Paper code - U117-103 (RE-FF&F)

F.Y.B.TECH. (COMMON) (SEM.-I); DEC. 2017: ~~END SEM~~ RE M EXAM.

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

Time: [**2 Hours**] [Max. Marks: **50**]

Solution & Scheme of Marking (Paper #1) ***Date: 20/11/2017***

Q.1 (a) Correct definition/ meaning of harbour and dock: **1 mark each (2)**

- 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.

Factors considered for harbour site selection:

- Availability land, labour and construction materials
- Nearness to other harbours/ ports
- Transport and communication facilities
- Natural protection from winds and waves
- Industrial development of the locality
- Bathymetry/ characteristics of sea bed, subsoil and foundation conditions
- Cargo and passenger traffic potential of harbour
- Availability of power source (electricity) and fresh water
- Overall marine conditions – waves, currents, etc.
- Reservations such as defense and strategic aspects.

Half mark each for any 4 correct factors (2) ***[Total 6 marks]***

(b)

(i) Flexible Pavement	**Rigid Pavement**
1)Can deform temporarily or permanently under loads	Practically does not deform under loads
2)Generally do not fail by rupture	Fail by rupture (cracking)
3)Regular & frequent repair/ maintenance required	Regular R/M not required
4) Low initial cost but high repair/ maintenance cost	High initial cost but very low R/M cost
5)Less durability	More durable
6)Overall thickness of pavement is more	Lesser thickness
7)e.g. Bituminous or Water Bound Macadam Roads	e.g. Concrete roads
(ii) Beam (Girder) Bridge	**Suspension Bridge**
1)Superstructure of bridge is a beam or girder	Bridge superstructure has pier & cables
2)There may be one or two or more supports	Any number of piers & cables possible
3)Load transfer occurs through support reactions	Load transfer through cables & piers
4)These are very commonly used	Not very common
5)Relatively cheap	Relatively costly

1 mark each for 3 correct differences between: **(i)**Flexible – Rigid Pavement, **(3)** and **(ii)**Beam (Girder) – Suspension Bridge. **(3) Fig. can be one of the differences.** ***[Total 6 marks]***

(c) Significance of infrastructure engineering can be summarized by following points:

(1) Enhancement of overall economy and improves sectoral growth/ development,
(2) Rapid rural development,
(3) More job opportunities/ employment generation and boost to entrepreneurship,
(4) Overall balanced development of a region,
(5) Quick access and reduced commuting (travel) time,

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(6) Distribution of resources, services, amenities and facilities on fairly equitable basis.
(7) Better (improved) health care, education and living conditions for people.

Brief discussion of any 4 points: 1 mark each. *[Total 4 marks]*

OR

Q.2 (a)(i) Air Transportation –

Advantages:

1. Saving in travel time
2. High passengers/ cargo (load) carrying capacity.
3. Relatively less accidents.
4. Reaching the inaccessible areas/ localities
5. Uninterrupted journey
6. No artificial routes/ tracks required.
7. Development of new technical skill
8. Very useful & efficient in case of disasters/ natural calamities/ other emergency situations
9. Engineering uses such as aerial survey, aerial photography, etc.

Disadvantages:

1. Stringent flight rules & regulations
2. Airports not available everywhere
3. Inconvenience to passengers.
4. High cost
5. Fear and safety/ security
6. Accidents are fatal/ devastating/ sever (chances of human survival are very less)
7. Dependency on weather conditions

(ii) Intelligent Transportation System –

Advantages:

1. Interdisciplinary approach, more opportunities for research and development.
2. High technology employment/ jobs and entrepreneurship opportunities.
3. Real time traveler information and public transportation management.
4. Efficient traffic management; traffic signals, crossings and intersection, transit management; 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, related problems (Lengthy procedure, decision making, corruption, etc.) and delays are eliminated from traffic management since everything gets recorded in digital (soft) form.

Disadvantages:

1. High initial, repairs and maintenance cost.
2. High end technology required and often the public awareness/ attitude are not favourable.
3. Proper training of the personnel involved in ITS is essential.
4. Relevant IT infrastructure requirement is huge (That may not be always available).
5. Uninterrupted power supply/ electricity/ energy requirement is large.
6. Very difficult to implement in remote/ rural areas and all localities in developing countries like India.

