DECEMBER 2017 / ENDSEM EXAM.

F. Y. B. TECH. (COMMON) (SEMESTER - I)

COURSE NAME:**Basic Civil Engineering.**(CODE:U117-103), 2017 PATTERN

Detailed Solution and Marking Scheme (Paper #2)

Q.1 (a)

Advantages of railway: (i)Less travel time, (ii)Less probability of accidents, (iii)More load carrying capacity, (iv)Travel cost is less for long distances.

Disadvantages of railway: (i)More repairs and maintenance cost, (ii)Service available at few specified locations only, (iii)Not suitable/ comfortable in hilly areas, (iv)Suitable only for smaller gradients, (v)Only specific vehicles (Engines, bogies, etc.) can be carried.

Half mark each for 3 advantages and 3 disadvantages. 3 marks for labeled cross section of broad-gauge single railway track. *[Total 6 marks]*

(b)

Any 2 types of bridges out of:

(1) Beam or Girder Bridge – Simply supported or cantilever or continuous type in which the loads are transferred to the subsoil through reactions at the supports.
(2) Arch Bridge – Load transfer is through the ends of arch OR arches.
(3) Truss Bridge – Loads are transferred through the members of truss and the support reactions.
(4) Suspension Bridge – Load transfer occurs through the cable and piers.
(5) Bascule Bridge – Single OR double bascule. Can swing about horizontal axis in vertical plane.
(6) Swing Bridge – Can swing in horizontal plane about vertical axis.
(7) Vertical Lift Bridge – Can be bodily lifted up or down.

2 marks each for brief explanation of any 2 types of bridges, 1 mark each for sketches. *[Total 6 marks]*

(c)

ITS (Intelligent Transportation Systems) is an advanced application which, without embodying intelligence as such, aims to provide innovative services relating to different modes of transport and traffic management and enables various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks. ITS is very fast developing technology or tool for management/ operation of all modes of the modern transportation in general and surface transportation in particular.

European Union (EU) defined ITS in 2010 as systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport.

Advantages of ITS:

1) Improved interdisciplinary approach, research and development opportunities.
2) High technology employment/ jobs and entrepreneurship opportunities.
3) Real time traveler information and public transportation management.
4) Efficient traffic management (traffic signals, crossings/ intersection, control and collision avoidance)
5) Avoidance of traffic delays and unnecessary longer routes.
6) Emergency/ accidents/ incidents management system.
7) Number-plate recognition and toll collection.
8) Electronic fare collection.
9) National inter-operations possible (International in near future).
10) Environmental and Energy benefits.
11) Customer satisfaction resulting in to more productivity and health benefits.
12) Human intervention, and related problems (Lengthy procedure, delays in decision making, corruption, etc.) and are eliminated from traffic management system since everything gets recorded in digital (soft) form.

Advantages of ITS:

(1)High initial and operating/ recurring cost, (2)High end technology requirement needs advanced machines and relevant training to officials, (3)Advanced IT infrastructure requirement, (4)May not be possible in all cities/ areas, (5)Hugh uninterrupted power (electricity) required.

1 mark for meaning of Intelligent Transportation System (ITS), half mark each for 3 correct advantages and 3 correct disadvantages of ITS. *[Total 4 marks]*

OR

Q.2(a)

- Dock is the area of water between or next to one or group of human made structures for berthing (boat/ ship is anchored or moored alongside) the boats and ships. It helps handling of boats or ship usually on or near a shore.

  Dock may also be referred to as dockyard where loading, unloading/repairing of ship is done.
- Harbour can be defined as a sheltered area of sea in which vessels can be launched, built or repaired; or seek refuge in storms; or facilitate loading & unloading of cargo and passengers.

Major types of docks are dry docks and wet docks.

1) **Dry Dock** is generally a narrow rectangular basin that is flooded to allow boat/ ship to float in it, and then water is drained out to allow that load to come to rest on a dry platform. Dry docks are structured areas used for the construction, repair and maintenance of ships, boats, and other vessels. The unique construction allows the water to be filled up in that area, also known as lock, so that vessels can be maneuvered in and out of the area. Once the vessel enters the dry dock, the gates are closed and the seawater is drained out so that hull and other areas of the ship which have been exposed to sea water for a long time are available for carrying out maintenance and repair works.
2) **Wet Dock** is a large enclosed basin with gates for maintaining a desired constant water level in it irrespective of the water level outside the dock due to tides, waves, etc. It is also termed as harbour dock.

