

# VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

## DEPARTMENT OF PHYSICS

### QUESTION BANK



### PH8201-PHYSICS FOR CIVIL ENGINEERING

Regulation – 2017

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*Prepared by*

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SUBJECT : PH8201-PHYSICS FOR CIVIL ENGINEERING

SEM / YEAR: II SEM/AY-2018-2019

### UNIT I - THERMAL PERFORMANCE OF BUILDINGS

Heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings, thermal measurements, thermal comfort, indices of thermal comfort, climate and design of solar radiation, shading devices - central heating. Principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems -water piping - cooling load - Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C.Systems.

#### PART - A

Q.No	Questions	BT	Competence
1.	What is called fenestration? Give two examples.	BT L 2	Understand
2.	What is thermal insulation? List out the benefits.	BT L 1	Remember
3.	What are different types of heat flow?	BT L 2	Understand
4.	Define heat gain and heat loss.	BT L 2	Understand
5.	List few factors which affect the thermal performance of the building.	BT L 4	Analyse
6.	State the significance of thermal comfort.	BT L 1	Remember
7.	What is thermal performance of the building?	BT L 3	Apply
8.	Define thermal indices.	BT L 1	Remember
9.	What is R-Value? What is its importance?	BT L 4	Analyse
10.	Define solar radiation.	BT L 2	Understand
11.	What are the uses of shading devices?	BT L 3	Apply
12.	Write the significance of central heating.	BT L 1	Remember
13.	What is ventilation?	BT L 2	Understand
14.	How will you classify natural ventilation?	BT L 4	Analyse
15.	What is chilled water plant?	BT L 2	Understand
16.	Write at least two advantages of fan coil systems.	BT L 5	Evaluate
17.	What is meant by cooling load?	BT L 2	Understand
18.	What is air filtration?	BT L 1	Remember
19.	What do you mean by air-conditioning?	BT L 2	Understand
20.	Write any three precautions to prevent fire caused by AC systems.	BT L 2	Understand

#### PART - B

1.	i) What is meant by fenestration and what are the advantages? (6) ii) Explain in detail the thermal insulation of the buildings. (10)	BT L 2	Understand
2.	i) What is thermal insulation? Give its importance. Name any two thermal insulators. (6) ii) Discuss the factors with example components that affect thermal performance of buildings. (10)	BT L 2	Understand

3.	Explain in detail how heat gain and heat loss estimations are carried out for a building. (16)	BT L 2	Understand
4.	Describe climate and design of solar radiation. (16)	BT L 2	Understand
5.	Explain in detail i) Central heating, (6) ii) Shading Devices. (10)	BT L 1	Remember
6.	Discuss in detail the ventilation in a building and explain how is the ventilation is measured? (16)	BT L 1	Remember
7.	What is natural ventilation? Give its purpose. Explain the principles behind wind driven and stack ventilation mechanisms. (16)	BT L 2	Understand
8.	Discuss in detail the window type and packaged air conditioner systems. (16)	BT L 1	Remember
9.	Describe the principle, construction and working of chilled water plant with neat diagram. (16)	BT L 1	Remember
10.	Write short note on (i) Fan coil units with its block diagram. (8) (ii) Design of natural ventilation. (8)	BT L 4	Analyse
11.	Write short note on (i) Water piping (8) (ii) Cooling load (8)	BT L 4	Analyse
12.	Explain in detail the different types of air-conditioning systems. (16)	BT L 1	Remember
13.	Discuss in detail the centralized air conditioning systems for different types of buildings. (16)	BT L 4	Analyse
14.	Discuss the air conditioning systems for different types of buildings and protection against fire caused by AC system. (16)	BT L 1	Remember

## UNIT II - ACOUSTICS

Classification of sound- decibel- Weber–Fechner law – Sabine’s formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multi-storeyed buildings.

