b) Derive the relation between shrinkage limit, void ratio and specific gravity   05

c) The plastic limit of soil is 25% and its plasticity index is 8% when the soil is dried from its   10
state at plastic limit the volume change is 25% of its volume at plastic limit .Similarly the
corresponding volume change from liquid limit to dry state is 34% of its volume at liquid limit
find shrinkage limit and shrinkage ratio.

4. a) Define Darcy's law and derive the expression for finding coefficient of permeability for   05
stratified soil deposits in vertical direction.

b) A well is fully penetrated into a 16 m thick layer of sand which is underline by a rock layer   10
water is pumped out of the well at constant rate of 450000 litre per hour .The water level in
two observation wells situated at 15m and 30m from the test well are found to be 3.7 m and
2.6 m respectively below the ground level. Find the Coefficient of permeability of the soil and
also calculate the radius of influence of the test well and the drawdown in the test well.

c) List out the uses of flow net .Given a flow net of cofferDam Foundation has 6 flow channels   05
and 18 equipotential drops.The head of water lost during seepage is 6 m. If the coefficient of
permeability of foundation is 4×10^{-5} m/min ,Then the seepage loss per metre length of dam
will be

5. a) A layer of saturated clay 4 m thick overlain by a sand layer 5m Deep. The water table is 3 m   10
below the surface. The saturated unit weight of clay is 19kN/m³ and saturated unit weight of
sand is 20kN/m³ and bulk density of sand above the water table is 17kN/m³. If a 4 m Deep
sand layer of density=20kN/m³ is placed over the surface, find the effective stress at the centre
of the clay layer (i) Immediately after the fill has been placed.
(ii)Many years after the fill has been placed. Also draw the pressure distribution diagrams for
total , neutral and effective stress after a long run.

b) A falling head permeability test was carried out on a 15 cm long sample of silty clay. The   05
diameter of the sample and stand pipe were 9.8 cm and 0.75cm respectively. The water level
in the stand pipe was observed to fall from 60 cm to 45cm in 12 minutes. Find (i) Coefficient
of permeability in meter/ day (ii) Height of water level in stand pipe after 20 minutes.

c) Explain briefly different types of seepage failures on hydraulic structures along with their   05
prevention measures

6. a) The results of an IS Standard Proctor Test are as follows: 10

Trial No.	1	2	3	4	5
Moisture content (%)	10	12	14.3	16.1	18.2
mass of mould +wet soil(g)	2925	3095	3150	3125	3070

volume of mould=1000ml ,mass of mould=1000g. The specific gravity of the soil particle is
2.65. Plot the following: a) moisture content - dry density curve, b) zero air voids curve and c)
80% saturation line. Determine the optimum moisture content and the corresponding
maximum dry density d) Also find the degree of saturation at OMC.

b) explain the effect of compaction on engineering properties of soil   05

c) what is Undisturbed and disturbed samples explain any two design features required for   05
getting Undisturbed sample

****
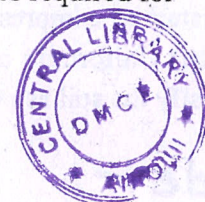
E (CIVIL) | SEM - V | TE) R-19 cscheme | 11/6/25.

(Time: 3 Hours)   [Total Marks: 80]

Note: i.   Q. No. 1 is **compulsory**
        ii. Attempt **any 3** out of remaining 5

1.   Solve any four   (20 M)
   A.   Discuss on disadvantages of Roadways, Railways and Airways.
   B.   Explain various surveys related to highways.
   C.   Explain O&D study
   D.   Compare rigid and flexible pavement and draw neat sketch of both pavements showing each layer.
   E.   Write a note on Soil Stabilisation.
   F.   Explain development of pothole in rigid pavement.

2. A.   Write a note on: (10 M)
        i.   Level of service
        ii.   Types of Conflict points at four-legged intersection.

   B.   Solve the following: (10 M)
        i.   Draw layout of an airport with two intersecting runways and mention the purpose of each element of airport.
        ii.   Draw layout of artificial Harbour and mention the purpose of each element.

3. A.   What is camber? What are its types? Find out the amount of camber to be provided on a 4-lane   (10 M)
        divided State Highway.
   B.   Explain Lane distribution factor. Also find Million standard axle (msa) for construction of a two- (10 M)
        lane road having initial traffic 600 cvpd in both directions. Rate of growth is 7.5 %, VDF is 3,
        construction period is 2 years & Design period is 20 years.

4. A.   Write a note on: (10 M)
        i.   Types of traffic signals
        ii.   Road markings
   B.   Explain stepwise procedure for construction of Bituminous concrete pavement.   (10 M)

5. A.   Discuss on Super elevation and Negative super elevation. Also, If a 5^0 curve diverges from a 3^0 (10 M)
        main curve in reverse direction in a layout of B.G yard. If speed on Branch line is 40 kmph, find
        the speed of Main line.
   B.   Write a note on: (10 M)
        i.   Highway drainage.
        ii.   Types of Harbors

6. A.   Enlist different tests carried out in Transportation Engineering Laboratory and explain any one in   (10 M)
        detail.
   B.   Solve the following: (10 M)
        i.   Write a note on Water Bound Macadam road.
        ii.   Find out the stress due to wheel load 5100 kg. Take E = 3 x 10^5 kg/cm^2, h = 18 cm, μ
              = 0.15, k = 6 kg/cm^3, a = 15 cm.

Q.P. CODE:-
86342   **Page 1 of 1**   Program Code

1T00635.