Q1(A). Concrete is neither strong nor tough as steel ,so why is it the most widely used engineering material . Write three primary reason?

Ans. There are many of reason of use of engineering material but there are three different reason of use of engineering material are discuss below.

The primary function of an engineering material is to withstand applied loading without breaking and without exhibiting excessive deflection.

1. Engineering materials refers to the group of materials that are used in the construction of manmade structures and components.

Materials engineering is mainly concerned with the use of this fundamental knowledge to design and to produce materials with properties that will meet the requirements of society.

2. This is because the engineering materials are less expensive then steel and only steel are did not grape for long time project and also engineering materials are obtained result of need of society and also engineering materials are used costly in nowadays in whole world .the requirements of engineering materials are more then steel.
3. Therefore the material selection process is quite important for the long term success of engineering application and materials are used in day to day life their important is to understand their functions
There are many of reason of used of engineering materials.

Q1(B).
what are factors influencing compressive strengths of concrete. Explain in detail?
Ans.
The factors influencing compressive strength of concrete are discuss below .
Concrete strength is affected by many factors, such as quality of raw materials, water/cement ratio, coarse/fine aggregate ratio, age of concrete, compaction of concrete, temperature, relative humidity and curing of concrete.
The effect of mix proportions, type and brand of cement, availability of moisture for curing, accelerators and curing temperatures on the rate and potential strength development of concrete are discussed.
The whole world wishes their structure to be strong and durable and for that, they always design their structure according to the desired strength and service. Strength gives an overall indication of quality of concrete; as it is directly related to the lifelong performance of the concrete structure. The strength of the concrete shows the ability of the structure to withstand various loads (i.e. Dead Load, Live Load, Earthquake Load, Wind Load.
The strength of the concrete can be measured with the different test that are conducted on it such as, Compressive strength, Tensile strength and Flexural strength.
Q2 (A).
Explain micro structure hydrated cement paste in detail?
Ans.
The microstructure of concrete can be described in the following three aspects:

(i) hydrated cement paste, which represents the hydration products of cement and water reaction, and the main product of this reaction is the calcium silicate hydrate (C-S-H) gel; (ii) pore structure, which refers to the gel pores.

Hydrated cement paste is composed of capillary pores and the hydration product. The pores within the structure of the hydration product are termed 'gel' pores. This hydration product includes C-S-H, CH, Aft, AFm, etc. Gel pores are included within the structure of hydrated cement. According to Powers, 1/3 of the pore space is comprised of gel pores, and the rest are capillary pores. The pores inside cement paste contain water (or pore solution), which can be classified into:

Capillary water: Present in voids larger than 50 Ao. the removal of which does not cause any shrinkage strains, and (b) water held by capillary tension in small pores, which causes shrinkage strains on drying.

Adsorbed water: Water adsorbed on the surface of hydration products, primarily C-S-H. Water can be physically adsorbed in many layers, but the drying of farther surfaces can occur at about 30 % relative humidity. Drying of this water is responsible for a lot of shrinkage.

Bound water: This is chemically bound to the hydration product, and can only be removed on ignition. Also called 'non-evaporable' water.

2 and 3 are together called 'gel' water.

The hydration cement paste are discussed.

Q2 (B).

What do we meant by thermal properties of concrete. Explain in detail?

Ans.

Thermal properties of concrete are discuss below .

Introduction.

Introduction

Thermal properties of a concrete can be defined as the effect of the heat and high temperature on the concrete.

Concrete is a material used in all climatic regions for all kinds of structures.

Thermal properties of concrete are important in all over the concrete structures .

Thermal properties are important in structures in which temperature differentials occur including those due to solar radiation during casting and the inherent heat of hydration.

The thermal properties of concrete are more complex than those of most other materials because these are affected by moisture content, cement content, heat of hydration, type of aggregate.

Thermal properties of concrete are study about the thermal properties of concrete there are following properties needed which name are below.

1.thermal conductivity.

2. Thermal diffusivity.

3. Specific heat.

(1). Thermal conductivity:-

The thermal conductivity of concrete is one of the key parameters needed to predict temperature variation during hydration.

This measures the ability of the material to conduct heat.

