

PURBANCHAL UNIVERSITY
2023

B.E. (Civil)/Eighth Semester/*Final*

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG469SW: Solid Waste Management (Elective-II) (*New Course*)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side. Assume necessary data appropriately if required.

Answer FIVE questions

- 1(a) Define Integrated Solid Waste Management. Discuss about the hierarchy of ISWM. 2+6
- (b) Define hazardous waste. What are the various methods of collecting solid waste? Recommend one system that you think is suitable for Kathmandy Valley with justification. 2+6
- 2(a) How is heat value calculated? Calculate the heat value of Propyl Alcohol ($\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$). 2+6
- (b) A typical distribution of waste components of MSW generated by a residential community is as follows: 8

| Components | % by weight |
|-------------------------|-------------|
| Food waste | 52 |
| Paper | 10 |
| Plastic | 10 |
| Textile | 5 |
| Rubber | 2 |
| Leather | 2 |
| Garden Trimming | 4 |
| Wood | 2 |
| Glass | 1 |
| Tins/Cans | 5 |
| Dirt, Ashes, Brick bats | 7 |
| Total | 100 |

Determine;

- (a) Overall moisture content (b) Overall density of waste sample

Contd. ...

(2)

3(a) What is the area required for land filling the waste of Kathmandu, if the per capita waste generation is 300g (1 litre per capita by volume as discarded) and average projected population is 20,00,000 for one decade. Calculate the area required if 25% of the waste produced per capita is added for commercial and other wastes and 75% of the waste is expected to reach the landfill site. The density of waste after compaction in the landfill is expected to be 550kg/m³. It is estimated that there will be 6 cells in 1 lift of 5m including daily cover height of 15cm and intermittent cover of 30cm. The landfill allows maximum of 6 lifts. The landfill site is run for 6 days a week. 10

(b) What are the factors considered in selection of landfill site. 6

4(a) What will be the break even haul distance between a direct haul system and a transfer station operation with the following: 10

- Direct haul system uses 4 m³ skips
- Cost of operation of transfer trailer = Rs. 12/m³-km
- The transfer station (TS) uses 30 m³ transfer trailer
- The cost of operation of tractor trailer = Rs. 6.50/m³-km
- Initial investment in TS=Rs. 55000000 (for buildings, equipments, facilities, etc.)
- Useful life of TS=25 years; Interest rate = 11.5%
- Cost of operation and maintenance of TS=Rs. 600000/yr
- Volume of waste handled = 500000 m³/yr

If the average two way distances to disposal site is 20 km, What would be the amount of money saved annually by having TS?

(b) Describe in brief the types of collection system? 6

5(a) What is the compactor size required to haul waste from a residential colony with the following details. 8

- Container size = 0.25m³
- Container utilization factor=-0.75
- Avg. no. of container in each station=2
- Collection vehicle compaction ratio=2.5
- Container unloading time U_c=8 min/container
- Two-way haul distance x=40km; Speed limit =40km/hr
- Length of workday H = 8hr/day
- Average driving time between the containers = 8 minutes

(3)

(b) Explain in brief about recovery of organic wastes in Nepal. 8

6. Write short notes on any FOUR:

- (a) Leachate
- (b) Composting
- (c) Physical characteristics of solid waste
- (d) Landfill gas management
- (e) Environmental Ethics

4x4=16

| Components | Range | Typical | Density, kg/m ³ | Moisture, % | % by mass (dry basis) | Inert residue % |
|--------------------------------|---------|---------|----------------------------|-------------|-----------------------|-----------------|
| Food wastes | 120-480 | 290 | 50-80 | 70 | 48.0 | 5 |
| Paper | 30-130 | 85 | 4-10 | 6 | 43.5 | 6 |
| Cardboard | 30-80 | 50 | 4-8 | 5 | 44.0 | 5 |
| Plastics | 30-130 | 65 | 1-4 | 2 | 60.0 | 10 |
| Textiles | 30-100 | 65 | 6-15 | 10 | 55.0 | 2.5 |
| Rubber | 90-200 | 130 | 1-4 | 2 | 78.0 | 10 |
| Leather | 90-260 | 160 | 8-12 | 10 | 60.0 | 10 |
| Garden Trimmings | 60-225 | 105 | 30-80 | 60 | 47.8 | 4.5 |
| Wood | 120-320 | 240 | 15-40 | 20 | 49.5 | 1.5 |
| Glass | 160-480 | 195 | 1-4 | 2 | | 98 |
| Tins/cans | 45-160 | 90 | 2-4 | 3 | | 98 |
| Non ferrous metal | 60-240 | 160 | 2-4 | 2 | | 96 |
| Ferrous metal | 120-200 | 320 | 2-6 | 3 | | 98 |
| Dirt, ashes, bricks etc. | 320-960 | 480 | 6-12 | 8 | 26.3 | 70 |
| Municipal Solid Waste | 90-180 | 130 | 15-40 | 20 | | |
| Uncompacted | | | | | | |
| Compacted (in Compactor Truck) | 180-450 | 300 | | | | |
| Compacted (in landfill normal) | 350-550 | 475 | | | | |
| Well Compacted (in landfill) | 600-750 | 600 | | | | |

Typical Solid waste Properties

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PURBANCHAL UNIVERSITY

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B.E. (Civil)/Eighth Semester/*Final*

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG499BE: Bio-Engineering (Elective-III) (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer FIVE questions.

