36	16475A0337	12	0	12
7	16475A0307	AB	0	0	37	16475A0338	AB	0	0
8	16475A0308	11	5	16	38	16475A0339	12	0	12
9	16475A0309	AB	0	0	39	16475A0340	11	4	15
10	16475A0310	AB	0	0	40	16475A0341	AB	0	0
11	16475A0311	AB	0	0	41	16475A0342	13	5	18
12	16475A0312	AB	0	0	42	16475A0343	11	5	16
13	16475A0314	12	5	17	43	16475A0344	AB	0	0
14	16475A0315	AB	0	0	44	16475A0347	AB	0	0
15	16475A0316	AB	0	0	45				
16	16475A0317	AB	0	0	46				
17	16475A0318	12	4	16	47				
18	16475A0319	AB	0	0	48				
19	16475A0320	12	4	16	49				
20	16475A0321	AB	0	0	50				
21	16475A0322	12	5	17	51				
22	16475A0323	AB	0	0	52				
23	16475A0324	AB	0	0	53				
24	16475A0325	AB	0	0	54				
25	16475A0326	AB	0	0	55				
26	16475A0327	AB	0	0	56				
27	16475A0328	12	4	16	57				
28	16475A0329	AB	0	0	58				
29	16475A0330	AB	0	0	59				
30	16475A0331	12	5	17	60				

P. SRAVANI

Name of the Staff Member

Signature of the Staff Member

Signature of the HOD.

29/3/19

NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET

IV B.Tech II Sem (15 batch) I MID Award List 2018-19

Branch: ME-D Date: 4/2/19 Subject: Power Plant Engineering

Sl.No.	H.T. NO.	Marks Awarded for (15) MID	(5) ASSIGN MENT	(20) TOTAL	Sl.No.	H.T. NO.	Marks Awarded for (15) MID	(5) ASSIGN MENT	(20) TOTAL
1	16475A0301	14	5	19	31	16475A0332	02	0	02
2	16475A0302	14	5	19	32	16475A0333	06	4	10
3	16475A0303	11	4	15	33	16475A0334	05	0	05
4	16475A0304	12	5	17	34	16475A0335	07	4	11
5	16475A0305	11	5	16	35	16475A0336	05	5	10
6	16475A0306	AB	0	00	36	16475A0337	10	5	15
7	16475A0307	14	5	19	37	16475A0338	13	5	18
8	16475A0308	06	4	10	38	16475A0339	12	5	17
9	16475A0309	14	5	19	39	16475A0340	06	3	09
10	16475A0310	13	5	18	40	16475A0341	12	5	17
11	16475A0311	12	5	17	41	16475A0342	AB	5	05
12	16475A0312	12	5	17	42	16475A0343	09	4	13
13	16475A0314	11	4	15	43	16475A0344	09	5	14
14	16475A0315	14	4	18	44	16475A0347	14	5	19
15	16475A0316	14	5	19	45				
16	16475A0317	11	4	15	46				
17	16475A0318	08	4	12	47				
18	16475A0319	09	5	14	48				
19	16475A0320	05	4	09	49				
20	16475A0321	13	5	18	50				
21	16475A0322	AB	0	00	51				
22	16475A0323	14	5	19	52				
23	16475A0324	13	4	17	53				
24	16475A0325	07	5	12	54				
25	16475A0326	14	5	19	55				
26	16475A0327	14	5	19	56				
27	16475A0328	10	4	14	57				
28	16475A0329	12	4	16	58				
29	16475A0330	13	5	18	59				
30	16475A0331	05	3	08	60				

Name of the Staff Member P. SRAVANI

P. Sravani
Signature of the Staff Member

Signature of the HOD 8/2/19

NEC

NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

UNIT WISE IMPORTANT QUESTIONS

Model Question Paper-I

Code: R16ME4104 R16

NARASARAOPETA ENGINEERING COLLEGE:: NARASARAOPET
(AUTONOMOUS)
YALLMANDA(POST), NARASARAOPET- 522601
B. TECH V SEMESTER REGULAR EXAMINATIONS
POWER PLANT ENGINEERING
MECHANICAL ENGINEERING
[OUTCOME BASED EDUCATION PATTERN]

Time: 3 Hrs
Max. Marks: 60

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answering the question in Part-A is compulsory
3. Answer any THREE Questions from Part-B

Execution Plan

Sl. No	Activities	Time (Minutes)
1	To study the Question Paper and choose to attempt	5
2	Part-A 5 Minutes x 6 Questions	30
3	Part-B 45 Minutes x 3 Questions	135
4	Quick revision & Winding up	10
	Total	180

PART–A (12Marks)
Answer ALL Questions.