Half mark each for 3 correct advantages & 3 disadvantages. *No Expl. required.* ***[Total 6 marks]***

(b)

Factors considered for selecting site for a bridge:

1. Connection with roads/ railways on both banks
2. Embankments: Firm/ solid/ sound embankments needed
3. Foundation conditions
4. Availability of construction materials and labour
5. Crossing with the river: Right angled crossing preferable
6. Straight stretch of river
7. Velocity of flow
8. Width of river, Depth of water
9. Type of bridge
10. Cost of construction

1 mark each for correct brief explanation of 6 factors: bridge site selection. *[Total 6 marks]*

(c)

Sr. No.	Comparison Point	Roadways	Railways
1	Accident rate	Comparatively more	Comparatively less
2	Construction and maintenance cost	Low as compared to railway	Very high
3	Cost of transport	More	Cheap especially for long distances
4	Employment potential	High	Less
5	Gradient	Steep gradient may be provided	Minimum to carry heavier loads at high speeds
6	Length of haul	Short distances	Long distances
7	Usefulness in hilly areas	Suitable	In general not suitable (Narrow gauge railway is possible)
8	Load Carrying capacity	Limited capacity loads	Can handle heavier
9	Maintenance	Only occasional repairs are required	Regular/ constant maintenance required due moving/ loose parts & wheels.
10	Operational control	No rigid controls	Rigid signaling/ interlocking
11	Right of entry	All have right to come in or go out	Not free to all
12	Suitability	Suitable as per customers' needs	Not very suitable
13	Tractive resistance	Nearly five to six times of railway vehicles on steel rails	Nearly $1/5^{th}$ to $1/6^{th}$ on pneumatic type on roadways
14	Vehicle type	Different types of vehicles such as cars, cycles, buses, trucks, etc.	Reserved only for the movement of trains
15	Width of right of way	More	Less as per the gauge of track

Roadways Vs railways: Half mark each for 8 correct points. *[Total 4 marks]*

Q.3 (a) Generally there are 4 components of a Water Supply System (Scheme), as given below.

(1)Collection works include surface water source like a pond or lake or a river. But for making water available all the year, collection works include a dam, and its reservoir. Dam collects and stores water on

its upstream side in the form of a reservoir (Pond). These collection works are generally far away from city or village.

(2)Transmission works generally has pumps and pipes through which water is conveyed (transported or transmitted) from reservoir to the water purification plant in the city/ village. If the collection site is on high (elevated) ground, canals can be used for flow under gravity instead of pumping.

(3)Purification works are necessary as water collected from natural surface sources is not fit (safe) for drinking. Hence water undergoes physical (mechanical), chemical and biological processes through screening, coagulation, sedimentation, filtering, disinfection (chlorination), etc.

(4)Distribution works has a system of pipes (network or branched pipes) with dead ends. These GI/ CI/ plastic pipes convey the purified water from purification plant to the desired points/ locations such as houses or overhead tanks or underground tanks.

2 marks for neat diagram of W. S. S., brief expl. of components 4 marks. ***[Total 6 marks]***

(b)

Noise pollution means an unwanted or undesirable sound that leads to physical and mental problems in humans.

Ill-effects of noise pollution: Ill-effects on humans depend on the intensity (loudness and frequency) of the sound and time of exposure.

(i) Auditory Effects: Noise pollution may cause temporary or permanent hearing impairment. The most direct harmful effect of excessive noise falls on the ears. Many times, extreme noise ruptures the ear drums.

(ii) Non auditory or Psychological effects: As rapid noise hinders sleep, insomnia has adverse effects on human functioning. The person becomes irritable, angry, tired and tense, and he even becomes neurotic or crazy, and may face problems such as lack of memory, concentration, and interruption in speech, irritation, irritability, stress and depression.

(iii) Physiological effects: The noise not only creates irritability, anger, but also accelerates the heart rate by increasing blood flow in the arteries. The constant noise increases the amount of cholesterol in the blood, which contracts blood vessels, increasing the likelihood of cardiovascular disease. Health experts believe that rising noise gives rise to neurological disease, nervous breakdown, hypertension, vision, dizziness, excessive sweating, and exhaustion.

Noise Control techniques: "Noise mitigation is the set of strategies to reduce noise pollution". There are three elements to consider in noise control: Source, Transmission path, Receiver.

(1)Control at the Source: The noise generation could be stopped or limited to a certain extent.
e.g. Replacing the old machines, change in the process or design of machines for quiet operations; oiling, tightening loose parts, and similar type of maintenance, etc.

(2)Control of Transmission path: This can be modified by putting the source inside a sound proof enclosure, constructing a noise barrier or using sound absorbing materials along the path.
e.g. In highways, noise can be reduced by sound-proofing or various types of sound barriers (wood or concrete barriers besides the roads, or vegetation can act as barriers).

(3)Control at the Receiver: In industries sustained exposure to noise can cause permanent hearing damage to workers. Thus to protect from this effect, wearing ear protection or altering work schedule will be the remedial measure. Sound-proof rooms/ cabins can be provided.

