

Please give concise and to-the-point answers to all questions. The limit of number of words is listed. Words beyond the limit will not be considered. No extra sheets.

Question 1 (10 marks, 150 words): Indicate with reasons whether the following statements are true or false (No marks without correct reasons. Give concise 1 line reasons and answer in the correct order.):

- The rupture modulus gives higher than actual estimates of tensile strength.
- Concrete has a very low strength under triaxial compressive loading.
- The strength of concrete varies along the length of a column.
- Shrinkage always leads to cracking.
- Contraction joints prevent the formation of cracks in concrete pavements.
- Electrochemical reactions are prevented from occurring when steel reinforcement is galvanised.
- Concretes in dry environment can deteriorate due to cyclic freezing and thawing.
- The wet-process of shotcreting gives a better quality control.
- Timber must be seasoned before use.
- The colour of burnt-clay bricks represents their quality.

Question 2 (5 marks, 75 words): Indicate with reasons whether the following statements are true or false (Answer any five, except those marked not for you. No marks without correct reasons. Give concise 1 line reasons and answer in the correct order.):

- 30% nano-clay replacement is suitable for concrete (Not for Vijay Pratap Singh).
- Nano-materials have fewer flaws (Not for Prateek Mishra).
- Sonication must be carried out on nanofibres and CNTs (Not for Prateek Mishra).
- Geosynthetics have a passive nature of action (Not for Snehal Sinha).
- Non-recyclability of glass makes it unsustainable (Not for Manish Choudhary).
- Hempcrete has a negative carbon footprint (Not for Yash Choudhary).
- Hempcrete is suitable for structural applications (Not for Yash Choudhary).

Question 3 (15 marks, 150 words): Give 1 possible reason and 1 possible method to avoid each of the issues below. (Answer in the correct order and do not repeat the reason and method of prevention.)

- Autogenous shrinkage cracks in concrete.
- High bleeding in concrete.
- Alkali silica reaction when using reactive aggregates.
- Corrosion in marine conditions.
- Freeze-thaw deterioration.
- Honeycombing in concrete on removal of formwork.
- High permeability of concrete.
- High brittleness in steel.
- Acid attack on concrete.
- High viscosity of asphalt concrete.

Question 4 (10 marks, 80 words): You want to develop the perfect construction material. (It's a new material, not one that already exists.) List 5 properties that you would want in that material. For each of these properties, list one existing material that has desirable levels of this property.

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