

**GUJARAT UNIVERSITY**  
**B.E. SEM V (MECHANICAL)**  
**M-502 THERMAL ENGINEERING**

Subject	Code	Teaching Scheme		Examination Scheme					
		Theory Hrs	Pract Hrs	Exam	Theory Paper	Theory Marks	Pract	TW	Total
THERMAL ENGINEERING	M-502	04	02	Sessional	1.5 Hrs	50	25	25	200
				University	3 Hrs	100			

- 1 **Thermal Power Plant :**  
Simple Rankine cycle for power plant, General layout of modern thermal power plant, points to be considered for site selection.
- 2 **Cycles for steam power plant :**Simple Rankine cycle
- 3 **High pressure Boilers and Accessories:**  
Introduction, Unique features and Advantages of High pressure boiler, La- Mont boiler, Benson boiler, Lo-effler boiler, Schmidt-Hartmann boiler ,Velox boiler, Supercritical boiler, Super charged boiler, Packaged boilers-small and medium size, waste heat boiler, operating parameters of high pressure boiler,  
Different types of superheaters , reheaters , economizers , air-preheaters , superheat control, Boiler slagging, fouling and corrosion.  
Eligibility criteria to operate the boiler, inspection procedure in brief, mention of Indian Boiler Act-annual certification of boiler.
- 4 **Fuel handling, feeding and burning:**  
Introduction, Out plant handling, Storage of Coal, In plant handling, coal crushing, Coal burning methods, Overfeed stokers, Underfeed stokers, pulverized fuel handling systems, unit and central systems, pulverizing mills- ball mill, ball and race mill, impact or hammer mill, bowl mill . Advantages of pulverized fuels, Pulverized fuel burners-long flame burner, short flame burner, cyclone burner, turbulent burner.
- 5 **Draught System:**  
Introduction, Losses in Air-Gas loop system and its measurements, Natural draught—estimation of height of chimney for a specific draught, Maximum discharge condition. Forced and induced draughts, Balanced draught, methods of draughts production, power requirement by fans.
- 6 **Ash handling systems :**  
Introduction, Different types of ash handling systems, mechanical, hydraulic, pneumatic and by steam. Dust collection and its disposal-Mechanical dust collector, electro-static precipitators.
- 7 **Condensers and cooling towers:**  
Introduction to various types of condensers, detailed study of surface condensers—Types of pumps for handling air and condensate, vacuum efficiency, sources of air leakage, estimation of air leakage, pump capacity, calculations-deaerators –Condenser water cooling systems, various types of cooling towers, their construction and operation, terms related to performance of cooling tower and Problems
- 8 **Feed water treatment:**  
Different types of impurities found in feed water, importance of boiler feed water treatment, study of effects such as scale formation, corrosion, priming, foaming, carryover caustic embitterment , temporary and permanent hardness, internal and external water treatment systems—hot lime soda process, zeolite ion exchanger, demineralization plants, regeneration, PH value determination, rapid tests for softness of water. Sea water treatment using reverse Osmosis (RO).
- 9 **Pollution and its control:**  
Introduction, Air and water Pollution problems of a thermal power station, pollution and their effects, control of SO<sub>2</sub> and NO<sub>2</sub>. Controls of particulates in fuel gases, Different types of separators and precipitators and its control.
- 10 **Nuclear power plants:**  
Introduction, Phenomenon such as fission and fusion, chain reaction, nuclear fuels, General components of Nuclear reactor ,Different types of reactors, construction and working of PWR, BWR,CANDU reactor

**Term Work:** The term work shall be based on the topics mentioned above.

**Practical / Oral:** The candidate shall be examined on the basis of above term-work.

**Books:**

1. Power Plant Engineering by Domkundwar & Arora., Dhanpatrai Pub
2. Power Plant Engineering by P. C. Sharma., S.K.Katariya & Sons
3. Power Plant Technology by G. D. Rai.,Khanna Pub.
4. Power Plant Technology by El-Wakil, TMH Pub.
5. Power Plant Engineering by P.K.Nag, TMH Pub.
6. .Power plant Engg. R.K.Rajput., Laxmi Prakashan