Total No. of Questions: 24

Enrollment No : _____

MEDICAPS UNIVERSITY

Faculty of Engineering

End Semester Examination May 2025

CE3EC01 Advanced Construction Equipment & Materials

Programme	:	B.Tech.	**Branch/Specialisation**	:	CE
Duration	:	3 hours	**Maximum Marks**	:	60

Note: *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

Section 1 (Answer all question(s))

		Marks	CO	BL
Q1.	Which of the following is NOT classified as a non-weathering material? ○ Composite fibre ◉ Uncoated mild steel ○ Glazed brick ○ Polymer coatings	1	2	2
Q2.	Heat treatment of steel is primarily used to: ○ Increase corrosion resistance only ◉ Modify mechanical properties like hardness and toughness ○ Improve surface finish only ○ Reduce material weight only	1	1	2
Q3.	Shape memory alloys (SMAs) return to their original shape when exposed- ○ To magnetic field ○ To electric current ◉ To heat/temperature change ○ To water	1	1	1
Q4.	What is the primary function of electro-rheological fluids? ○ Conduct electricity ◉ Change viscosity under an electric field ○ Improve thermal resistance ○ Increase structural stiffness	1	1	2
Q5.	In blasting operations, which of the following is commonly used as an explosive? ○ Cement slurry ◉ Ammonium nitrate fuel oil ○ Silica gel ○ Bitumen	1	1	1
Q6.	Which pile-driving methods involves the use of a drop hammer? ○ Vibratory driving ○ Diesel hammer driving ◉ Impact hammer driving ○ Auger drilling	1	1	1
Q7.	What is the main purpose of a scraper in earthmoving operations? ◉ Cutting and filling material efficiently ○ Compacting soil ○ Mixing concrete ○ Lifting heavy objects	1	1	1
Q8.	Which type of excavator is most suitable for loading operations in mining? ◉ Front shovel excavator ○ Hydraulic hoe ○ Wheel loader ○ Skid steer loader	1	1	1
Q9.	3D volumetric construction primarily involves: ○ Assembly of steel structures ◉ Prefabricated modules transported & assembled onsite ○ Layer-by-layer concrete pouring ○ Tunneling under water bodies	1	2	2

Q10. Which method is commonly used for excavation in tunneling projects? **1 1 1**

- ○ Jacking method
- ○ Slip form method
- ◉ Tunnel Boring Machine (TBM)
- ○ Shotcreting

Section 2 (Answer any 2 question(s))

Marks CO BL

Q11. Explain how structural plastics & composites contribute to sustainability in construction. **5 3 3**

Rubric	Marks
structural plastics contribution	2.5
composites plastics contribution	2.5

Q12. Describe the various non-weathering materials used in modern construction and state their advantages. **5 3 3**

Rubric	Marks
Types of non-weathering materials	2.5
Advantages of non-weathering materials	2.5

Q13. How does heat treatment influence the microstructure and strength of steel? Provide examples. **5 3 3**

Rubric	Marks
Heat treatment influence on microstructure and strength of steel	3
Relevant Example	2

Section 3 (Answer all question(s))

Marks CO BL

Q14. Define the terms piezoelectric materials and electro strictive materials. **4 2 2**

Rubric	Marks
Define Piezoelectric Materials	2
Define Electro strictive material	2

Q15. (a) Compare the properties, uses, and advantages of CFRP, GFRP, and epoxy resin in retrofitting. **6 3 3**

Rubric	Marks
Properties of CFRP, GFRP, and epoxy resin in retrofitting.	2
Uses of CFRP, GFRP, and epoxy resin in retrofitting.	2
Advantages of CFRP, GFRP, and epoxy resin in retrofitting.	2

(OR)

(b) Explain the concept of smart materials and classify them based on their response mechanisms.

Rubric	Marks
Concept of smart materials	3
Classification of smart materials	3

Section 4 (Answer any 2 question(s))

Marks CO BL

Q16. Discuss in detail the various types of pile driving equipments and their working mechanism. **5 3 3**

Rubric	Marks
Types of pile driving equipment	2.5
Working mechanisms of pile driving equipment	2.5

Q17. How are geological conditions influence the choice of excavation equipment and methods? **5 3 3**

Rubric	Marks
Geological conditions for choice of excavation equipment	2.5
Geological conditions for choice of excavation methods	2.5

Q18. Describe the different crushers used in aggregate production and their advantages and limitations. **5 3 3**

Rubric	Marks
List of types of crushers	1
Advantages of crushers	2
Limitation of crushers	2

Section 5 (Answer any 2 question(s))

Marks CO BL

Q19. Write a detailed note on types and operations of scrapers. **5 3 3**

Rubric	Marks
Types of scrapers	2.5
Operation of scrapers	2.5

Q20. Discuss the impact of hydraulic technology on the efficiency of modern excavators. **5 3 3**

Rubric	Marks
Modern excavators name and hydraulic technology description for their efficiency	5

Q21. How do performance charts help in estimating the production capacity of construction equipment? **5 3 3**

Rubric	Marks
Performance chart role in estimating the production capacity of construction equipment	5

Section 6 (Answer any 2 question(s))

Marks CO BL

Q22. Explain the different methods used in tunnel boring and their applications. **5 3 3**

Rubric	Marks
Methods used in tunnel boring	2.5
Applications of Tunnel boring	2.5

Q23. How does slip formwork enhance efficiency in high-rise construction? **5 3 3**

Rubric	Marks
Description including key points of enhancement of efficiency in high-rise construction by slip formwork	5

Q24. Explain the step-by-step process of fabricating and installing precast structural element. **5 3 3**

Rubric	Marks
For each correct step - one mark (Max. 5 marks)	5

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