Harbours are broadly classified as: (1)Natural, (2)Semi-natural, and (iii)Artificial harbours.

(1)Natural harbours: Natural formations affording safe discharge facilities for ships on sea coasts, in the form of creeks and basins, are called natural harbours. With the rapid development of navies engaged either in commerce or war, improved accommodation and facilities for repairs, storage of cargo and connected amenities had to be provided in natural harbours. The size and draft of present day vessels have necessitated the works improvement for natural harbours. The factors such as local geographical features, growth of population, development of the area, etc. have made the natural harbours big and attractive. Bombay and Kandla are examples of natural harbours

(2)Semi-natural harbours: This type of harbour is protected on sides by headlands protection and it requires man-made protection only at the entrance. Vishakhapatnam is a semi-natural harbour.

(3)Artificial harbours: Where such natural facilities are not available, countries having a seaboard had to create or construct such shelters making use of engineering skill and methods, and such harbours are called artificial or man-made harbours. Madras is an artificial harbour. Thus, a naval vessel could obtain shelter during bad weather within a tract or area of water close to the shore, providing a good hold for anchoring, protected by natural or artificial harbour walls against the fury of storms

1 mark each for correct meaning of Dock & Harbor. 2 marks each for types and uses of docks and harbours. *[Total 6 marks]*

(b)

Factors affecting highway alignment:

1. Construction materials: For bringing down the costs of construction and maintenance of highways, it is necessary to have easy availability of natural building materials like stones, gravel and sand along the highway. The road alignment having minimum carting problems of road building materials is generally preferred.
2. Crossings: The provision of stream crossing, river crossing and railway crossings along the road alignment should be properly studied. The availability of a suitable bridge site along the road alignment is very important and as a matter of fact, it sometimes proves to be the only single decisive factor in fixing the highway alignment.
3. Geological features: The highway alignment should be made in such a way that no serious difficulties are met from the geological features of the locality such as stability of earthwork, landslides, etc.
4. Land acquisition: The availability of adequate land for the construction of highway is necessary. If the road alignment is such that considerable built-up area and cultivated land area are to be acquired, it will prove to be difficult, costly and time consuming.

6. Expected Traffic: The road alignment should take care of probable traffic flow, number and types of vehicles and the future trends. Road alignment as such should suit the requirements of traffic and it should be so laid or designed that adequate safety is granted for the road travel.

1 mark each for brief explanation of 6 factors to select an alignment for highway. *[Total 6 marks]*

(c)

1 mark each for 4 points of comparison between airways and waterways. *[Total 4 marks]*

Q.3 (a)

Different treatment methods and units/ components of a sewage treatment plant are classified in three different categories followed by sludge treatment and disposal:

(1)Preliminary/ Primary Treatment: Refers to mechanical or physical unit operations. Primary treatment consists of **screens** (for removal of floating matter), **grit chamber** (for removal of inorganic suspended solids) and **primary sedimentation tank** (for removal residual settleable solids which are mostly organic). Skimming tanks may be used for removal of oils; however, in conventional treatment plant no separate skimming tank is used and oil removal is achieved by collecting the scum in primary sedimentation tank.

(2)Secondary Treatment: Refers to chemical and biological unit processes. This primary treatment alone will not produce an effluent with an acceptable residual organic material concentration. Almost invariably biological methods such as **Activated Sludge Process**, **Trickling Filters** and **Rotating Biological Contactors** are used in the treatment systems to effect secondary treatment for removal of organic material. In biological treatment systems, the organic material is metabolized by bacteria in presence of air (Oxygen) called aerobic digestion (And in absence of oxygen/ air; known as anaerobic process).