### PART – A

Q. No	Questions	BT	Competence
1.	Classify sound waves based on frequency.	BTL 1	Knowledge
2.	Define intensity of sound.	BTL 1	Knowledge
3.	Define sound intensity level & Write its unit.	BTL 2	Understand
4.	The intensity of sound during heavy traffic is $10^{-4} \text{ Wm}^{-2}$ . Calculate intensity level in decibel.	BTL 4	Analyse
5.	State Weber-Fechner law.	BTL 4	Analyse
6.	Define reverberation and reverberation time.	BTL 1	Knowledge
7.	Define absorption coefficient of a material. What is its unit?	BT L 5	Evaluate

8.	A hall has a volume of 5000 m <sup>3</sup> . It is required to have reverberation of 1.5 second. What should be the total absorption in the hall?	BTL 6	Creating
9.	Mention few factors affecting the acoustics of building.	BTL 4	Analyse
10.	What is focussing?	BTL 1	Knowledge
11.	What are different types of sound absorbers?		
12.	Mention a few sound absorbing materials.	BTL 2	Understand
13.	What is a floating floor? Why is it used in buildings?	BTL 3	Apply
14.	How is the noise produced in a building?	BTL 4	Analyse
15.	What is structural born noise?	BTL 3	Apply
16.	How noises are measured?	BTL 4	Analyse
17.	What is transmission loss in sound?	BTL 3	Apply
18.	What is sound insulation? How it is measured?	BTL 3	Apply
19.	What are the main causes of noise in multi-storeyed building?	BTL 4	Analyse
20.	Mention the requirements for good acoustics of building.	BTL 1	Knowledge

**PART – B**

1.	Derive Sabine's formula for reverberation time using growth and decay method. (16)	BTL2	Understand
2.	Derive expression for energy density inside a hall and hence deduce Sabine's formula for the reverberation time of the hall. (16)	BTL 4	Analyse
3.	Explain the various factors that affecting architectural acoustics of a building and their remedies? (16)	BTL 2	Understand
4.	Discuss the factors, reverberation, resonance, echelon effect, focussing and reflection that affect the acoustics in hall and the remedies for them. (16)	BTL 1	Knowledge
5.	i) Describe the methods of sound absorption in buildings. (8) ii) How will you estimate absorption coefficient of the hall? (8)	BTL 1	Knowledge
6.	Discuss the various types of sound absorbing materials. (16)	BTL 1	Knowledge
7.	Describe different types of sound absorbers used in designing a building with good acoustical properties. (16)	BTL 2	Understand
8.	What are the mechanisms involved in the sound absorption? Explain in detail the sound measurements and the noise insulation in the buildings. (16)	BTL 4	Analyse
9.	i) Write short notes on porous absorbers. Give two examples. (6) ii) Describe airborne sound and impact sound insulation measurements. (10)	BTL 2	Understand
10.	Write note on different types of noises in buildings. (16)	BTL 3	Apply
11.	i) What are the remedies to protect good acoustics of the building? (8) ii) How will you measure the noise produced inside the building?(8)	BTL 1	Knowledge
12.	Explain the various methods of sound insulation. (16)	BTL 2	Understand
13.	Write in detail about the sound insulation in buildings? (16)	BTL 2	Understand
14.	Discuss in detail about impact of noise in multi-storeyed buildings. (16)	BTL 4	Analyse

### UNIT III - LIGHTING DESIGNS

Radiation quantities – spectral quantities – relationship between luminescence and radiant quantities – hemispherical reflectance and transmittance – photometry: cosines law, inverse square law. Vision – photopic, mesopic, scotopic visions. Colour – luminous efficiency function - Visual field glare, colour - day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

#### PART – A

Q.No	Questions	BT Level	Competence
1.	What is radiometry?	BTL1	Remember
2.	Define Radiant intensity.	BTL1	Remember
3.	Define irradiance.	BTL1	Remember
4.	Define hemispherical transmittance and reflectance.	BTL4	Analyse
5.	What is luminous flux and write its unit?	BTL1	Remember
6.	Define luminous intensity.	BTL2	Understand
7.	Define candela.	BTL1	Remember
8.	Define intensity of illumination.	BTL1	Remember
9.	What is Photometry?	BTL1	Remember
10.	State inverse square law in Photometry.	BTL2	Understand
11.	Define Lambert's Cosines law.	BTL1	Remember
12.	What are Photopic, Mesopic and Scotopic?	BTL2	Understand
13.	What do you mean by glare? How does it affect the optical performance of the hall?	BTL3	Apply
14.	Mention different types of glare.	BTL3	Apply
15.	What are the methods to reduce glare?	BTL2	Understand
16.	What is meant by day light factor?	BTL2	Understand
17.	What is the use of models in daylight calculation?	BTL2	Understand
18.	Explain briefly artificial sky models.	BTL4	Analyse
19.	What is the purpose of supplementary artificial lighting?	BTL5	Evaluate
20.	Mention few artificial light sources.	BTL5	Evaluate

