POWER PLANT ENGINEERING

Subject code: A70353
Regulations: R15-JNTUH
Class: IV Year B. Tech MECH I Sem

Department of Mechanical Engineering
BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY
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POWER PLANT ENGINEERING (A70353)
COURSE PLANNER

I. COURSE OVERVIEW:
Power Plant Engineering basically focuses on power generation principles for real world applications. More specifically this course is focused on application of energy principles and power generation cycles. The main purpose of implementing this course in curriculum is to learn about how the power is generated in a power plant and its applications.

II. PRE REQUISITES:
The knowledge of following subjects is essential to understand Power Plant Engineering

- Thermal Engineering
- Heat Transfer
- Fluid Mechanics & Hydraulic Machines
- Electrical Engineering
- Plant Economics

III.COURSE OBJECTIVES:

1.	Basic knowledge of Different types of Power Plants, site selection criteria of each one of them.
2.	Understanding of Thermal Power Plant Operation, turbine governing, different types of high pressure boilers including supercritical and supercharged boilers, Fluidized bed combustion systems.
3.	Design of chimney in thermal power plants, knowledge of cooling tower operation, numerical on surface condenser design.
4.	Basic knowledge of Different types of Nuclear power plants including Pressurized water reactor, Boiling water reactor, gas cooled reactor, liquid metal fast breeder reactor.
5.	Understanding of Power Plant Economics, Energy Storage including compressed air energy and pumped hydro etc.
6.	Discussing environmental and safety aspects of power plant operation

IV. COURSE OUTCOMES:

S.No.	Description	Bloom's Taxonomy Level
1.	Able to get the basics of Power Plants.	Knowledge, Understand (Level1, Level2)
2.	Able to get the idea about the power generation by renewable and non-renewable energy resources.	Knowledge, Understand (Level1, Level2)
3.	Able to know about the different types of cycles and natural resources used in power plants and their applications.	Knowledge, Understand, Apply (Level1, Level2)

V. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (PO)		Level	Proficiency assessed by
PO1	**Engineering knowledge**: Graduates will demonstrate the ability to use basic knowledge in mathematics, science	2	Assignments and Exams

Program Outcomes (PO)		Level	Proficiency assessed by
	and engineering and apply them to solve problems specific to mechanical engineering.		
PO2	**Problem analysis**: Graduates will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results.	2	Assignments and Exams
PO3	**Design/development of solutions**: Graduates will demonstrate the ability to design any mechanical system or thermal that meets desired specifications and requirements.	2	Assignments and Exams
PO4	**Conduct investigations of complex problems**: Graduates will demonstrate the ability to identify, formulate and solve mechanical engineering problems of a complex kind.	--	--
PO5	**Modern tool usage**: Graduates will be familiar with applying software methods and modern computer tools to analyze mechanical engineering problems.	--	--
PO6	**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.	--	--
PO7	**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.	--	--
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	--	--
PO9	**Individual and team work**: Graduates will demonstrate the ability to function as a coherent unit in multidisciplinary design teams, and deliver results through collaborative research.	--	--
PO10	**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.	--	--
PO11	**Project management and finance**: Graduate will be able to design a system to meet desired needs within environmental, economic, political, ethical health and safety, manufacturability and management knowledge and techniques to estimate time, resources to complete project.	2	Assignments and Exams
PO12	**Life-long learning**: Graduates should be capable of self-education and clearly understand the value of life-long learning.	--	--

VI. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED

Program Specific Outcomes (PSO)		Level	Proficiency assessed by
PSO1	The student will be able to apply the knowledge of Mathematics, Sciences and engineering fundamentals to formulate, analyze and provide solutions for the problems related to Mechanical engineering and communicate them effectively to the concerned.	--	--
PSO2	Design mechanical systems in various fields such as machine elements, thermal, manufacturing, industrial and inter-disciplinary fields by using various engineering/technological tools to meet the mercurial needs of the industry and society at large.	3	Lectures, Assignments
PSO3	The ability to grasp the latest development, methodologies of mechanical engineering and posses competent knowledge of design process, practical proficiencies, skills and knowledge of programme and developing ideas towards research.	3	Guest Lectures

VII. SYLLABUS

UNIT – I

Introduction to the Sources of Energy – Resources and Development of Power in India. Steam Power Plant**:** Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.**COMBUSTION PROCESS:** Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT II

INTERNAL COMBUSTION ENGINE PLANT: Diesel Power Plant-Introduction – IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

GAS TURBINE PLANT: Introduction – classification - construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparison.**DIRECT ENERGY CONVERSION:** Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT – III HYDRO ELECTRIC POWER PLANT: Water power – Hydrological cycle / flow measurement – drainage area characteristics – Hydrographs – storage and Pondage – classification of dams and spill ways.**HYDRO PROJECTS AND PLANT:** Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

POWER FROM NON-CONVENTIONAL SOURCES: Utilization of Solar- Collectors-Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy.

