Q.6	i.	Write down applications of pre-stressed concrete.	**4**	2	5	3	1
	ii.	Explain 3-D volumetric construction method and flat slab construction method in detail.	**6**	2	5	3	1
OR	iii.	Explain various tunnel construction methods in detail.	**6**	2	5	3	1

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Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	Diameter of thin stream used in pure water jet lie between- (a) 0.004 to 0.01 inch (b) 0.01 to 0.02 inch (c) 0.02 to 0.05 inch (d) 0.05 to 0.07 inch	**1**	1	5	1	
	ii.	In Slab milling method, cutting tool is made up of- (a) Silicon Carbide (b) Aluminium Oxide (c) Titanium Carbide (d) All of these	**1**	1	5	1	
	iii.	What is a defining characteristic of smart materials? (a) They are made from a single type of material (b) They are only used in consumer electronics (c) They can change their properties in response to external stimuli (d) They are always rigid and unchanging	**1**	1	5,6	1	

iv. What does the term 'piezoelectric' derive from? **1** — 1 — 5,6 — 1
   (a) A Latin word meaning to conduct
   (b) A Greek word meaning to press
   (c) An English term for electrical energy
   (d) A French phrase for mechanical movement

v. Mathematical expression of Top stemming depth is- **1** — 1 — 3 — 1
   (a) T= 0.5 times of Burden Distance
   (b) T= 0.7 times of Burden Distance
   (c) T= 1.5 times of Burden Distance
   (d) T= 1.7 times of Burden Distance

vi. In ANFO, Percentage of Fuel oil is- **1** — 1 — 11 — 1
   (a) 2.2%   (b) 3.6%
   (c) 4.8%   (d) 5.70%

vii. Which of the following is considered as Hauling equipment **1** — 1 — 5 — 1
   (a) Back Hoe   (b) Power Shovel
   (c) Dragline   (d) Scraper

viii. Which of the following best describes the function of a clamshell bucket? **1** — 1 — 5 — 1
   (a) To compact earth and soil
   (b) To lift heavy steel beams
   (c) For dredging operations and handling loose materials
   (d) To transport materials over long distances

ix. In precast flat panel system, construction of panel is done by **1** — 1 — 5 — 1
   (a) Pre-stress concrete
   (b) Plain concrete
   (c) Reinforced concrete
   (d) All of these

x. Method of construction involves slab directly supported on columns are termed as- **1** — 1 — 5 — 1
   (a) Precast flat panel system
   (b) Flat slab construction
   (c) 3D volumetric construction
   (d) Precast cladding system

Q.2 i. What do you understand by the term Glazed brick? Write down various advantages of Glazed brick. **4** — 2 — 6 — 2 — 2

ii. Explain the following term- **6** — 2 — 5,6 — 2 — 2
   (a) Fibre reinforced composites
   (b) Particle reinforced composites

OR iii. What is water jet cutting method? Explain different types of water jet cutting method with neat sketch diagram **6** — 2 — 5 — 2 — 1

Q.3 Attempt any two:
i. Explain various applications of smart material in different fields. **5** — 2 — 5,6 — 2 — 2

ii. Explain shape memory alloy with neat sketch diagram. Also discuss phenomenon of SMA effect. **5** — 2 — 5,6 — 2 — 2

iii. Explain piezoelectric strain measurement and process of strain measurement in detail. **5** — 2 — 5,6 — 2 — 2

Q.4 i. Explain working of diesel hammer in detail with neat sketch. **4** — 2 — 5 — 2 — 1

ii. Explain various types of Explosives in details. **6** — 2 — 11 — 2 — 2

OR iii. Explain the following term with mathematical expression: **6** — 2 — 11 — 2 — 2
   (a) Burden distance
   (b) Top stemming depth
   (c) Sub drilling depth
   (d) Spacing

Q.5 i. Explain different parts of scraper. **4** — 2 — 5 — 2 — 1

ii. What is Back hoe? Explain its working and factors affecting output of Back hoe with neat sketch diagram. **6** — 2 — 5 — 2 — 1

OR iii. Explain trenching machine and its types with neat sketch diagram. **6** — 2 — 5 — 2 — 1

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Marking Scheme

CE3EC01 Advanced construction Equipment and Material

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Q.1 i)   a. 0.004 to 0.01 inch   **1**

ii)   c. Titanium Carbide   **1**

iii) c. They can change their properties in response to external stimuli. **1**

iv)   b. A Greek word meaning to press.   **1**

v)   b. T= 0.7 times of Burden Distance   **1**

vi)   d. 5.70%   **1**

vii) d. Scraper   **1**

viii) c. For dredging operations and handling loose materials.   **1**

ix)   a. Pre-stress concrete   **1**

x)   b. Flat Slab Construction   **1**

Q.2 i.   Definition: 1 mark
            Advantages: 3 Marks

ii.   a. Fibre Reinforced Composites Correct Explanation: 3 Marks
            b. Particle Reinforced Composites Correct Explanation: 3 Marks

OR   iii. Definition: 1 mark
            Explanation: 3 Marks
            Diagram: 2 Marks

Q.3 i.   For giving correct applications of Smart material in any 5 fields,
            Give 5 marks.

ii.   Explanation of SMA: 2 marks
            Diagram: 1 mark
            Phenomenon: 2 marks

iii. Explanation of piezoelectric strain measurement: 3 marks
            Process: 2 marks

Q.4 i.   Working of Diesel Hammer : 3 marks
            Diagram: 1 mark

ii.   For giving correct explanation of different types : 6 marks

OR   iii. Give 1 mark for each point explanation.
            Give 0.5 mark for each point.

Q.5 i.   Give 1 mark for each part. On explaining 4 parts give 4 marks

ii.   Definition: 1 mark
            Working: 1 mark
            Factors affecting: 3 marks
            Diagram: 1 mark

OR   iii. Definition: 1 mark
            Types: 3 marks
            Diagram: 2 marks

Q.6 i.   For giving correct applications of Pre-stressed concrete, Give 4
            marks.

ii.   3-D volumetric construction method Correct Explanation: 3 marks
            Flat Slab construction method Correct Explanation: 3 marks

iii. For giving correct explanation of any 2 tunnel construction
            method : Give 6 marks

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