

**COURSE TITLE** : **HOSPITAL ENGINEERING**  
**COURSE CODE** : **4067**  
**COURSE CATEGORY** : **A**  
**PERIODS/WEEK** : **4**  
**PERIODS/SEMESTER** : **72**  
**CREDIT** : **4**

<b>MODULE</b>	<b>TOPIC</b>	<b>PERIODS</b>
I	HOSPITAL ORGANIZATION	17
	<b>Test I</b>	1
II	HOSPITAL ELECTRICAL POWER SUPPLY	17
	<b>Test II</b>	1
III	HOSPITAL GAS SYSTEMS AND AIR CONDITIONING	17
	<b>Test III</b>	1
IV	HOSPITAL ADMINISTRATION & QUALITY CONTROL	17
	<b>Test IV</b>	1
	<b>TOTAL</b>	<b>72</b>

## **OBJECTIVES**

### **MODULE I**

#### **1.0 Hospital Organization, Building, Architecture & Services**

- 1.1 Define Bio-engineering & bio –medical Engineering
- 1.2 Define Clinical Engineering and Hospital Engineering
- 1.3 Describe the duties and responsibilities of Biomedical engineer in a hospital
- 1.4 Explain Hospital Organization chart
- 1.5 Describe the Architecture and Planning of a Hospital
- 1.6 Specify the space requirements in a Hospital building
- 1.7 Distinguish the design of various wards
- 1.8 Explain the design of ICU
- 1.9 Define Sterilization
- 1.10 Describe different types of sterilization
- 1.11 Describe single and double chamber autoclave
- 1.12 Describe ethylene oxide Gas sterilization
- 1.13 Explain waste disposal methods

### **MODULE II**

#### **2.0 Electrical power supply systems in Hospitals**

- 2.1 Outline the wiring details needed in a Hospital
- 2.2 Mention the specifications of Hospital wiring
- 2.3 List the components of the substation in hospitals
- 2.4 Explain the operation of a substation
- 2.5 State the importance of uninterrupted power supply in Hospital
- 2.6 List the importance of voltage stabilizers
- 2.7 Explain circuit breakers
- 2.8 Explain protective relays
- 2.9 Explain surge protector
- 2.10 Describe Electromagnetic interference filter

### **MODULE III**

#### **3.0 Essentialities of Hospital gas systems and Air conditioning**

- 3.1 Describe the features of operation tables

- 3.2 Describe the characteristics of theatre lighting
- 3.3 Explain centralized gas supply system
- 3.4 Define Refrigeration
- 3.5 Define refrigerant and give examples
- 3.6 State the principle of Refrigeration and air conditioning
- 3.7 Explain refrigeration system
- 3.8 Explain Working and Operations of year - round air conditioning system
- 3.9 Explain the working of different displacement compressors
- 3.10 Explain the working of centrifugal compressor
- 3.11 Specify filters and air purity for various wards and theaters

#### **MODULE IV**

##### **4.0 Hospital Administration & Quality control**

- 4.1 Describe the costing and financial planning of Hospital systems
- 4.2 Describe the ordering, testing, acceptance and maintenance protocol
- 4.3 Describe the organization of maintenance protocol.
- 4.4 Importance of ISO certification.

### **CONTENT DETAILS**

#### **MODULE I**

##### **Hospital Organization, Building, Architecture & Services**

Bio-engineering , bio –medical Engineering- duties and responsibilities, Clinical engineering, Hospital Engineering - Organization of Hospital Engineering in small, median and large hospitals. Architecture and Planning of a Hospital – space requirements, design of various wards, design of ICU, waste disposal, sterilization- definition, types-steam, gas, radiation, filtration, chemical

#### **MODULE II**

##### **Electrical power supply systems in Hospitals**

Outline the wiring details needed in a Hospital, Specifications of Hospital wiring, Substation in hospitals- Components, Operation of a substation, Protective circuits- circuit breakers- principle and working, protective relays, surge protection-, State the functions of Electromagnetic interference filter, Importance of UPS and voltage stabilizers

#### **MODULE III**

##### **Essentialities of Hospital gas systems and Air conditioning**

Operation Table, Theater Lights, Centralized gas supply systems (air, O<sub>2</sub>, N<sub>2</sub>O and Vacuum) in hospital , Refrigeration and air conditioning- refrigerant, principle of Refrigeration and air conditioning, compressors-positive displacement and centrifugal , Working and Operations of air conditioning system, Filters and air purity for various wards and theaters

#### **MODULE IV**

##### **Hospital Administration & Quality control**

Costing and financial planning of Hospital systems ,Ordering, Testing, acceptance and maintenance protocol -organization of maintenance protocol, ISO certification.

#### **REFERENCE**

- 1. Hospital Electrical safety simplified - Robert B Spooner
- 2. Refrigeration and air conditioning- Khurmi

3. Hospitals Planning, Design & Management - G D Kunders, S Gopinath, A Katakam
4. Total Quality Management - Joes E Rpss
5. Encyclopedia of Medical Devices – John .G. Webster