SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF PHYSICS

QUESTION BANK

II SEMESTER

1920201-PHYSICS FOR CIVIL ENGINEERING

Academic Year 2022 – 2023

Prepared by

Dr. M. Anbuchezhiyan, Dr. K. Thiruppathi,

Dr. S. Gandhimathi, Mrs. R. Sasireka, Dr. M. P.Ramya Rajan

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SUBJECT : 1920201-PHYSICS FOR CIVIL ENGINEERING

SEM / YEAR: II SEM/AY-2021-2022

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. 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 (AC) systems– Protection against fire to be caused by A.C.Systems.			
PART – A			
Q.No	**Questions**	**BTL**	**Competence**
1.	What are the modes of heat transfer?	BTL 1	Remembering
2.	Define fenestration.	BTL 1	Remembering
3.	What is thermal insulation?	BTL 1	Remembering
4.	Write any two benefits of thermal insulation.	BTL 2	Understanding
5.	List any two properties of thermal insulating materials.	BTL 2	Understanding
6.	What are thermal insulating materials?	BTL 1	Remembering
7.	Define heat gain and heat loss.	BTL 1	Remembering
8.	What is meant by thermal performance of the building?	BTL 1	Remembering
9.	Mention two factors which affect the thermal performance of the buildings.	BTL 2	Understanding
10.	What are thermal measurements?	BTL 1	Remembering
11.	Write the significance of thermal comfort.	BTL 2	Understanding
12.	Define thermal indices.	BTL 1	Remembering
13.	What is R-value?	BTL 2	Understanding
14.	Define solar radiation.	BTL 1	Remembering
15.	Mention the uses of shading devices.	BTL 2	Understanding
16	List out the types of shading ndevices.	BTL 2	Understanding
17.	What is ventilation?	BTL 1	Remembering
18.	Classify natural ventilation.	BTL 1	Remembering
19.	What is chilled water plant?	BTL 1	Remembering
20.	Write two advantages of fan coil systems.	BTL 2	Understanding
21.	Define cooing load.	BTL 1	Remembering
22.	What is air filtration?	BTL 1	Remembering
23.	What is meant by air-conditioning?	BTL 2	Understanding
24.	Write any two precautions to prevent fire caused by AC systems.	BTL 2	Understanding
PART – B			
1.	Write in detail about heat transfer through fenestrations in a building. (13)	BTL 2	Understanding
2.	Explain the thermal insulation of the buildings. (13)	BTL 2	Understanding

3.	(i) Give the importance of thermal insulation? Name any two thermal insulating materials. (3) (ii) Discuss the factors that affect the thermal performance of buildings with example. (10)	BTL 2	Understanding
4.	Discuss the factors which affect the thermal performance of buildings. (13)	BTL 2	Understanding
5.	Write short note on (i) thermal measurements (4) (ii) thermal comfort (4) (iii) indices of thermal comfort (5)	BTL 2	Understanding
6.	Explain how heat gain and heat loss estimations are carried out for a building. (13)	BTL 2	Understanding
7.	Discuss heat gain and heat loss estimation in the components of buildings. (13)	BTL 2	Understanding
8.	Describe climate and design of solar radiation. (13)	BTL 1	Remembering
9.	Explain the function, importance and types of shading devices. (13)	BTL 1	Remembering
10.	Describe the different types of shading devices. (13)	BTL 2	Understanding
11.	Explain the method of ventilation measurements in a building? (13)	BTL1	Remembering
12.	(i) What is natural ventilation? (3) (ii) Explain the principle behind wind driven and stack ventilation mechanisms. (10)	BTL 2	Understanding
13.	Describe the principle, construction and working of chilled water plant with neat diagram. (13)	BTL 1	Remembering
14.	Write short note on (i) Fan coil units with its block diagram (7) (ii) Water piping (6)	BTL 2	Understanding
15.	What do you mean by packaged air conditioners and explain in detail? (13)	BTL 2	Understanding
16.	Explain the window type air conditioner systems. (13)	BTL 2	Understanding
17.	Discuss the air conditioning systems for different types of buildings and protection against fire caused by AC system. (13)	BTL 1	Remembering
	PART – C		
1.	Describe the various methods of thermal insulation which are used to keep our homes cool inside when there is warm temperature outside and vice versa. (15)	BTL 3	Applying
2.	(i) With neat diagram explain the working of chilled water plant. (10) (ii) Mention the advantages of chilled water plant over simple packaging cooling units. (5)	BTL 2	Understanding
3.	How to design natural ventilation which is mainly used to control indoor air quality and also explain the ventilation measurements. (15)	BTL 3	Applying
4.	Describe the construction and working of window type air conditioner. (15)	BTL 2	Understanding

5.	Explain in detail (i) chilled water plant (5) (ii) fan coil systems (5) (iii) cooling load (5)	BTL 2	Understanding

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 - impact of noise in multi- storied buildings, sound insulation and its measurements.