Defined as the ratio of the flux of heat to temperature gradient.
The major factors influencing the conductivity are the moisture content of concrete, the type of aggregate, the mix proportions, the type of cement and the temperature of the concrete.
$k=Q*L/A(T2-T1)$
Where:
Q = heat flow (W)
L = length or thickness of the material (m)
A = surface area of material (m2)
T2−T1 = temperature gradient.
(2). Specific Heat:-
Specific Heat is defined as the quantity of heat required to raise the temperature of a unit mass of concrete by 1°C.
The Common range of values for concrete is between 840 and 1170 J/kg per 1°C.
Specific heat represents the heat capacity of concrete.
It increases with the moisture content of concrete and is affected by the mineralogical character of the aggregate,
Specific heat increases with an increase in temperature.
It also increases with a decrease in the density of concrete.
Thermal Properties of concrete
(3) .Thermal diffusivity:-
Thermal diffusivity is a measure of the rate at which temperature change within the mass take place.
The larger the value of thermal diffusivity of a mass the faster the changes will occur.
The value of thermal diffusivity is dependent on the aggregate type, moisture content, degree of hydration of the cement paste, and exposure to drying.
Diffusivity can be determined by:
D = K/sd
D = Thermal diffusivity (m2/s)
K = Thermal conductivity (J/s)
S = Specific heat (J/kg)
d = Density of concrete (kg/m3).
Write a brief note on:-
Q3(1).
Normal strength of concrete.
Ans (1).
Normal strength of concrete are depend on the ingredients of concrete.
A project must needed an a normal strength of concrete.
The Normal strength concrete possesses good workability given that all the concrete ingredients are in proper and accurate proportions. These aggregates must be of proper gradation.
The compressive strength of normal concrete has a value ranging between 20 and 40 MPa. The high strength concrete will have strength above 40MPa.

Lower the water cement ratio with adequate curing period helps in having a concrete of lower permeability. For a normal strength concrete the permeability is found to be in the range of 1 x 10-10 cm/sec.
Q3(2):- Reinforced concrete.
Ans .
Rcc is stand by reinforcement cement concrete.
Reinforced concrete (RC) (also called reinforced cement concrete or RCC) is a composite material in which concrete's relatively low tensile strength and ductility are counteracted by the inclusion of reinforcement having higher tensile strength or ductility.
Reinforced concrete, concrete in which steel is embedded in such a manner that the two materials act together in resisting forces. The reinforcing steel—rods, bars, or mesh—absorbs the tensile, shear, and sometimes the compressive stresses in a concrete structure.
Reinforced cement concrete (R.C.C) is the combination of ordinary concrete with the reinforcement to increase its compressive and tensile strength to a great extent.
Concrete is a versatile material for modern construction which is prepared by mixing together well-proportioned quantities of cement(even lime in some cases), sand, crushed rock or gravel and water. It has been used from foundations to the rooftops of buildings, in the construction of highways roads traffic, and hydro-power tunnels, irrigation canals, drains, and all other conceivable structures.
Q3(3). Pre_stressed concrete.
Ans.
Pre_stressed concrete is a system into which internal stresses are deliberately induced without any form of external loads to improve its performance. The internal stresses induced in the concrete structure is used to counteract the stresses coming from the external load application.
Pre_stressed concrete is a form of concrete used in construction. It is substantially "Pre_stressed" (compressed) during production, in a manner that strengthens it against tensile forces which will exist when in service.[1][2]:3–5[3].
Pre_stressed concrete is used in a wide range of building and civil structures where its improved performance can allow for longer spans, reduced structural thicknesses, and material savings compared with simple reinforced concrete. Typical applications include high-rise buildings, residential slabs, foundation systems, bridge and dam structures, silos and tanks, industrial pavements and nuclear containment structures.
Pre_stressed concrete is one of the most important part of the construction you should and you must have proper knowledge about it.
Q3(B).
Explain briefly interfacial transition zone in concrete?
Ans.
Introduction:-
It is now well-established experimentally that interfacial transition zones (ITZ's) exist around aggregate (rock, sand) particles in concrete.
The Interfacial Transition Zone (ITZ) Between Cement Paste and Aggregate in Concrete. This paper describes the so called interfacial transition zone (ITZ) in concrete. This is the region of the cement paste around the aggregate particles, which is perturbed by the presence of the aggregate.

The overall engineering properties of concrete in relation to the ITZ are beyond the scope of this review.

Nevertheless, the local properties of the interfacial zone are reviewed: the mechanical and the transport characteristics of the ITZ are discussed in relation to the porosity and connectivity of pores.

The interfacial transition zone (ITZ) that exists in the cement paste near sand particles and rocks in concrete require concrete to be considered as a (at least) three-phase composite:

(1) bulk cement paste,

(2) ITZ cement paste,

(3) rock and sand,

collectively called aggregates.

In reality, the ITZ contains a gradient of properties, but can be approximated as a single property shell with some finite thickness. This paper discusses how this gradient of properties can be quantitatively mapped into a single property shell, for the case of ionic diffusivity (electrical or thermal conduction), using an exact analysis of the dilute composite limit, in which the volume fraction of (spherical) aggregates is small.