Hall Ticket No | | | | | | | | | | | Question Paper Code: BSTB07

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER - I

M.Tech I Semester End Examinations, January - 2020

Regulations: R18

STRUCTURAL HEALTH MONITORING

(STRUCTURAL ENGINEERING)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT– I

1.	a)	What are the factors affecting structural health? Explain them in detail.	**[7M]**
	b)	Describe in detail various types of inspection and maintenance methods with a flow chart.	**[7M]**
2.	a)	Explain the mechanism of various causes of deterioration in post- construction stage?	**[7M]**
	b)	Discuss in detail the various causes of damage in fresh state? Suggest the suitable remedial measures?	**[7M]**

UNIT– II

3.	a)	Explain the procedure for fire rating of structure using ASTM E 119?	**[7M]**
	b)	Illustrate in detail step by step the process of structural health monitoring.	**[7M]**
4.	a)	Describe the concrete encasement method of protecting building against fire.	**[7M]**
	b)	write in detail about the factors influencing the cracking and spalling and mention regarding C/D ratio	**[7M]**

UNIT– III

5.	a)	Explain the need and importance of quality control and quality audit in structures.	**[7M]**
	b)	What is the effect of temperature on the strength of concrete examined critically?	**[7M]**
6.	a)	Discuss briefly the simulation and loading methods in static structural health monitoring.	**[7M]**
	b)	What are the functions of hardware tools in static structural health monitoring?	**[7M]**

UNIT– IV

7.	a)	Explain the functioning of smart materials used in structural health monitoring.	**[7M]**
	b)	What are the functions of hardware tools in static structural health monitoring?	**[7M]**

8. a) Write a short notes on data based techniques in vibration based structural health monitoring. **[7M]**
   b) List out the applications of structural health monitoring in post-earth quakecontrols and explain them in detail. **[7M]**

UNIT– V

9. a) Discuss how piezo– electric materials are used in structural health monitoring. **[7M]**
   b) Define and explain in detail about electro–mechanical impedance (EMI) technique **[7M]**

10. a) Illustrate briefly the procedure for Adaptations of EMI technique with an exmples. **[7M]**
    b) Explain the process of Repairs and Rehabilitations of Structures in detail. **[7M]**

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COURSE OBJECTIVES:

The course should enable the students to:

I	Diagnosis the distress in the structure understanding the causes and factors.
II	Assess the health of structure using static field methods.
III	Assess the health of structure using dynamic field tests.
IV	Suggest repairs and rehabilitation measures of the structure

COURSE OUTCOMES (COs):

CO 1	Know the causes of Distress in structures, factors effecting structural health, need of regular maintenance of structures.
CO 2	Understand the concept of structural health monitoring and various methods applied for monitoring of structures and structural safety
CO 3	Understand the importance of structural audit and Assessment of Health Structure, Collapse and Investigation, Investigation Management, SHM Procedures
CO 4	Know The Importance of Static field testing, Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement
CO 5	Understand the Dynamic Field testing, stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition systems, Remote Structural Health Monitoring. Introduction to Repairs and Rehabilitations of Structures impedance (EMI) technique, Adaptations of EMI technique

COURSE LEARNING OUTCOMES (CLOs):

BSTB07.01	Understand deterioration and distress in structures.
BSTB07.02	Identify the condition of structures.
BSTB07.03	Identify the type of deterioration and method of correction.
BSTB07.04	Understand the general causes of distress
BSTB07.05	Evaluate causes and prevention methods for structural health monitoring.
BSTB07.06	Understand the concepts for structural health monitoring.
BSTB07.07	Understand various measures in structural health monitoring.
BSTB07.08	Understand the safety of structures in structural health monitoring
BSTB07.09	Identify the importance of structural audit.
BSTB07.10	Analyse structural health monitoring
BSTB07.11	Analyse inspection and testing of concrete
BSTB07.12	Identify symptoms and diagnosis of distress
BSTB07.13	Understand the damage assessment
BSTB07.14	Understand the procedure of structural health monitoring.
BSTB07.15	Importance of Investigation Management.
BSTB07.16	Understand Simulation and Loading Methods in static field
BSTB07.17	Understand the sensor systems in structural health monitoring.
BSTB07.18	Recognize the importance of Static Response Measurement.
BSTB07.19	Understand health monitoring of structures by Dynamic Response Method.
BSTB07.20	Analyse Data Acquisition Systems in dynamic field testing methods.
BSTB07.21	Understand building instrumentation.
BSTB07.22	Recognize the behaviour of sensors.
BSTB07.23	Understand piezo– electric materials and other smart materials in structural health monitoring

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	BSTB07.01	Understand deterioration and distress in structures.	CO 1	Understand
	b	BSTB07.03	Identify the type of deterioration and method of correction.	CO 1	Remember
2	a	BSTB07.02	Identify the condition of structures	CO 1	Understand
	b	BSTB07.04	Understand the general causes of distress	CO 1	Remember
3	a	BSTB07.07	Understand various measures in structural health monitoring	CO 2	Understand
	b	BSTB07.05	Evaluate causes and prevention methods for structural health monitoring.	CO 2	Remember
4	a	BSTB07.06	Understand the concepts for structural health monitoring	CO 2	Understand
	b	BSTB07.09	Identify the importance of structural audit.	CO 2	Remember
5	a	BSTB07.14	Understand the formulation of grid structures.	CO 3	Understand
	b	BSTB07.14	Understand the procedure of structural health monitoring.	CO 3	Remember
6	a	BSTB07.12	Identify symptoms and diagnosis of distress	CO 3	Understand
	b	BSTB07.14	Understand the procedure of structural health monitoring.	CO 3	Remember
7	a	BSTB07.17	Understand the sensor systems in structural health monitoring.	CO 4	Understand
	b	BSTB07.18	Recognize the importance of Static Response Measurement.	CO 4	Remember
8	a	BSTB07.16	Understand Simulation and Loading Methods in static field.	CO 4	Understand
	b	BSTB07.18	Recognize the importance of Static Response Measurement.	CO 4	Remember
9	a	BSTB07.20	Analyze Data Acquisition Systems in dynamic field testing methods.	CO 5	Understand
	b	BSTB07.22	Recognize the behavior of sensors.	CO 5	Remember
10	a	BSTB07.20	Analyze Data Acquisition Systems in dynamic field testing methods.	CO 5	Understand
	b	BSTB07.23	Understand piezo– electric materials and other smart materials in structural health monitoring.	CO 5	Remember

Signature of Course Coordinator **HOD, CE**