December 2018; **Backlog** . . . . EXAM.

F. Y. B. TECH. (COMMON) (SEMESTER - I) CV11173

COURSE NAME: **Basic Civil Engineering.** (CV11173), 2017 PATTERN

Detailed Solution and Marking Scheme

Q.1 (a) 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.
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.
Selection of site for harbour:

- Availability of cheap land and construction materials
- Transport and communication facilities
- Natural protection from winds and waves
- Industrial development of the locality
- Sea bed, subsoil and foundation conditions
- Traffic potentiality of harbour
- Availability of electrical energy and fresh water
- Favorable marine conditions
- Defense and strategic aspects etc.

1 mark each for correct definition of harbour and dock. and 1 mark each for correct 4 factors for selection of a harbour. ***[Total 6 marks]***

(b) 1 mark each for correct sketch and 3 differences: (i)Bridge superstructure- Bridge substructure, (ii)Suspension Bridge – Girder (Beam) Bridge. ***[Total 6 marks]***

(c) Advantages/ necessity of I.E.:

(i) Enhancement of overall economy and improves sectoral growth/ development,
(ii) Rapid rural development,
(iii) More job opportunities/ employment generation and boost to entrepreneurship,
(iv) Overall balanced development of a region,
(v) Quick access and reducing travel time,
(vi) Distribution of resources, services, amenities and facilities on fairly equitable basis, Better (improved) health care, education and living conditions for people.

Half mark each for stating 8 necessities of infrastructure engg. OR 1 mark each if 4 points explained correctly. ***[Total 4 marks]***

OR

Q.2(a)1 mark each for 3 advantages and drawbacks of: (i)Bullet train, and (ii)Intelligent Transportation System. ***[Total 6 marks]***

(i) Advantages of Bullet Train: (1)Time saving, (2)Comfortable Journey, (3)High connectivity between Metro Cities, (4)Possible increase in productivity
Drawbacks of Bullet Train: (1)High initial cost, (2)Public perception is not good, (3)Special tracks, stations and rail cars required, (4)Bad Public attitude (Damaging acts)

(ii) 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.
Drawbacks 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.

(b) Any 6 factors for selection of site for an airport:

(1) Regional Plan: The site selected should fit well into the regional plan there by forming it an integral part of the national network of airport.

(2)Airport Use: The selection of site depends upon whether its use is for civilian or military operations. Hence airport site should he such that it provides natural protection to the area from air raids.

(3)Proximity to Other Airports: The site should be selected at a considerable distance from the existing airports so that the aircraft landing in one airport does not interfere with the movement of aircraft at another airport.

(4)Ground Accessibility: The site should be readily accessible for the users. Airline passenger is more concerned with his door to door time rather than the actual time in air travel. The time to reach the airport is, therefore, an important consideration especially for short-haul operations. The time required to reach an airport in a passenger car, from the business or -residential center, should normally not exceed 30 minutes. The best location is a site adjacent to the main highway.

(5)Topography: Natural features like ground contours, trees; streams etc. A raised ground such as a hill top is usually an ideal site for an airport.

(5)Obstructions: When aircraft is landing or taking off, it loses or gains altitude very slowly as compared to the forward speed. Large clearance areas must be available on either side of runways over which the aircraft can safely gain or lose altitude. The areas should be free of obstructions. The obstructions may consist of fences, trees, pole lines, building and other natural or man-made objects.

(6)Visibility: Poor visibility lowers the traffic capacity of the airport. Site should therefore be free from visibility reducing conditions, such as fog, smoke and haze. Fog generally settles in the area where wind does not flow, e.g. in a valley, smoke and haze nuisance exist nearer the industrial areas.

(7)Wind: Runway available should be so oriented that landing and takeoff is done by heading into the wind should be collected over a minimum period of about five years

(8)Noise Nuisance: The extent of noise nuisance depends upon the limb-out path of aircraft, type of engine propulsion and the gross weight or aircraft. The problem becomes more acute with jet engine aircrafts. The site should be away from residential or industrial areas.

(9)Soil/ subsoil characteristics: We have to check the strength of the soil sub grade, of the bearing on the cost of construction. Natural drainage also plays an important role.

(10)Zoning and development of surrounding area: Development of surrounding area is to be talked in terms of what type of development is taking place, whether it is a residential or sensitive area.

(11)Availability of utilities: Availability of utilities such as water, power, etc., or sewers needs to be ascertained. It is also in terms of the communication facilities to be provided to the passengers as well as to the controlling units of the airports by which the navigation will be taking place in air.

(12)Economy of construction: If equally well-suited alternative sites are available, the site which is most economical should be given preference. Waterlogged areas or reclaimed lands are very costly to develop than those of natural ground. Uneven terrain requires more leveling than flat or even terrain. Availability of local materials and labor also has a significant impact on the cost of the project.