(3)Tertiary Treatment: Refers to any one or combination of two or all three. Depending upon the requirement for the final effluent quality, tertiary treatment methods and/or pathogen removal may be included. The effluent then undergoes tertiary treatment/ **disinfection** by incorporation of **UV radiation** or **chlorination**. Other methods such as sand filters and reverse osmosis may also be used instead for this stage of treatment, depending upon the nature of the sewage and the effluent from secondary treatment.

(4)Sludge Treatment and Disposal: Sludge is mostly water with lesser amounts of solid material removed from liquid sewage. **Sludge drying beds** are commonly used in small wastewater treatment plants to dewater the sludge prior to final disposal. Two mechanisms are involved in the treatment process, such as filtration of water through the sand, and evaporation of water from sludge surface. The solid and liquid can also be separated by operation of centrifuge. Sludge can be disposed of by liquid injection to land or by disposal in a landfill.

2 marks for neat schematic diagram of a sewage treatment plant. 4 marks for its components (Units) &their purpose (use) in 1 sentence each. *[Total 6 marks]*

(b)

1 mark for meaning of air pollution, 1 mark each for 3 ill-effects and 3 ways of controlling air pollution. *[Total 4 marks]*

(c)

4 marks for note on 'e-Waste Management'. Necessary points: Meaning, categories and sources and disposal of e-wastes. *[Total 4 marks]*

OR

Q4(a)

Objectives of water supply scheme: (1)To supply good **quality** (safe and wholesome) of water to consumers, (2)To supply sufficient **quantity** of water to the users/ consumers, (3)To supply water **at convenient points and timings,** (4)To supply water **at reasonable cost** to the users, (5)To encourage personal and house hold **cleanliness** of users.

Half mark each for any 4 objectives of water supply system. 2 marks for neat sketch of pumped water supply system, 2 marks for proper labeling. *[Total 6 marks]*

(b)

2 marks for expl. of roof-top rainwater harvesting, 2 marks for neat labeled sketch. *[Total 4 marks]*

(c)

2 marks for sources of solid wastes, 2 marks for brief expl. of solid waste management. *[Total 4 marks]*

Q.5 Rewriting the Question with the most appropriate option as Answer:

a) .....is not role of Civil Engineer in Mechanical Engg. branch.**(i)Design of bridge** [1]

b) .....is not an application of Environmental Eng.**(iv)Design of turbines** [1]

c) Knowledge of Structural Engg. is NOT required for ... **(i)Design of turbines** [1]

d) Identify CORRECTroles of Civil Engineer. **(iii)Both i and ii** [1]

e) Knowledge of Geotechnical Engineering is required for **(i)Soil classification** [1]

f) Which of the following is not a type of shallow foundation? **(i)Piles** [1]

g) ..... is not a category of smart material. **(iii)Alum** [1]

h) Meaning of 1:2:4concrete is ..... [1]
(iii)1 part cement: 2 parts coarse aggregate: 4 parts sand

i) For which of the following brick is **not** used?**(iv)Window Sill** [1]

j) Which of the following is not a type of concrete?**(iv)PCC 25** [1]

k) Which of the following is **not** a part of Dumpy Level? **(iv)Cube corner prism** [1]

l) Identify the INCORRECT stepin chain surveying.**(ii)Centering** [1]

m) An Engineer's scale correspondingto R.F. of 1:100000 is .....**(i)1cm=1km** [1]

n) In a leveling work, if BM and HI values are 300.500 m and 302.655 m; then staff reading is .... And is called ..... **(i)2.115m, BS** [1]

o) A contour mapshows a series of loops such that RLs increase uniformly towards smaller inner loops. Hence it shows a .....**(iii)Hill** [1]

p) Planning principle prospectdoes notdeal with ...**(iii)Positions of doors** [1]

q) Which is an incorrect statement out of following? [1]
(iv)Carpet area is generally about 1.2 times the built-up area

r) Which is not relevant to Building Bye-laws?**(ii)Uniform within a State** [1]

s) Identify the ODD TERM from the following **(i)GRIHA** [1]

t) Which of the following is NOT a component of smart city?**(iv)None of these** [1]

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NOTE: Apart from the solution given above, other relevant, correct matter shall be treated as correct answers and proportionate marks shall be given.