UNIT –IV NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile materials – Nuclear reactor – reactor operation.**TYPES OF REACTORS:** Pressurized water reactor, Boiling water reactor, sodium-graphite reactor, fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

UNIT – V

Power Plant Economics and Environmental Considerations: 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.

TEXT BOOKS:

1. Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub
2. A Course in Power Plant Engineering: / Arora and S. Domkundwar.

REFERENCE BOOKS:

1. A Text Book of Power Plant Engineering / Rajput / Laxmi Publications
2. Power plant Engineering/ Ramalingam/ Scietech Publishers
3. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
4. An Introduction to Power Plant Technology / G.D. Rai.
5. Power plant Engg - Elanchezhian- I.K. International Publications.

NPTEL Web Course:

1. http://nptel.ac.in/courses/112106133/1
2. http://nptel.ac.in/courses/112106133/2
3. http://nptel.ac.in/courses/112106133/3
4. http://nptel.ac.in/courses/112106133/4
5. http://nptel.ac.in/courses/112106133/5

NPTEL Video Course:

1. http://nptel.ac.in/courses/108105058/8
2. http://nptel.ac.in/courses/108105058/9
3. http://nptel.ac.in/courses/108105058/10

GATE& IES SYLLABUS: NOT APPLICABLE

COURSE PLAN (WEEK – WISE):

Session	Week	Unit	Topics	Course Learning Outcomes	References
1	1	1	Introduction to the Sources of Energy,	**Understand** the steam power plant layout, working of various circuits, combustion process of coal, dust collectors, cooling towers, corrosion	T1: 1.1- 1.2 & 1.6
2			Resources and Development of Power in India.		
3			Steam power plant layout, working of different circuits		T1: 9.1-9.2 & 10.1-10.3
4			Fuel and handling equipments, Types of coals,		
5	2		Coal handling, choice of handling equipment,		
6			Coal storage, Ash handling systems, Corrosion		

7			Combustion process, properties of coal, feed water treatment, overfeed and under feed fuel beds.	and feed water treatment.	
8			Traveling grate stokers, spreader stokers, retort stokers,		
9	3		Pulverized fuel burning system and its components,		T1: 9.3-9.10
10			Combustion needs and draught system, Dust collectors,		
11			Cyclone furnace, design and construction, dust collectors, cooling towers and heat rejection.		
12			Mock Test - I		
12	4	2	Internal Combustion Engine Plant, Diesel Power Plant	**Understand** the principles of layout, working and other features of diesel engine power plant, gas turbine power plant and energy conversion directly from solar energy, fuel cells, thermo ionic, thermo electric and MHD	T1: 14.1-14.9
13			Introduction, IC Engines, Types, Construction		
14			Plant layout with auxiliaries		
15			Fuel supply system, super charging		
16	5		Air starting equipment, lubrication, Cooling system,		T1: 15.1-15.17
17			Classification of Gas Turbine Plant		
18			Construction, Layout with auxiliaries		
19			Principles of working of closed and open cycle gas turbines.		
20	6		Combined Cycle Power Plants and comparison.		
21			Direct Energy Conversion, Solar energy, Fuel cells,		T1:1.4
22			Thermo electric and Thermo ionic, MHD generation		
23			Revision		
24	7	3	Introduction to Hydro Electric Power Plant	**Understand** the layouts and working of hydro electric power plant and power	T1: 16.1-16.7
25			Water power, Hydrological cycle		
26			Flow measurement, drainage area characteristics Hydrographs,		