1 mark each for correct expl. of 6 factors [Total 6 marks]

(c) Components of ITS:

(1) GPS (Global Positioning System) and/ or smart phone based monitoring
(2) GIS (Geographical Information System)
(3) CCTV network and monitoring system.
(4) Wireless communication
(5) High computation technologies (Computers)
(6) Technological advances in electronics, sensors, telecommunications and information technology; coupled with ultramodern/state-of-the-art microchip, RFID (Radio Frequency Identification), and inexpensive intelligent beacon sensing technologies.
(7) Vehicle- and infrastructure-based networked systems, i.e., Intelligent Vehicle Technologies.
(8) Infrastructure sensors or indestructible devices that are installed or embedded in the road or surrounding the road (e.g. on buildings, poles) and may be manually disseminated during preventive road construction maintenance or by sensor injection machinery for rapid deployment. Vehicle-sensing systems include deployment of infrastructure-to-vehicle and vehicle-to-infrastructure electronic beacons for identification or may employ automatic number plate recognition or vehicle magnetic signature detection for vehicle monitoring in critical zones.
(9) Audio, Video and Bluetooth detection.
(10) Weather information/ forecasting system.

Half mark each for 8 correct components of ITS. ***[Total 4 marks]***

Q.3(a)

(1)Collection works, (2)Transmission works, (3)Purification works, (4)Distribution works.

a. Collection: For major cities, or where water requirements are large, water is collected from a surface source—mostly a river or stream. If the river is perennial, a direct intake structure can be built on the river bank. If, however, river is not perennial, a dam is built across the river so that water is stored in the reservoir. Water is then drawn from the reservoir as per needs. The collection works, therefore, consist of a storage or diversion work, and an intake structure.

b. Transmission: In many cases, the collection works may be far away from the city where water is to be supplied. In that case, water is conveyed to the city through the transmission works. These form the connecting link between the collection works and the purification works. Depending upon the topography of the area between the two sites, the transmission works may be in the form of conduits, canals or aqueducts. For simple gravity flow, canals are generally used. However, if highlands intervene, pumping may be used.

c. Purification: The water collected directly from the source may not be safe for drinking because of physical, chemical and biological impurities. The municipal water works must deliver to the consumer the water that is: (i)hygienically safe, (ii)esthetically attractive and palatable, and (iii)economically satisfactory for its intended use. Diseases like typhoid, cholera, dysentery etc. are water borne diseases.

2 marks for correct sketch + 4 marks for four components (Works or Units) of a typical water supply system. ***[Total 6 marks]***

(b)

Half mark each for 4 ill-effects and 4 ways of controlling air pollution. ***[Total 4 marks]***

(c) Note on 'Noise Pollution': Meaning/ definition, Ill-effects, control measures

Ill-effects:

i. Auditory Effects: Noise pollution may cause temporary or permanent hearing impairment. The most direct harmful effect of excessive noise falls on the ears. Extreme noise may rupture 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.

Control measures:

a. Source: The noise generation could be stopped or limited to a certain extent.

Ex: To control aircraft noise, has to set limits on aircraft engine noise and forcing manufacturers to design engines for quiet operations.

b. Transmission path: This could be modified by putting the source inside a sound proof enclosure, constructing a noise barrier or using sound absorbing materials along the path.

Ex: In highways, noise could be baffled with walls or other types of barriers (wood or concrete barriers beside the road and thus screen the noise or even vegetation can act as barrier).

c. Receiver: In industries sustained exposure to noise can cause permanent hearing damage to workers. To protect from this effect, wearing ear protection or altering work schedule will be the remedial measure.

Meaning/ definition 1 mark, Sources 2 marks, ill-effects 1 mark, control 1 mark. ***[Total 4 marks]***

OR

Q4(a)

Limited sources/ resources of potable water hence scarcity on one side; while ever increasing demand on the other side due to increase in population and rapid urban developments on the other side. Potable water must be conserved by recycling, efficient utilization/ reduce wastages and leakages, rainwater harvesting, storing rainwater in small bunds/ percolation tanks, etc. **Half mark each for RWH meaning/ definition and RTRWH (1 mark) + 2 marks for correct advantages of RTRWH + 3 marks for sketch.** ***[Total 6 marks]***

(b)2 marks each for neat labelled sketches of Gravity Dam and Earthen Dam. ***[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.

1 mark for meaning of 'e-waste' + 3 marks for list & sources. ***[Total 4 marks]***

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

(a) (ii)Environmental Engineering ….. 2 marks

(b) (iii)Location of stations ….. 2 marks

(c) (ii)Water purification plant ….. 1 mark

(d) (iv)Both i and ii ….. 2 marks

(e) (iv)Fe 200 ….. 2 marks

(f) (iv)Stone ….. 1 mark

(g) (ii)Reciprocal ranging ….. 2 marks

(h) (i)It is a perpendicular offset ….. 2 marks

(i) (i)3.3 m ….. 1 mark

(j) (i)Privacy ….. 2 marks

(k) (i)126 m^2 ….. 2 marks

(l) (iii)L:B ratio for rooms 1.2 to 1.5 ….. 1 mark

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