#### PART – B

1.	Discuss the different radiometric quantities. (16)	BTL2	Understand
2.	Discuss the different photometric quantities. (16)	BTL2	Understand
3.	Describe relations between radiant and luminous characteristics of radiation. (16)	BTL2	Understand
4.	State Cosines law and derive the expression for intensity of illumination. (16)	BTL4	Analyse
5.	Show that luminance on a surface is inversely proportional to the square of the distance. (16)	BTL4	Analyse
6.	Explain the following a) Photopic b) Mesopic c) Scotopic (6+5+5)	BTL1	Remember
7.	Explain colour – luminous efficiency function. (16)	BTL2	Understand
8.	Write notes on a) Visual field glare b) day light calculation c) day light factor. (5+5+6)	BTL1	Remember
9.	Write in detail about the day light design and measurements in the buildings. (16)	BTL1	Remember
10.	Write detailed note on effect of window shape and size-on day light. (16)	BTL1	Remember
11.	Explain in detail the use of building models and artificial skies in estimating daylight factor and deciding on artificial lighting. (16)	BTL4	Analyse

12.	Discuss in detail the principles and techniques involved in artificial lighting. (16)	BTL1	Remember
13.	List any four artificial light sources and discuss about ambient, task and accent lighting in buildings. (16)	BTL1	Remember
14.	Explain supplementary artificial lighting with an example in detail. (16)	BTL2	Understand

#### **UNIT IV - NEW ENGINEERING MATERIALS**

Composites - definition and classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline - Non Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibres - ferroelectric and ferromagnetic ceramics - High Aluminium ceramics.

#### **PART – A**

Q.No	Questions	BT Level	Competence
1.	What are composite materials?	BTL2	Understand
2.	What are the types of composites based on matrix materials?	BTL2	Understand
3.	What is fibre reinforced plastics?	BTL2	Understand
4.	What are the types of fibre reinforced plastics?	BTL2	Understand
5.	What is the role of matrix in FRP in composites?	BTL3	Apply
6.	Mention the application of composites.	BTL3	Apply
7.	What are Metallic glasses? Write any two properties.	BTL1	Remember
8.	List any four applications of metallic glasses.	BTL3	Apply
9.	List the advantages of metallic glasses as transformer core materials.	BTL5	Evaluate
10.	What are shape memory alloys?	BTL2	Understand
11.	Define pseudo elasticity in SMA.	BTL2	Understand
12.	Distinguish between crystalline and Non crystalline ceramics	BTL4	Analyse
13.	What are ceramic materials?	BTL1	Remember
14.	Write the mechanical properties of ceramics.	BTL5	Evaluate
15.	What are the applications of ceramics?	BTL2	Understand
16.	What are ferromagnetic ceramics?	BTL2	Understand
17.	What are ferroelectric ceramics?	BTL2	Understand
18.	Write a note on slip casting.	BTL5	Evaluate
19.	What is high alumina ceramics?	BTL2	Understand
20.	State any four applications of High Aluminium ceramics?	BTL3	Apply