S No		Question	Cognitive Level	CO	Marks
1	a	What are the advantages of artificial draught over natural draught	K1	1	2
	b	What is the reason of using lean A: F ratios in gas turbines and what is the range of it?	K1	2	2
	c	What is meant by unit hydrograph	K1	3	2
	d	What is chain reaction?	K1	4	2
	e	What is the importance of measurement and instrumentation in power plant	K1	5	2
	f	What is the importance of load factor	K1	6	2

UNIT WISE SAMPLE ASSESSMENT QUESTIONS

COURSE OUTCOMES: Students are able to

CO1: Explain the layout, construction and working of the components inside a thermal power plant. (K2)

CO2: Illustrate the components inside a Diesel, Gas and Combined cycle power plants (K2)

CO3: Analyze the concepts and flows and processes of different power plants (K4)

CO4: Enumerate the types of power production from renewable energy (K3)

CO5: Examine the economics of power plants (K4)

S NO	QUESTION	KNOWLEDGE LEVEL	CO
	UNIT I		
1	Explain the working principle of Coal based thermal power plant with neat sketch.	K2	CO1
2	Explain the working principle of super critical boiler with neat sketch.	K2	CO1
3	Classify and explain the working of mechanical dust collectors.	K2	CO1
4	Explain the working principle of (i) Chain stoker (ii) Spreader stoker	K2	CO1
	UNIT 2		
1	Draw and explain the layout of modern diesel power plant showing the following systems. (i) Fuel supply system (ii) Lubrication system	K2	CO2
2	Describe the various methods used for starting diesel engine. Describe the correct sequence of steps for starting and stopping procedure.	K1	CO2
3	Enumerate and explain the essential components of closed cycle Gas turbine power plant.	K3	CO2
4	State merits and demerits of closed cycle Gas turbine power plant.	K1	CO2
	UNIT 3		
1	What factors to be considered while selecting materials for the various reactor Components	K1	CO3
2	Enumerate and explain the essential components of a nuclear reactor.	K3	CO3
3	Explain about Pressurized water reactor and gas cooled reactor.	K2	CO3
4	Explain the working of pump storage plant in coordination with nuclear power plant	K2	CO3
5	Explain the principle of operation of boiling water reactor used for power generation along with a neat sketch	K2	CO3
	UNIT 4		
1	What is a spillway? Why are spillways required? What are the different types of Spillways.	K1	CO4
2	Explain with a neat sketch a pumped storage hydro plant, state its advantages	K2	CO4
3	Explain the factors affecting the run-off in hydrological cycle	K2	CO4
4	Explain the principle of operation of Fuel cell with neat sketch.	K2	CO4
	UNIT 5		
1	Define peak load, demand factor, load factor and plant use factor.	K1	CO5
2	Explain how the NOx emissions can be reduced in the flue gases	K2	CO5
3	Explain briefly various methods of pollution	K2	CO5

Code: 19BME7PE09

Model Question Paper-I

(R19)

NARASARAOPETA ENGINEERING COLLEGE:: NARASARAOPET
(AUTONOMOUS)
YALLMANDA(POST), NARASARAOPET- 522601
B. TECH VIII SEMESTER REGULAR EXAMINATIONS
POWER PLANT ENGINEERING
MECHANICAL ENGINEERING
[OUTCOME BASED EDUCATION PATTERN]

Time: 3 Hrs **Max. Marks: 60**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5X12=60M)