PART – A

Q. No	Questions	BT Level	Competence
1.	Classify the sound waves based on frequency.	BTL 1	Remembering
2.	Define decibel.	BTL 2	Understanding
3.	What is loudness?	BTL 2	Understanding
4.	Differentiate Loudness and Intensity.	BTL 2	Understanding
5.	State Weber-Fechner law.	BTL 2	Understanding
6.	Write mathematical expression of Sabine's formula with terms.	BTL 2	Understanding
7.	Define sound intensity level.	BTL 2	Understanding
8.	The intensity of sound by roaring of a lion at a distance of 5 m is 0.01 Wm^{-2}. Calculate intensity level in decibel.	BTL 3	Applying
9.	When the sound intensity is tripled, calculate the increase in the acoustic intensity level.	BTL 3	Applying
10.	What is reverberation?	BTL 1	Remembering
11.	Define reverberation time.	BTL 2	Understanding
12.	If the reverberation time is lower than the critical value, how will it affect the acoustical quality of a building?	BTL 2	Understanding
13.	Define absorption coefficient of a material.	BTL 1	Remembering
14.	A cinema theatre has a volume of 7500 m^3. What should be the total absorption in the theatre, if the reverberation time of 1.5 seconds is to be maintained?	BTL 3	Applying
15.	Mention any two factors which affect the acoustics of a building.	BTL 1	Remembering
16.	List out the any two remedies for factors affecting acoustics of buildings.	BTL 2	Understanding
17.	What is meant by focusing?	BTL 2	Understanding
18.	What is echelon effect?	BTL 2	Understanding
19.	Mention few sound absorbing materials.	BTL2	Understanding
20.	What is a floating floor?	BTL2	Understanding
21.	What is structure born noise?	BTL 1	Remembering
22.	What are the types of noises produced in the multistoried building?	BTL 1	Remembering
23.	List the main causes of noise in multistoried building.	BTL2	Understanding
24.	Mention the requirements for good acoustics of building.	BTL 1	Remembering

PART – B			
1.	Derive Sabine's formula for reverberation time using growth and decay method. (13)	BTL2	Understanding
2.	(i) Derive expression for energy density inside a hall. (6) (ii) Deduce Sabine's formula for the reverberation time of the hall. (7)	BTL 1 BTL 1	Remembering Remembering
3.	Derive Sabine's mathematical relation for reverberation time. (13)	BTL2	Understanding
4.	Derive the expression for (i) growth of sound energy (6) (ii) decay of sound energy (7)	BTL2	Understanding
5.	Explain the various factors which affect the architectural acoustics of a building and write their remedies. (13)	BTL 2	Understanding
6.	Discuss the terms, reverberation, loudness, resonance, echelon effect, focusing that affect the acoustics in hall. (13)	BTL 1	Remembering
7.	Explain the various factors that affect acoustics of buildings. What are their remedies? (13)	BTL 3	Applying
8.	(i) Describe the methods of sound absorption. (6) (ii) Derive an expression for measuring the absorption coefficient of a material. (7)	BTL 1 BTL 2	Remembering Understanding
9.	Explain the different types of sound absorbing materials used in a building. (13)	BTL 1	Remembering
10.	Describe different types of sound absorbers used in designing a building with good acoustical properties. (13)	BTL 2	Understanding
11.	Discuss in detail the methods of sound absorptions and absorbing materials. (13)	BTL 2	Understanding
12.	Write a note on noise measurements and the impact of noise in multi-storied buildings. (13)	BTL 2	Understanding
13.	Explain the different types of noises in buildings. (13)	BTL 1	Remembering
14.	Discuss about the impact of noise in multistoried buildings. (13)	BTL 2	Understanding
15.	(i) What are the remedies to protect good acoustics of the building? (6) (ii) How will you measure the noise produced inside the building? (7)	BTL 1 BTL 2	Remembering Understanding
16.	Explain the various methods of sound insulation. (13)	BTL 2	Understanding
17.	Elaborate in detail about sound insulation and its measurements. (13)	BTL 2	Understanding
PART – C			