- 1(a) Explain advantages and limitations of Bio-engineering. How does the relative strength of Bio-engineering and civil engineering techniques varies over time? Explain. 3+3+2
- (b) Differentiate between colluviums and alluviums. Explain about different soil forming factors. 2+6
- 2(a) Explain in brief the method of severity analysis of site. 8
- (b) What do you mean by plant propagation? Describe the method of propagation of bamboo used in bioengineering technique. 2+6
- 3(a) Define crib wall and its application in Bio-engineering? How do you construct crib wall? How can crib wall be integrated with bioengineering techniques? 2+4+2
- (b) Explain Hydraulic role of plant on slope stabilization and erosion control. 8
- 4(a) Explain the function, site and construction step of jute netting in bioengineering. 8
- (b) Explain the technique of brush layering along with its function. 8
- 5(a) What do you mean by nursery? Explain different activities to be done for preparing plant to leave nursery. 2+6
- (b) What is drought factor? Describe the procedure of selecting plant using drought factor? Give an example. 1+6+1
6. **Write short notes on:** 4×4=16
- (a) Shrub seeding
- (b) Routine and preventive maintenance of bioengineering works
- (c) Factors affecting optimal technique
- (e) Run off related hazard

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Time: 03:00 hrs.

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BEG469RW: Railway Transport Engineering (Elective-II) (*New Course*)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side. Assume suitable data if necessary.

Answer FIVE questions.

- 1(a) What are the disadvantages of Railway transportation compare to road transportation. Explain about the classification of railways. 3+5
- b) Explain about curve resistance and grade resistance. Calculate the maximum permissible load that a BG locomotive with hauling power of 15 tonne to pull on a straight track with rising gradient of 1 in 200 at a speed of 80 km/hr. 4+4
- 2(a) What are the function of the subgrade in railway track. Explain different causes of failure of railway embankment? 4+4
- (b) What are the objectives of Signaling in railway? Explain about different types of signal based on Location. 2+6
- 3(a) Define Marshalling yard and its function. With sketch, explain about flag station and junction station of railways. 4+4
- (b) Calculate the maximum permissible speed on a curve on a Railway route with a maximum sanctioned speed of 130 km/h. The superelevation provided is 50 mm and the transition length is 60 m. Also, the transition length of the curve cannot be increased due to proximity of the yard. 8
- 4(a) What are the requirement of Ideal Rail section? Explain functions of rails. Mention bending of rails on curve. 2+2+4
- (b) A 5° curve diverges from a 3° main curve in the reverse direction in the layout of a broad gauge yard. If the speed on the branch line is restricted to 40km/h, determine the restricted speed on the main line. Assume permissible cant deficiency as 7.5 cm. 8

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Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG469TE: Traffic Engineering Management (Elective-II) (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. The marks allotted for each sub-question is specified along its side. Assume necessary data suitably.

Answer FIVE questions.

1(a) What are the scope of traffic engineering? Explain the various traffic problems in major cities of Kathmandu. 4+4

(b) Derive Green Shield equation. Explain the relationship between speed, flow and density. 4+4

2(a) Twenty-five spot speed observations were taken and were as under (km/hr):

50,40,60,54,45,31,72,58,43,52,46,56,43,65,33,69,34,51,47,41,62,43,55,40,49.

Calculate:

(i) Time mean speed

(ii) Space mean speed and

(iii) Verify the relation between them

(iv) What will be the average density of above traffic stream if the mean headway is 8 sec? 2+2+2+2

(b) What are the methods of conducting speed studies? 8

3(a) Define basic possible and practical capacity. Write down factors affecting capacity. 6

(b) From an in-out survey conducted for a parking area consisting of 30 bags, the initial count was found to be 20. The numbers of vehicles coming in and out of the parking lot at the time interval of 10 minutes are shown in Table below. Find the accumulation, total parking load, average occupancy and efficiency of parking lot. 10

| Time | 10 | 20 | 30 | 40 | 50 | 60 |
|------|----|----|----|----|----|----|
| In | 5 | 8 | 7 | 6 | 7 | 6 |
| Out | 5 | 6 | 8 | 4 | 9 | 8 |

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PURBANCHAL UNIVERSITY

2023

B.E. (Civil)/Eighth Semester/*Final*

Time: 01:30 hrs.

Full Marks: 40 /Pass Marks: 16

BEG456CI: Engineering Professional Practice (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer FOUR questions. Q.N. (5) is compulsory.

4×10=40

1a) Define profession, professionalism, ethics and moral. Explain the role of engineering society in development of Nepal.

(b) Enlist the code of conduct for professional engineer enacted in Nepal. Describe the governing roles of NEC.

2(a) Explain different types of contract used in engineering construction and consulting services.

(b) Explain the different elements of contract.

3(a) Why job description is important? Enunciate the job description of civil engineering working under DUDBC.

(b) Explain in detail about trademarks, copyrights and patent rights.

4(a) What is prequalification and post-qualification? What are the key differences between bid bond and performance bond?

(b) Differentiate tort liability and vicarious liability.

5. A number of cracks, structural as well as settlement appeared in a building designed by an engineer within two years of its completion. Municipality had approved the design and drawing. Later it is found that without any soil investigation, structural design and detailing of reinforcement report had been prepared during the construction of the building. The consultant was good friend of contractor. Being a member of Probe Team, what is your judgment on the failure of this building?

10

Discuss the position of the house owner.

The engineer's role.

The role of the Municipality.

