

Total number of printed pages – 7 **B. Tech**
CPEV 8202

Fourth Semester Examination – 2008

**PRINCIPLE OF CIVIL AND ENVIRONMENTAL
ENGINEERING – II**

Full Marks – 70

Time : 3 Hours



*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*

1. Briefly answer the following questions : 2×10
- (i) Give the relation between void ratio and porosity.
 - (ii) What do you mean by Liquid limit and plastic limit of soil ?

- (iii) Discuss how the coefficient of permeability is related in the Darcy's Law ?
- (iv) Plot the relation of dry density with water content in a standard proctor test ?
- (v) What are the difference between working stress method and limit state method of RCC design ?
- (vi) Explain what is development length ?
- (vii) Define critical neutral axis.
- (viii) What will be the saturation concentration of Oxygen in water at 20°C at 1 atm if the Henry's Law constant is 4.01×10^4 atm / mole ?
- (ix) What is open system and closed system in the material balance ? Explain with help of sketches.

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- (x) Explain noise pollution with two examples.
Discuss how much noise the produce ?

2. (a) Sketch the grain size distribution curves for uniformly graded soil. What do you mean by effective size, uniformity coefficient and coefficient of curvature. 6

- (b) Discuss the procedure of constant head permeability test with the help of a diagram. 4

3. (a) An undisturbed soil sample 25 mm thick consolidated 50% in 20 minutes, when tested in laboratory with drainage allowed at top and bottom. The soil layer, from which the sample was obtained, is 4 m

thick in the field. How much time will it take to consolidate 5% with double drainage ?

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- (b) A cylinder of soil fails under an axial vertical stress of 15 tonnes/m² when it is laterally unconfined. The failure plane makes an angle of 50° with the horizontal. Calculate the values of cohesion and angle of internal friction of soil. 5

4. Design a simply supported beam having a clear span of 6 m and supported on walls having 300 mm thickness. The beam is loaded with a uniformly distributed load of 20KN/m throughout the span. Use M20 grade of concrete and

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Fe 415 grade of steel. The cover of reinforcement is 30 mm. Assume any other data necessary. 10

5. (a) Distinguish between under reinforced, over reinforced and balanced section with the help of diagrams. 6

(b) What do you mean by the following terms? 4

(i) Grades of concrete

(ii) Effective span

(iii) Effective depth

(iv) Cover in the reinforcement.

6. (a) An industry discharges its treated effluent with a flow rate of $1 \text{ m}^3/\text{sec}$ into a river of flow rate $250 \text{ m}^3/\text{sec}$. If the BOD concentration of the river background is

1.5 mg/L , determine the maximum BOD of the effluent discharge if the BOD of the river should not be greater than 1.7 mg/L .

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(b) Derive the equations of first order and second order reaction kinetics. (show the diagrams.) 6

7. Answer within *three to four* sentences :

2.5×4

(i) Which gases are responsible for ozone layer depletion and from where they are generated ?

(ii) Name important air pollution control equipments.

(iii) List important green house gases and discuss their sources.

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(iv) What are the major sources of thermal pollution in rivers ?

8. Write short notes on the following (any four) :

2.5 × 4

(i) Safe bearing capacity

(ii) Active and passive earth pressure

(iii) Sustainable development

(iv) Green house effect

(v) Composition of Solid waste.

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