1.	The architects and engineers could use a formula which was developed by Wallace Clement Sabine that allows planning when designing a concert hall so that they could achieve the best reverberation time .Derive an expression for reverberation time. (15)	BTL 3	Applying
2.	(i) Derive the expression for total sound energy absorbed in the hall. (7) (ii) Deduce an expression for reverberation time in a room in advance of construction and occupancy of an auditorium. (8)	BTL 2 BTL 2	Understanding Understanding
3.	Explain the factors which affects the good speech intelligibility in a building and its remedies (15)	BTL 2	Understanding
4.	How the noise transmission can be reduced in an acoustical construction through walls, windows, doors, ceilings and floors. (15)	BTL 4	Analyzing
5.	Write in detail about (i) noise and its measurements (8) (ii) impact of noise in multi- storied buildings (7)	BTL 2	Understanding

UNIT III - LIGHTING DESIGNS

Radiation quantities – spectral quantities – relationship between luminescence and radiant quantities – photometry: cosines law, inverse square law. Vision – photobic, mesophic, scotopic visions. Colour – luminous efficiency function - Visual field glare - day light calculations - day light design of windows 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	Remembering
2.	What are radiation quantities?	BTL1	Remembering
3.	Define radiant intensity.	BTL1	Remembering
4.	Define irradiance.	BTL1	Remembering
5.	What are spectral quantities?	BTL1	Remembering
6.	Define spectral radiant power.	BTL1	Remembering
7.	What is luminous flux and give its unit?	BTL1	Remembering
8.	Define luminous intensity.	BTL2	Understanding
9.	Differentiate between luminescence and radiant quantities.	BTL2	Understanding
10.	Define candela.	BTL1	Remembering
11.	Define intensity of illumination.	BTL1	Remembering
12.	What is photometry?	BTL1	Remembering
13.	State inverse square law in photometry.	BTL2	Understanding
14.	Define Lambert's Cosines law.	BTL1	Remembering
15.	What is meant by photopic vision?	BTL2	Understanding
16.	Differentiate between photobic vision and mesophic vision.	BTL2	Understanding
17.	What is meant by glare?	BTL1	Remembering
18.	Mention different types of glare.	BTL2	Understanding
19.	List any two methods to reduce glare.	BTL2	Understanding
20.	What is meant by day light factor?	BTL2	Understanding
21.	Write the use of models in daylight calculation.	BTL2	Understanding
22.	What are artificial sky models?	BTL1	Remembering
23.	What is the purpose of supplementary artificial lighting?	BTL1	Remembering
24.	Mention any two artificial light sources.	BTL2	Understanding

PART – B

1.	Discuss the different radiometric quantities. (13)	BTL2	Understanding
2.	Discuss the different photometric quantities. (13)	BTL2	Understanding
3.	Describe the relations between radiant and luminous characteristics of radiation. (13)	BTL2	Understanding
4.	State Cosines law and derive an expression for intensity of illumination. 13)	BTL1	Remembering
5.	Show that luminance on a surface is inversely proportional to the square of the distance. (13)	BTL 3	Applying
6.	Write about vision. Explain various types of visions. (13)	BTL2	Understanding

7.	Explain the following (a) photopic (b) mesopic (c) scotopic visions. (5+4+4)	BTL1	Remembering
8.	Explain colour – luminous efficiency function. (13)	BTL2	Understanding

9.	Write notes on (i) Visual field glare (7) (ii) Day light calculation & day light factor. (6)	BTL1	Remembering
10.	Discuss daylight calculation and daylight design of windows. (13)	BTL2	Understanding
11.	Explain the day light design and measurements in the buildings. (13)	BTL2	Understanding
12.	Explain the use of building models and artificial skies in estimating daylight factor and deciding on artificial lighting. (13)	BTL2	Understanding
13.	Write in detail about use of different models and artificial skies in a building. (13)	BTL2	Understanding
14.	Discuss the principles and techniques involved in artificial lighting. (13)	BTL1	Remembering
15.	(i) List any four artificial light sources. (4) (ii) Discuss about ambient, task and accent lighting in buildings. (9)	BTL1 BTL2	Remembering Understanding
16.	Write the principle of artificial lighting. Differentiate between artificial light and supplementary artificial lighting with examples. (13)	BTL2	Understanding
17.	Explain supplementary artificial lighting.	BTL2	Understanding

PART – C

1.	Discuss in detail radiation quantities, spectral quantities and relationship between luminescence and radiant quantities. (15)		
2.	Explain the three ranges of human vision adaptation level. (15)	BTL2	Understanding
3.	(i) Derive Lambert's Cosine law for intensity of illumination. (8) (ii) Derive inverse square law in photometry. (7)	BTL2 BTL2	Understanding Understanding
4.	Write a short note on visual field glare and explain the types of glare and its remedies. (15)	BTL2	Understanding
5.	Recent years have seen a huge shift away from traditional incandescent filament-type light bulbs to more energy-efficient alternatives. Explain the sources and the types of light source that is produced by electrical means. (15)	BTL 3	Applying

UNIT IV - NEW ENGINEERING MATERIALS

Composites - definition and classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses –Preparation, properties and applications- Shape memory alloys - Ceramics - Classification - Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties – (thermal, mechanical, electrical and chemical) - ferroelectric and ferromagnetic ceramics - High Aluminum ceramics.