1 mark for def., Half mark each for 3 ill-effects & 3 control measures (3). ***[Total 4 marks]***

(c)

Solid wastes are the unwanted solid materials that are no longer of values to their owners (albeit they may be still of values to other parties). They are generated from various human and animal activities. Each year, billions of tones of solid wastes are generated which are in need of proper treatment. Improper management of solid wastes has direct adverse effects on human health and the environment (e.g., polluting rivers and groundwater sources and generating foul air).

Sources of Solid Wastes:

Source	Description
Houses, hotels, restaurants, shops, offices, workshops, schools, hospitals, etc.	Food wastes, garden wastes, paper, plastics, glass, metal, rags, empty bottles, etc.
Construction (building sites) and demolition works	Concrete, cement, sand, coarse aggregate, pieces of timber, stones and bricks, metals, wood, asphalt, soil, etc.
Industrial	Relative homogeneous wastes such as metal, plastics, ashes, sands, paper, sludge, etc. (manufacturers, chemical plants, etc.
Agriculture	Manures, hazardous chemicals, fertilizers, spoiled food
Mining	Solid wastes like coal, metal, sludge, etc.

Disposal of solid wastes: The final stage of solid waste management is safe disposal where associated risks are minimized. There are four main methods for the disposal of solid waste. viz. Land application, Composting, Burning or incineration, Recycling (resource recovery). The most common of these is undoubtedly land application, although all four are commonly applied in emergency situations.

(i)Landfill: Once solid waste is transported off-site it is normally taken to a landfill site. Here the waste is placed in a large excavation (pit or trench) in the ground, which is back-filled with excavated soil each day waste is tipped. Ideally, about 0.5m of soil should cover the deposited refuse at the end of each day to prevent animals from digging up the waste and flies from breeding.

(ii)Incineration: Although burning or incineration is often used for the disposal of combustible waste, this should generally only take place off-site or a considerable distance downwind of dwellings. Burning refuse within dwelling areas may create a significant smoke or fire hazard, especially if several fires are lit simultaneously. Burning may be used to reduce the volume of waste and may be appropriate where there is limited space for burial or landfill. Waste should be ignited within pits and covered with soil once incinerated, in the same manner as land filling.

(iii)Composting: Simple composting of vegetables and other organic waste can be applied in many situations. Where people have their own gardens or vegetable plots, organic waste can be dug into the soil to add humus and fiber. This makes the waste perfectly safe and also assists the growing process. This is designed to produce compost which is safe to handle and which acts as a good fertilizer.

Note on Solid Waste Management with relevant points. ***[Total 4 marks]***

OR

Q4 (a)

Water pollution refers to the introduction of such matter or substances in the natural waters that is harmful to the natural aquatic ecosystems. Water pollution may be caused by point sources at stationary locations such as an effluent pipe or nonpoint sources (also called diffuse sources) such as land runoff and the atmosphere.

Sources: (i)Natural – surface runoff due to sufficient rains (flow of soil/ debris in to water bodies), (ii)Houses (Domestic waste water), hotels, restaurants, laundries, dairies, etc. – sewage, detergents, acids, waste drinks/ liquids, (iii)Hospitals, laboratories, industries – effluents consisting of chemicals (acids, alkalies, etc.), radioactive wastes, (iv)Agriculture – Excess fertilizers, pesticides, manure flowing in to ground water sources.

Control Measures: (i)Replacing/ Recycling/ Reusing/ Dilution of wastes whatever possible, (ii)Use of less chemicals, fertilizers, chemicals, and promoting organic farming, (iii)Treatment of sewage/ industrial effluent before disposal, (iv)Legal provisions (Rules/regulations, acts w.r.t. water pollution)

1 mark for def., Half mark each for 4 sources (2) and one mark each for 3 control measures (3)

[Total 6 marks]

(b)Advantages of Earthen Dam:

1. These are suitable for river valleys of any type: steep gorges or wide valleys
2. Can adapt to a broad range of foundation conditions (from good rock to permeable soil)
3. Uses locally available natural materials
4. Comparatively easy to construct (Very high end technology not necessary).

5. Relatively less initial cost

Disadvantages of Earthen Dam:

1. It may be raid that they have greater susceptibility to damage than concrete dams due to the possibility of getting washed away during slash floods in the river.
2. These are prone to concealed leakage, perhaps due to faulty construction or internal erosion in the dam body or in a permeable foundation.
3. It requires a separate spillway that may not be integrated within the dam body itself.
4. Frequent inspection, monitoring and repair/ maintenance required.
5. Relatively less durable.
6. More chances of failure due to piping or undermining.

