

## Q.P.Code : 26543

(3 Hours)

Total Marks: 80

**N.B:Question No 1 is compulsory.**

**Attempt Any 3 out of remaining 5 questions.**

**Assume any suitable data wherever required.**

**Q.1 Attempt Any Four :(Each sub-question carries 05 marks) (20)**

- What are the desirable properties of sub grade soil?
- Mention step by step procedure of Marshall Stability method of bituminous mix design.
- What is the difference between the modulus of elasticity & resilient modulus of material?
- Explain the Significance of soil stabilization.
- How does the grading of aggregates affect the performance of pavement?

**Q.2 (20)**

- A longitudinal channel with trapezoidal cross- section is to be constructed with a longitudinal slope 1 in 2500. The type of soil is clay.  $N=0.024$ , Max. allowable velocity is 0.6m/s. Design channel for discharge of  $3\text{m}^3/\text{sec}$ . Assume  $n=2$ . 10
- Write short notes on: 1) Significance of Drainage system. 10  
2) Design procedure on side drains.

**Q.3 (20)**

- Design the filter media based on permeability ratio & piping ratio. The Subgrade gradation is given in table. Assume that drain pipe has a circular perforated hole of 10mm diameter. 15

Sieve size(mm)	% passing
1.18	95
0.425	85
0.300	60
0.150	50
0.075	14
0.053	05

- How do highway pavement differ from Airport pavement? 05

**Q.4 (20)**

- Discuss the salient engineering characteristics of soil influencing the performance of road. 10
- Enlist and explain the factors affecting gravitational water. 10

**Q.5 (20)**

- Write short notes on Density void Analysis. 05
- A clay layer 4m thick has a final settlement of 6cm. The layer has single drainage if the co eff. of consolidation is  $0.02\text{cm}^2/\text{min}$ . Determine the time required for different % of consolidation from 10% to 90%. 15

**Q.6 (20)** Following are Marshall test results for 5 specimens. Find optimum bitumen content of themix.

Bitumen content	Stability (kg)	Flow (units)	Vv (%)	VFB (%)	Gm
3	499.4	9.0	15.5	34	2.17
4	717.3	9.6	7.2	65	2.21
5	812.7	12.0	3.9	84	2.26
6	767.3	14.8	2.4	91	2.23
7	662.8	19.5	.1.9	93	2.18