PART – A

Q.No	Questions	BTL Level	Competence
1.	What are composite materials?	BTL2	Understanding
2.	List the types of composites based on matrix materials.	BTL1	Remembering
3.	Name the types of fibre reinforced plastics.	BTL2	Understanding
4.	Mention the role of matrix in composites.	BTL2	Understanding
5.	What is the role of reinforcement in composites?	BTL2	Understanding
6.	Mention any two applications of composites.	BTL1	Remembering
7.	What are metallic glasses?	BTL1	Remembering
8.	What is glass transition temperature in metallic glasses?	BTL2	Understanding
9.	Why metallic glasses are used as transformer core materials?	BTL1	Remembering
10.	What are shape memory alloys?	BTL2	Understanding
11.	Define shape memory effect.	BTL2	Understanding
12.	Define pseudo elasticity in SMA.	BTL2	Understanding
13.	What are ceramic materials?	BTL1	Remembering
14.	Distinguish crystalline and non-crystalline ceramics.	BTL2	Understanding
15.	Write any two thermal properties of ceramics.	BTL1	Remembering
16.	Write any two mechanical properties of ceramics.	BTL1	Remembering
17.	Write any two electrical properties of ceramics.	BTL1	Remembering
18.	List any two chemical properties of ceramics.	BTL1	Remembering
19.	Define slip casting.	BTL2	Understanding
20.	What is meant by hot isostatic pressing?	BTL1	Remembering
21.	Write any two applications of ceramics.	BTL2	Understanding
22.	What are ferromagnetic ceramics?	BTL2	Understanding
23.	What is meant by high alumina ceramics?	BTL2	Understanding
24.	Mention any two applications of high alumina ceramics.	BTL2	Understanding

PART – B

1.	Write short note on (i) Fibre Reinforced Plastics(FRP) (6) (ii) Fibre Reinforced Metals (FRM) (7)	BTL1	Remembering

2.	Discuss in detail Fiber Reinforced Plastics (FRP) with examples.	BTL2	Understanding
3.	Discuss in detail Fiber Reinforced Metals (FRM) with examples.	BTL2	Understanding
4.	Explain the properties and applications of fiber reinforced plastics. (13)	BTL2	Understanding
5.	Explain the preparation and properties of metallic glasses. (13)	BTL2	Understanding
6.	Write the various characteristics of metallic glass along with its preparation.	BTL1	Remembering
7.	What are the types of metallic glasses and explain how it is prepared by melt spinning technique. (13)	BTL2	Understanding
8.	(i) What are the types of shape memory alloys? Explain with neat diagram their characteristics. (10) (ii) List out the applications of shape memory alloys. (3)	BTL1	Remembering
9.	Explain the characteristics and applications of shape memory alloys. (13)	BTL2	Understanding
10.	Describe the types, properties and applications of shape memory alloys. (13)	BTL2	Understanding
11.	Discuss the various properties and applications of ceramics in the construction engineering. (13)	BTL1	Remembering
12.	Discuss the manufacturing process of ceramics and its applications. (13)	BTL1	Remembering
13.	Explain different ceramic forming processes. (13)	BTL2	Understanding
14.	With neat diagrams, explain (i) Slip casting (ii) Isostatic pressing (iii)Gas pressure bonding. (5+4+4)	BTL1	Remembering
15.	Explain thermal, mechanical, electrical and chemical properties of ceramic materials. (13)	BTL2	Understanding
16.	Write note on (i) Ferroelectric ceramics (ii) Ferro magnetic ceramics (iii) High alumina ceramics. (4+4+5)	BTL1	Remembering
17.	Explain the properties and applications of high alumina ceramics. (13)	BTL2	Understanding
	PART – C		
1.	Classify the materials based on reinforcement techniques and also explain the types based on the matrix materials. (15)	BTL 3	Applying
2.	Explain how the ceramic materials are classified and describe its manufacturing methods? (15)	BTL2	Understanding
3.	(i) Explain the types, preparation and properties of metallic glasses. (10) (ii) List the applications of metallic glasses. (5)	BTL2 BTL 3	Understanding Applying