Advantages of Roof-Top Rain Water Harvesting:

(1)Useful for fresh water conservation
(2)Ground water sources can be recharged
(3)Urban flooding is reduced
(4)Reduces the use of treated water
(5)Cost of water pumping is reduced
(6)Soil erosion is reduced
(7)Provides self sufficiency of water supply

Disadvantages of Roof-Top Rain Water Harvesting:

(1)Separate RWH system needs to be designed and installed
(2)Its initial cost is high
(3)RWH may not be possible at all sites
(4)Water collected and stored through RWH cannot be directly used for drinking

Half mark each for 2 correct advantages & 2 disadvantages (Drawbacks) ***[Total 4 marks]***

(c)

The term 'e-wastes' is used for the solid electronic wastes which are used or unwanted electronic products that have completed or exceeded their shelf life (use). Their category-wise sources are given in the table.

- These can be categorized into three main categories, viz.,

Large household appliances	Information and communications technology equipments	Consumer electronics
– Refrigerators	– Computers	– Toasters
– Freezers	– Laptops	– Coffee machines
– Microwaves	– Computer accessories	– Clocks
– Electric heating appliances	– Printers	– Watches
– Electric radiators	– Copying equipment etc	– Hair dryer
– Conditioning equipment etc		– Shavers etc

Management Techniques: As the population of India is on an upward spiral, with dependence on technology increasing with every passing day, e waste is also rising by leaps and bounds. The present dump yards are already overflowing with waste and there are no chances of getting fresh dumping yards owing to scarcity of land. Hence it is very essential to recycle electronic and electrical equipment in India.

(1)Reuse/ Recycle the e-waste: In order to reduce the volume of e waste generation, reusing of equipment after little modifications is a method of waste disposal in India. Usually used for computers and cell phones, this can be effective for reducing e-waste.

(2)Incineration: A controlled combustion process, this is a method in which the waste material is burned in specially designed incinerators at a very high temperature. It reduces the waste volume and some of the environmentally hazardous substances are transformed into less hazardous ones.

(3)Landfill: The e-wastes are placed in a pit or trench in the ground, which is back-filled with excavated soil. It is one of the methods of e-waste disposal in India, although it is not very appropriate or safe technique and can invariably pose serious threats to the soil and ground water.

Meaning of e-wastes 1 mark. Sources 1 mark, Managing e-wastes 2 marks. ***[Total 4 marks]***

Q.5 Rewriting the sentences & the most appropriate option as Answer:

a) Which of the following is not a relevant major area of Civil Engineering for construction of a bungalow? [1]
(iv)Transportation Engineering

b) ..... is not an application of Transportation Engineering. [1]
(iii)Location of stations

c) Knowledge of Environmental Engineering is relevant for ..... [1]
(iv)Construction of a dam

d) Identify proper sequence of steps needed for proposed construction of a multistoreyed building. [1]
(iv)Surveying & Planning, Structural design, Estimation

e) Structural Engg. is LEAST relevant for **(iv)Design of a dam** [1]

f) A structure in which the loads are transferred mainly through walls, called ..... **(ii)Load Bearing structure** [1]

g) ..... are used for construction of masonry. **(iv)Both A and B** [1]

h) Mortar is a mixture of ....., ... and adequate amount of water. [1]
(ii)Cement, sand

i) Which of the following material is **not** used for flooring? [1]
(iv)None of these

j) MS bar with yield strength of 250 N/mm^2 is designated as ..... [1]
(ii)Fe 250

k) ..... is unavoidable for measuring length of a survey line if there is an obstacle like hillock between the end stations. [1]
(ii)Reciprocal Ranging

l) Identify INCORRECT statement with respect to 'swing offsets'. [1]
(i)They are oblique offsets

m) An Engineer's scale 1mm=50m means R.F. of .....**(ii)1:5000** [1]

n) Horizontal Equivalent on a contour map means..... [1]
(iii)Distance between successive contours

o) Staff readings on stations A and B in a leveling work are measured a: 2.095 m and 3.360 m. Hence there is a ..... [1]
(ii)A fall from A to B

p) Building planning principle circulation deals with ..... [1]
(ii)Movement of persons

q) Total built-up area on a plot of size 12 mx15 m is 90 m^2. Hence FSI consumed (utilized) is ..... **(iv)0.5** [1]

r) Roominess as a planning principle is said to be best if ..... [1]
(ii)Length to breadth ration for room is 1.2 to 1.5

s) Which of the following is not a green building (Construction) principl [1]
(i)Prospect

t) Which of the following is NOT a component of smart city? [1]
(i)Circulation

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NOTE: For all Questions, any other relevant & correct matter in the answer will also fetch marks.