27			Storage and pond age, classification of dams and spill ways.	from non-conventional energy sources.	
28			Hydro Projects And Plant Classification, Typical layouts,		T1: 16.8-16.20
29			Plant auxiliaries - plant operation pumped storage plants.		
30			Revision		
31	8		Revision		
32			Introduction to Power From Non-Conventional Sources		T1:1.4
33			Utilization of Solar- Collectors		
34			Principle of Working, Wind Energy		
35	10		Types - HAWT, VAWT -Tidal Energy.		
36		4	Introduction to Nuclear Power Station	**Understand** the layout and working of nuclear power station and types of reactors.	T1: 13.1-13.3
37			Nuclear fuel, breeding, Fertile materials,		
38			Nuclear reactor, reactor operation.		
39	11		Types of Reactors its details,		T1: 13.3-13.13
41			Pressurized water reactor, Boiling water reactor,		
42			Sodium-graphite reactor, Fast Breeder reactor,		
43			Homogeneous Reactor,		
44	12		Revision		
46			Gas cooled Reactor		
47			Radiation hazards and shielding,		
48			Radioactive waste disposal.		
49	13		Revision		
50		5	Power Plant Economics and Environmental Considerations	**Understand** the major principles and exercises of power plant economics and environmental considerations.	T1: 17.1-17.11 & 21.1-21.6
51			Capital cost, investment of fixed charges, Operating costs		
52			General arrangement of power distribution,		
53	14		Load curves, load duration curve.		
54			Definitions of connected load,		
55			Maximum demand, demand factor,		
56	15		Average load, Load factor,		

57			Diversity factor and related exercises.		
58			Effluents from power plants		
59			Impact on environment, pollutants.		
60			Pollution standards, Methods of Pollution control.		
61	16		Revision		

IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

CO's	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	--	--	--	--	--	--	--	2	--	1	2	2
CO2	2	2	2	--	--	--	--	--	--	--	2	--	1	2	--
CO3	2	2	2	--	--	--	--	--	--	--	2	--	--	2	2

SUGGESTED BOOKS:TEXT BOOK:

1. A Course in Power Plant Engineering: / Arora and S. Domkundwar.
2. Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub

REFERENCES:

3. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
4. Power plant Engineering/ Ramalingam/ Scietech Publishers
5. A Text Book of Power Plant Engineering / Rajput / Laxmi Publications
6. An Introduction to Power Plant Technology / G.D. Rai.

DESCRIPTIVE QUESTIONS:

UNIT-I

Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	What are the methods used for handling of coal?	Understand	2
2	State the advantages and disadvantages of pulverized coal firing.	Knowledge	1
3	What is the function of cooling tower?	Understand	2
4	What are the requirements of a modern surface condenser?	Understand	2
5	What is drift? How is the drift eliminated in the cooling towers?	Understand	2
6	What is pulverization?	Understand	2

7	What are the methods used in ash handling system?	Understand	2
8	What is meant by overfeed and underfeed principles of coal firing?	Understand	2
9	How the air is produced important in the selection of thermal power plant site?	Understand	2
10	What are the requirements of a modern surface condenser?	Understand	2
11	Indicate the types of burner employed for pulverized coals in the thermal power plants.	Understand	2

Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Draw an explanatory line diagram of an ash handling system employed in steam power plants and also explain the difficulties encountered in the handling of ash in a thermal power station?	Apply	3
2	Explain the difficult types of coal handling process?	Understand	2
3	Explain the principle involved in preparation of coal and what are the methods of preparation?	Understand	2
4	What are the different types of dust collectors used?	Understand	2
5	What are the different types of pulverizing mills? Explain with its neat sketch.	Understand	2
6	How ash is handled in the power plant? Explain the ash handling system.	Understand	2
7	What are the methods used for pulverized fuel burning?	Understand	2
8	Explain the various draught systems with a neat sketch.	Understand	2
9	What are the different types of cooling towers? Explain with a neat sketch.	Understand	2
10	Explain the analysis of pollution from thermal power plants.	Understand	2

UNIT-2

Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	What are the applications of diesel electric power plants?	Understand	1
2	What are the methods used for starting a diesel engine?	Understand	2
3	What are the components present in the diesel electric power plants	Understand	2
4	What is the commonly used fuel injection system in a diesel power station?	Understand	2
5	What are the methods of cooling in a diesel engine power plant?	Understand	2

6	Discuss the effect of inter cooling in a gas turbine plant.	Understand	2
7	What is the difference between open cycle and closed cycle gas turbine plant?	Understand	2
8	How are the gas turbine blades cooled?	Understand	2
9	Why is the maximum cycle temperature of gas turbine plant much lower than that of diesel power plant?	Understand	2
10	Define mean effective pressure as applied to gas power cycles. How it is related to the indicated power of an I.C. engine?	Knowledge	1
11	Mention the various process of the Brayton cycle? Draw the p-V and T-s diagram of Brayton cycle.	Apply	3
12	What is the principle of operation of simple jet propulsion system?	Understand	2

Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Draw and explain the layout of a modern diesel power plant showing the following systems. a). Air Intake system b). Cooling system c).Fuel supply system d).Lubrication system and e). Exhaust system.	Apply	3
2	Describe the auxiliary equipments of a diesel engine power plant. What are the disadvantages of this plant?	Understand	2
3	Explain the various types of cooling system used in diesel power plant. Name and explain briefly the various types of fuel injection system.	Understand	2
4	Give the layout of diesel engine power plant. What are the advantages and disadvantages of diesel power plants?	Understand	2
5	Describe briefly the commonly used starting system in large and medium size engines.	Understand	2
6	Derive an expression for air standard efficiency of Brayton cycle in terms of: (i) Compression ratio and (ii) the pressure ratio.	Create	3
7	Bring out the difference between the closed cycle and open cycle gas turbine power plants	Understand	2
8	Draw a neat diagram of a regenerative gas turbine and re-heater and also explain it working with a help of a p-v diagram.	Apply	3
9	What are the methods used for improving the efficiency of a gas turbine plant?	Understand	2
10	Sketch the Brayton cycle. Air enters the compressor of the cycle at 1 bar and 250c. Pressure after compression is 3 bar. Temperature at turbine inlet is 6500c. Determine per kg of air the (i) cycle efficiency (ii) heat supplied to air, (iii) work available (iv) heat rejected in the cooler and (v) Temperature	Apply	3

	of air leaving the turbine.		

UNIT-3

Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	On what a factor does the selection of a water turbine for hydro electric power plants depends upon?	Understand	1
2	Enumerate the advantages and disadvantages of hydropower plants.	Understand	2
3	What is surge tank?	Understand	2
4	Mention the merits of hydro electric power plants.	Understand	2
5	Classify the hydro electric turbines with respect to high medium and low head.	Understand	2
6	What are the three main factors of power output of hydroelectric plant?	Understand	2
7	What are the main parts of pelton wheel?	Understand	2
8	What is the function of spear & nozzle?	Understand	2
9	What do you understand by water hammer?	Understand	2
10	What is the basis of classification of turbines?	Understand	2
11	What is a solar cell?	Understand	2
12	What are the advantages and limitations of tidal power plant?	Understand	2

Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Explain in detail about surge tank used in hydro electric power plant. Also explain about the classification and selection of dams.	Understand	2
2	What are the factors to be considered while selecting the site of a hydro power plant?	Understand	2
3	3. How are the turbines classified? Explain anyone with a suitable sketch.	Understand	2
4	Explain the construction and working of Geo thermal power plant.	Understand	2
5	What are the different types of Tidal power plants?	Understand	2
6	Explain the Solar thermal central receiver system.	Understand	2
7	What are the different types of ocean thermal energy conversion system?	Understand	2
8	Explain with a neat diagram of wind electric generating power plant.	Understand	2
9	Explain in detail about the various types of Wind energy system.	Understand	2
10	Write a brief note on HAWT & VAWT?	Understand	2

UNIT-4 Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	What are the advantages of nuclear power plant?	Understand	2
2	Explain the function of moderator?	Understand	2
3	Explain the function of nuclear reactor	Understand	2
4	List down the basic factors to be considered for the design of a nuclear power reactor?	Understand	2
5	What is “half life” of nuclear fuels?	Understand	2
6	List down the nuclear waste disposal method?	Understand	2
7	Define the term “Breeding”	Knowledge	1
8	What factors control the selection of a particular type of a reactor?	Understand	2
9	What are the components of pressurized water reactor nuclear power plant?	Understand	2
10	10. Give an example for a low head turbine a medium head turbine and a high head turbine.	Understand	2
11	What are reaction turbines? Give example.	Understand	2
12	Differentiate the impulse and reaction turbine.	Analyze	3

Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	What is chain reaction? How it is maintained? What is the difference between controlled and uncontrolled chain reaction? Explain with neat sketches and with examples.	Understand	2
2	Describe the boiling water reactor with the help of neat sketch and explain its chief characteristics.	Understand	2
3	Write short notes on nuclear waste disposal? Discuss the salient features of the nuclear waste disposal method?	Understand	2
4	What is a chain reaction? How it is controlled? Explain with a neat sketch a boiling water reactor.	Understand	2
5	Explain the working of a typical fast breeder nuclear reactor power plant, with the help of neat diagram	Understand	2
6	Write a brief note on types of reactors with the help of neat sketch?	Understand	2
7	What are the difference between a pressurized water reactor nuclear power plant and boiling water reactor nuclear power plant?	Understand	2
8	What are the desirable properties of a good moderator?	Understand	2
9	What are the advantages and disadvantages of nuclear power plant?	Understand	2
10	Explain with a neat sketch the indirect gas cooled	Understand	2

	reactor		

UNIT-5 Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Define demand factor.	Understand	2
2	Define load factor.	Understand	2
3	What is load curve?	Understand	2
4	Draw the load duration curve.		2
5	What is tariff?	Understand	2
6	How can we calculate the cost of electricity?	Understand	2
7	What is two part tariff?	Understand	2
8	How to improve the power factor?	Remember	3
9	What is the capital cost of power plant?	Understand	2
10	What is financing cost?	Understand	2
11	What is operating cost?	Understand	2
12	What is meant by depreciation?	Understand	2

Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Find the cost of generation per kW-hr from the following data: Capacity of the plant is 120 MW, Capital cost is Rs.1, 200 per kW installed, Interest and depreciation is 10% on capital, Fuel consumption is 1.2 kg/kW-hr, and Fuel cost is Rs. 40 / tone. Salaries, wages, repairs and maintenance costs are Rs. 6, 00, 000 / year. The maximum demand is 80 MW and load factor is 40 %.	Apply	3
2	A power station has two 60MW units each running for 1500 hours a year. The energy produced per year is 700 x 106 kW-hr. Calculate the plant load factor and plant use factor.	Apply	3
3	A central power station has annual factors as follows: Load factor = 60%, Capacity factor = 40%, Use factor = 45%, Power station has a maximum demand of 15,000 kW. Determine: Annual energy production, Reserve capacity over and above peak load, Hours per year not in service.	Apply	3
4	What do you understand by power plant economics? Explain the fixed costs and operating costs of a power station.	Understand	2
5	What is meant by load factor and diversity factor?	Understand	2
6	What are the elements which contribute to the cost of the electricity? How can the cost power generation be reduced?	Understand	2
7	What do you understand by power plant economics? Explain the fixed and operating cost of a power station.	Understand	2
8	Discus the generating cost per unit of 80 MW power with the following data: Capital Cost = Rs 160 x 107 Annual Cost of fuel = Rs 32 x 106 Annual wages and taxes = 10% of Capital cost Annual load factor = 45%.	Understand	2

OBJECTIVE QUESTIONS: JNTUH:

UNIT-1

1. Mention the one which is secondary source of energy
   (a) coal (b) uranium (c) electricity (d) diesel
2. Energy consumption of Nuclear Power in terms of percentage of total power is
   (a) 20 % (b) 5 % (c) 2.4 % (d) 50 %
3. Which one is renewable source of Energy
   (a) coal (b) uranium (c) wind (d) Hydro
4. Ash content of Indian coal is approximately
   (a) 10 % (b) 5 % (c) 40 % (d) 80 %
5. The calorific Value of the coal is highest for
   (a) Anthracite (b) Bituminous (c) Sub Bituminous (d) Lignite
6. Conveyor belt transfers coal safely up to the angle of _____.
7. Bucket elevator conveys coal in _____ direction
8. The per capita energy consumption in India presently is approximately _____.
9. Wagon Tippler ia an equipment used for_____.
10. Fixed carbon and volatile matter is part of _____analysis of coal.

UNIT-2

1. The working cycle of 4 stroke engine is completed in the following number of revolutions of crank shaft
   (a) ½ (b) 1 (c) 2 (d) 4
2. In a Diesel Engine, the fuel is ignited by_____.
3. The air standard efficiency of a Otto cycle compared to Diesel cycle for the given compression ratio is _____.
4. The pressure and temperature at the end of compression stroke in a petrol engine are of the order of _____.
5. The cetane number of the fuel used for Diesel engine in India in the range of
   (a) 60- 70 (b) 40-45 (c) 80-90 (d) None
6. A closed cycle Gas turbine works on
   (a) Carnot's cycle (b) Joule cycle (c) Atkinson cycle (d) Rankine cycle
7. The blades of Gas turbine rotor are made up of
   (a) C.I (b) Steel (c) carbon steel (d) High Nickel alloy
8. In the gas Power plant, the temperature of gas increases, the efficiency of the plant _____.
9. Gas Turbine for power generation is normally used to supply _____.
10. The mechanical efficiency of a gas turbine as compared with IC engine is _____.