4.	Describe about the memory metal or smart alloy which can be deformed when cold but returns to its pre-deformed shape when heated. (15)	BTL 4	Analyzing
5.	Write any one of the method to prepare ceramics and write its merits and demerits.	BTL 3	Applying

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, fire-proofing of materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

PART – A

Q.No	Questions	BTL	Competence
1.	Define seismology.	BTL1	Remembering
2.	What is meant by seismic waves?	BTL2	Understanding
3.	What are P - waves and S-waves?	BTL1	Remembering
4.	List the types of earthquake based on depth of focus.	BTL2	Understanding
5.	Define epicenter of an earthquake.	BTL1	Remembering
6.	Define intensity of an earthquake.	BTL1	Remembering
7.	What are the causes of earthquake?	BTL2	Understanding
8.	What is ground motion?	BTL2	Understanding
9.	Mention few units for the measurement of earthquakes.	BTL2	Understanding
10.	State ‘site effect’.	BTL1	Remembering
11.	What is Seismic Hazard Analysis?	BTL1	Remembering
12.	Mention the most important factors affecting seismic hazard at a location.	BTL2	Understanding
13.	Write about Deterministic Seismic Hazard Analysis.	BTL1	Remembering
14.	What is Probabilistic Seismic Hazard Analysis?	BTL2	Understanding
15.	Write the four steps in Probabilistic Seismic Hazard Analysis.	BTL2	Understanding
16.	What are cyclones?	BTL1	Remembering
17.	What are the categories of cyclone based on wind speeds and their capacity to cause damage?	BTL1	Remembering
18.	What is flood hazard?	BTL1	Remembering
19.	Name the types of floods.	BTL2	Understanding
20.	List the methods of flood prevention.	BTL2	Understanding
21.	What is fire hazards?	BTL2	Understanding
22.	List the types of fire hazards.	BTL2	Understanding
23.	What are fire extinguishers? Give examples.	BTL2	Understanding
24.	List the fire-proofing materials for buildings.	BTL1	Remembering

	PART – B		
1.	With necessary diagrams, explain different types of body waves and surface waves in seismology. (13)	BTL1	Remembering
2.	Describe the earthquake in terms of p-waves, s-waves and explain its various parameters. (13)	BTL2	Understanding
3.	Discuss the various earthquake hazards and explain the disaster mitigation after earthquake. (13)	BTL2	Understanding
4.	Discuss earthquake ground motion with types, intensity and magnitude. (13)	BTL2	Understanding
5.	Explain deterministic seismic hazard analysis and probabilistic seismic hazard analysis. (13)	BTL1	Remembering
6.	Discuss the Deterministic Seismic Hazard Analysis (DSHA). (13)	BTL1	Remembering
7.	Discuss in detail about probabilistic seismic hazard analysis and how it could be prevented?	BTL2	Understanding
8.	(i) How the cyclone is formed? (6) (ii) Explain the different types of cyclone. (7)	BTL2 BTL1	Understanding Remembering
9.	Explain cyclone hazard with cause and effects. (13)	BTL2	Understanding
10.	Explain flood hazards. Mention the effects and methods of flood prevention. (13)	BTL2	Understanding
11.	Describe the types, causes and effects of flood hazards. (13)	BTL1	Remembering
12.	Discuss about fire hazards and guidance on preventive measure. (13)	BTL2	Understanding
13.	Describe about fire proofing materials. (13)	BTL1	Remembering
14.	Write in detail about fire hazards and how it can be avoided using fire proofing materials?	BTL2	Understanding
15.	Explain the operation of different types of fire extinguishers equipment. (13)	BTL2	Understanding
16.	(i) Explain about the firefighting equipment's. (6) (ii) Write a note on fire safety regulations. (7)	BTL2 BTL1	Understanding Remembering
17.	Discuss in detail about prevention and safety measure regulations of fire fighting.	BTL2	Understanding
	PART C		

1.	Explain the occurrence of earthquake ground motion and its estimation technique. (15)	BTL2	Understanding
2.	How do you analyze the hazards created by nature using Probabilistic and deterministic Seismic hazard analysis?	BTL 3	Applying
3.	Vardha, Ghaja,Vayu, Hikka, and Maha are some of the names of one natural hazards. What are the preventive measures you can do for these natural hazards? (15)	BTL 4	Analyzing
4.	We could have prevented the 2015 Chennai flood caused by the torrential downpour and water logging crisis which brought the city lifeto a standstill. How? Discuss the causes and effects of different types of floods. (15)	BTL 4	Analyzing
5.	Fires can start suddenly and spread quickly, damaging your home and furniture and putting lives in danger. Summarize the fire hazards and the precautions you can make to prevent the fire accidents. (15)	BTL 3	Applying