Q.No		Questions	Marks	KNOWLEDGE	CO'S
		Unit – I			
1	A	**Describe** the implant coal handling with a neat diagram	[12M]	K1	CO1
		OR			
	B	**Why** the starting of diesel plant is more difficult? Explain the method used for starting diesel engine?	[12M]	K1	CO1
		Unit – II			
2	A	Draw and **explain** the layout of modern diesel power plant showing the following systems. (i) Fuel supply system (ii) Lubrication system	[12M]	K4	CO2
		OR			
	B	**Why** the starting of diesel plant is more difficult? Explain the method used for starting diesel engine?	[12M]	K1	CO2
		Unit – III			
3	A	**Explain** about Pressurized water reactor and gas cooled reactor.	[12M]	K4	CO3
		OR			
	B	**What** factors to be considered while selecting materials for the various reactor components	[12M]	K1	CO3
		Unit – IV			
4	A	**Explain** with a neat sketch a pumped storage hydro plant, state its advantages	[12M]	K4	CO4
		OR			
	B	**Explain** in brief as to how the human body reacts to changes in temperature of environment. Also explain the effect of activities on the heat load calculation for comfort applications.	[12M]	K2	CO4
		Unit – V			
5	A	**Explain** briefly various methods of pollution.	[12M]	K2	CO5
		OR			
	B	**Explain** how the NOx emissions can be reduced in the flue gases	[12M]	K2	CO5

Model Question Paper-II

Code: 19BME7PE09 R19

NARASARAOPETA ENGINEERING COLLEGE:: NARASARAOPET (AUTONOMOUS)

YALLMANDA(POST), NARASARAOPET- 522601

B. TECH VIII SEMESTER REGULAR EXAMINATIONS

POWER PLANT ENGINEERING

MECHANICAL ENGINEERING

[OUTCOME BASED EDUCATION PATTERN]

Time: 3 Hrs **Max. Marks: 60**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5X12=60M)

Q.No		Questions	Marks	KNOWLEDGE LEVEL	CO'S
1		**Unit – I**			
	A	**State** different types of water treatment methods used in steam power plants Explain any one with neat sketch.	[12M]	K5	CO1
		OR			
	B	i) **Discuss** the advantages and disadvantages of FBC boilers. ii) **Explain** the factors considered in selecting the site for Coal based thermal power plants.	[12M]	K6&K4	CO1
2		**Unit – II**			
	A	**Explain** the working principle of Diesel power plant with neat sketch.	[12M]	K4	CO2
		OR			
	B	**Discuss** the advantages and disadvantages of combined cycle power plants with neat sketch.	[12M]	K6	CO2
3		**Unit – III**			
	A	**Enumerate** the essential components of a nuclear reactor.	[12M]	K3	CO3
		OR			
	B	**Explain** the working of pump storage plant in coordination with nuclear power plant.	[12M]	K4	CO3
4		**Unit – IV**			
	A	**Explain** the working of solar power plants with neat sketch.	[12M]	K2	CO4
		OR			
	B	**Explain** the working of Geo thermal plants with neat sketch.	[12M]	K4	CO4
5		**Unit – V**			
	A	**Discuss** different Capital & Operating Cost of different power plants	[12M]	K6	CO5
		OR			

PART–B (48 Marks)

Answer any FOUR Questions

S. No		Question	Cognitive Level	CO	Marks
2	a	Describe the implant coal handling with a neat diagram	K1	1	6
	b	Explain the working of single retort stoker with neat sketch	K2&K4	1	6
3	a	Why the starting of diesel plant is more difficult? Explain the method used for starting diesel engine?	K1	2	6
	b	Explain the method used for super charging the engine?	K2	2	6
4	a	Explain the factors affecting the run-off in hydrological cycle	K2	3	6
	b	Explain the working of pump storage with neat sketch	K2	3	6
5	a	Enumerate and explain the essential components of a nuclear reactor	K2&K3	4	6
	b	What factors to be considered while selecting materials for the various reactor components	K1	4	6
6	a	Explain the working of pump storage plant in coordination with nuclear power plant	K2	5	6
	b	Explain the procedures for the measurement of oxygen	K2	5	6
7	a	Explain how the NOx emissions can be reduced in the flue gases	K2	6	6
	b	Define peak load, demand factor, load factor and plant use factor.	K1	6	6

❖