#### **PART – B**

1.	Explain in detail about the structure and applications of FRP and FRM. (16)	BTL1	Remember
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2.	Explain in detail the preparation, properties and applications of Fibre reinforced plastics. (16)	BTL2	Understand
3.	Explain in detail the preparation and properties of metallic glasses. (16)	BTL2	Understand
4.	How are metallic glasses prepared? Explain how the melt spinner device can be used to produce met glasses. (16)	BTL2	Understand
5.	How are shape memory alloys prepared? Explain with neat diagram their characteristics. List out any four applications of shape memory alloys. (16)	BTL4	Analyse
6.	What are ceramic materials? Discuss the various properties and applications in the construction engineering. (16)	BTL3	Apply
7.	Discuss the classification of ceramics. (16)	BTL4	Analysing
8.	Discuss in detail the manufacturing process of ceramics and its applications. (16)	BTL3	Applying
9.	Describe slip casting process in detail and mention different ceramic forming processes. (16)	BTL2	Understand
10.	With neat diagrams, explain i) Slip casting ii) Isostatic pressing iii) Gas pressure bonding. (6+5+5)	BTL1	Remember
11.	Explain thermal, mechanical, electrical and chemical properties of ceramic materials. (16)	BTL4	Analyse
12.	Discuss the characteristics, Advantages and applications of ceramic fibres. (16)	BTL3	Apply
13.	Write note on i) Ferroelectric ceramics ii) Ferro magnetic iii) High aluminium ceramics. (5+5+6)	BTL1	Remember
14.	Explain in detail the properties and applications of high Aluminium ceramics. (16)	BTL4	Analyse

### **UNIT V - HAZARDS**

Seismology and Seismic waves - Earth quake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and fire fighting equipment - Prevention and safety measures.

#### **PART - A**

Q.N	Questions	BT	Competenc
1.	What are seismic waves?	BTL2	Understand
2.	Explain P - waves and S-waves.	BTL1	Remember
3.	Define the two types of surface waves.	BTL2	Understand
4.	Define epicentre of an earthquake.	BTL1	Remember
5.	Define intensity of earthquake.	BTL1	Remember
6.	What are the causes of earthquake?	BTL4	Analyse
7.	Mention few units for the measurement of earthquakes.	BTL2	Understand

8.	What is SHA? Mention the most important factors affecting seismic hazard at a location.	BTL1	Remember
9.	Write about DSHA.	BTL1	Remember
10.	What is probabilistic seismic hazard analysis?	BTL2	Understand
11.	Write the four steps in PSHA.	BTL2	Understand
12.	What are cyclones?	BTL1	Remember
13.	What are the categories of cyclone based on wind speeds their capacity to cause damage?	BTL1	Remember
14.	What is flood hazard?	BTL1	Remember
15.	List the methods of flood prevention.	BTL2	Understand
16.	Write briefly the fire prevention code.		
17.	What is fire hazards and list the types.	BTL2	Understand
18.	What do you mean by the fire extinguisher? Give examples.	BTL4	Analyse
19.	What are fire-proofing materials?	BTL1	Remember
20.	Mention the fire safety regulations.	BTL2	Understand

**PART - B**

1.	With necessary diagrams, explain different types of body waves and surface waves in seismology. (16)	BTL1	Remember
2.	Describe the earthquake in terms of p-waves, s-waves and explain various parameters. (16)	BTL2	Understand
3.	Discuss the various earthquake hazards and explain the disaster mitigation after earthquake. (16)	BTL3	Apply
4.	Discuss earthquake ground motion with types, intensity and magnitude. (16)	BTL2	Understand
5.	Explain Deterministic seismic hazard analysis and probabilistic seismic hazard analysis. (16)	BTL1	Remember
6.	Discuss the Deterministic seismic hazard analysis. (16)	BTL1	Remember
7.	Explain in detail how the cyclone is formed. What are the different types?(16)	BTL4	Analyse
8.	Explain cyclone hazard with cause and effects. (16)	BTL3	Apply
9.	Discuss in detail the cyclone and the flood hazards. What are the safety measures? (16)	BTL4	Analyse
10.	Explain flood hazards. Mention the effects and preventive measures. (16)	BTL3	Apply
11.	Describe in detail about the flood hazards. (16)	BTL2	Understand
12.	Discuss in detail about fire hazards and guidance on preventive measure. (16)	BTL4	Analyse
13.	Describe fire proofing materials. (16)	BTL1	Remember
14.	Explain in detail the operation of different types of fire extinguishers equipments. (16)	BTL5	Evaluate
15.	Explain in detail the fire safety regulations and fire fighting equipments. (16)	BTL3	Apply



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