UNIT-3

1. The annual depreciation of a Hydro power plant is about
   (a) 5-10 % (b) 0.5-1.5 % (c) 10-15 % (d) 15-20 %
2. Water Hammer is developed in
   (a) Turbine (b) Surge tank (c) Penstock (d) Dam

3. Location of the surge tank in a Hydro electric station is near to the
   (a) Turbine (b) Tail Race (c) Reservoir (d) None
4. Pelton Turbine is suitable for high head and low _____.
5. The ratio of net work output to the total work developed in the turbine is called as _____.
6. Most widely used material for Solar cell is
   (a) Steel (b) cadmium (c) Silicon (d) Copper
7. The conversion efficiency of a fuel cell in the range of
   (a) 40 % (b) 50 % (c) 55 % (d) 70 %
8. The principle involved in thermo electric generator is
   (a) See beck (b) Hall (c) Faraday (d) All
9. The main by product of Bio gas plant is _____.
10. Which type of wind mill is simple in design _____.

UNIT -4

1. In India the first Nuclear plant wars started at
   (a) Narora (b) Kota (c) Tarapur (d) Kalpakkam
2. In which unit nuclear energy is measured
   (a) Joule (b) Curie (c) MW (d) MeV
3. Reflectors of Nuclear Reactor are made up of _____.
4. The conversion Ratio of Breeder Reactor is _____.
5. Fast breeder reactor is best suited for India because India has the large amount of
6. The commonly used fuels in nuclear reactor _____.
7. Nuclear energy is obtained is by_____.
8. Nuclear reactor is used to convert_____.
9. Moderators are used to slow down_____.
10. Breeder reactor is defined as _____.

UNIT -5

1. The load factor of a power station is generally about
   (a) Equal to unity (b) less than unity (c) more than unity (d) None
2. Diversity of a power plant is always _____.
3. The ratio of Average load by Peak load is known as _____.
4. If the operating time is complete 1 Year, the plant use factor is _____ capacity factor.
   (a) Greater (b) lower (c) equal (d) None
5. Utilization factor is reciprocal of _____.
6. Heat rate is defined as _____.
7. Load curve represents _____.
8. Cost of electricity can be calculated by _____.
9. Site selection is based on availability of resources like _____.
10. Combustion of fuels releases _____.

WEBSITES:

1. www.power-eng.com
2. www.rwe.com
3. www.plantengineering.com

4. www.iaea.org

EXPERT DETAILS:

1. Dr. B.SudheerPrem Kumar,Professor & HOD (Mech), JNTU,Hyderabad
2. Dr. A. V. S. S. K. S Guptha, Professor (Mech), JNTU,Hyderabad
3. Dr. E.Ramjee, Associate Professor (Mech),JNTU,Hyderabad
4. Dr. M.V.Ramana Murthy, Associate Professor (Mech), OU,Hyderabad
5. Dr. Raja Banerjee, Associate Professor, IIT, Hyderabad

JOURNALS:

Name of the Journals related to Power Plant Engineering

1. International Journal of Energy Engineering
2. Power Engineering
3. Journal of Engineering for Gas Turbines and Power, American Society of Mechanical Engineers
4. Nuclear Engineering and Design: An International Journal devoted to all aspects of Nuclear Fission Energy
5. Journal of Energy Engineering

LIST OF TOPICS FOR STUDENT SEMINARS:

1. Indian Energy Scenario and World Energy resources
2. Clean Coal Technology
3. Combined cycle Gas Turbine for efficient Energy Production
4. Super charging and Turbo charging for Diesel Power Plant
5. Optimization of Solar Power Plant
6. Safety in Nuclear Power Plants
7. Design of Wind Power Turbines
8. Economics and Environmental issues of Power Plants

CASE STUDIES / SMALL PROJECTS

- Case study on combined cycle power plant with cogeneration
- Study and Analysis of Small Hydro Projects
- Case studies on Interconnection Barriers for Distributed Renewable Power Projects
- Case Studies on Renewable Energy sources