

Birla Institute of Technology & Science, Pilani- Pilani Campus

Second Semester 2021-2022

Mid Semester Exam

Course No: CE G570

Nature of Exam: Closed Book

Duration: 90 Min

Course Title: Highway Cons. Tech.

Max. Marks: 50 (Weightage: 30%)

Date of Exam: 14/03/2023

Note:

1. All questions are compulsory.
 2. Figures to the right indicate full marks
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Q. 1	Explain the applications of following geosynthetic materials in Transportation Engineering. a) Geomembrane (5) b) Geocell (3) c) Geotextile (4)
Q. 2	Write the justification for: a) Lower target density for compaction of embankment constructed with expansive clay (2) b) Lower density of embankment made with fly ash. (2) c) Need of pulverization for construction of bound sub-base. (2)
Q. 3	Explain the advantages of open graded friction course. (4)
Q. 4	The surface dressing has to be provided on an existing lean bituminous surface having a movement of 1600 vehicles per lane per day. The existing road was present in a region where weather is neither too hot nor too cold. The cubical aggregates having 50% flakiness index and 16 mm median size are used for construction. The vehicles are moving at slow speed on existing road surface having +4% gradient. Estimate the quantity of aggregate and binder (viscosity grade and bituminous emulsion) required for construction of surface dressing. The bitumen content in emulsion is 65%. The charts and Tables are provided at the end of question paper [10].
Q. 5	Write the difference between bituminous macadam and stone mastic asphalt. (6)
Q. 6	Write the justification for: a) Sand Equivalent value of the fine aggregate used in bituminous concrete mix shall not be less than 50 (2) b) Use of bitumen rich DBM bottom layer (2) c) Higher initial cost of stone mastic asphalt (3) d) Improvement in moisture resistance of bituminous mix due to addition of hydrated lime. (2) e) Improvement in moisture resistance due to use of gap graded mix with rubberized bitumen. (3)

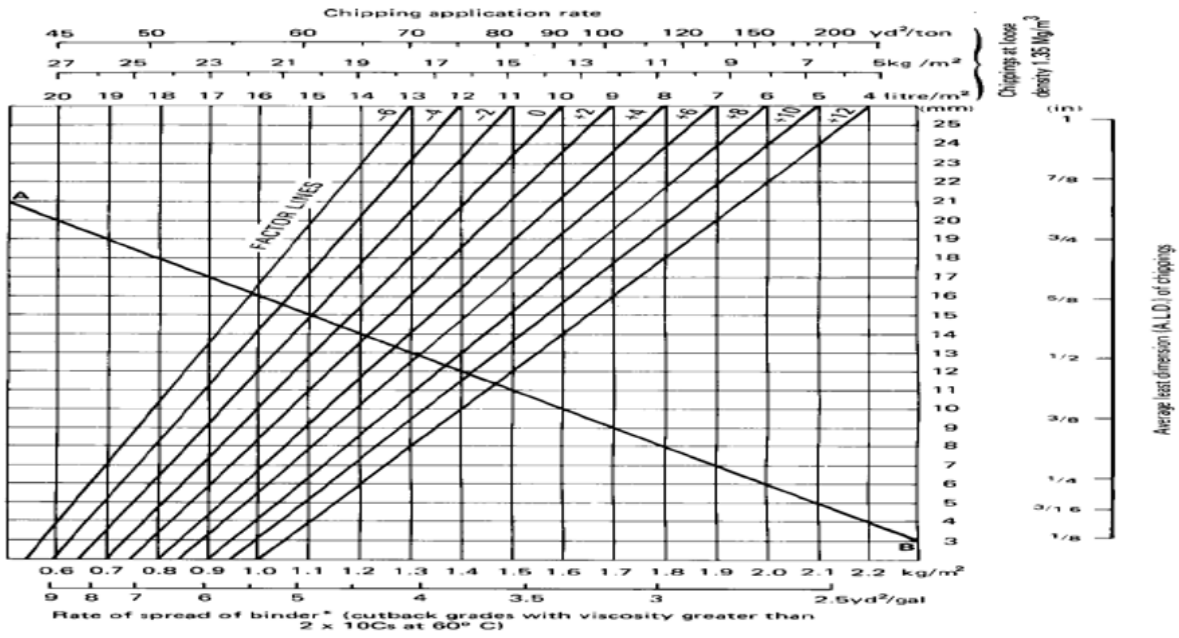


Fig. 14 Surface dressing design chart

- *1 For slow traffic or climbing grades steeper than 3 per cent, reduce the rate of spread of binder by 10 per cent
- 2. For fast traffic or down grades steeper than 3 per cent increase the rate of spread of binder by 10 to 20 per cent

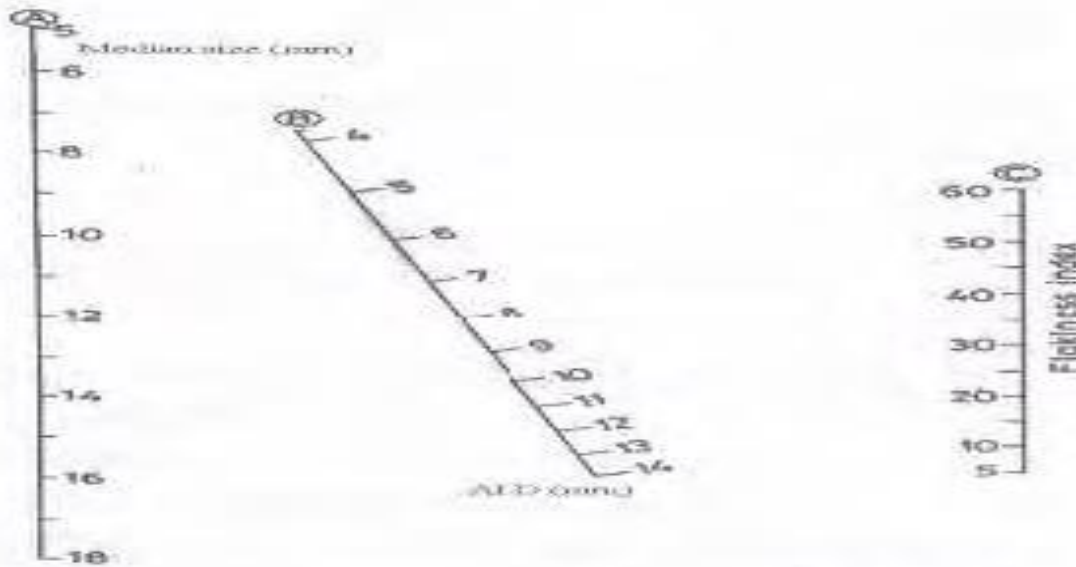


Fig. A 3 Nomograph for determination of ALD

(i) Volume of Traffic

	Vehicles/lane/day (Un laden weight greater than 15 kN)	Factor
Very light	0-50	+3
Light	50-250	+1
Medium	250-500	0
Medium-heavy	500-1500	-1
Heavy	1500-3000	-3
Very heavy	3000+	-5

(ii) Condition of Existing Surface

	Factor
Untreated or primed base	+6
Very lean bituminous	+4
Lean bituminous	0
Average bituminous	-1
Very rich bituminous	-3

(iii) Climate Conditions

	Factor
Wet and cold	+2
Tropical (wet and hot)	+1
Temperate	0
Semi-arid (hot and dry)	-1
Arid (very dry and very hot)	-2

(iv) Type of Aggregates

	Factor
Round/dusty	+2
Cubical	0
Flaky	-2
Pre-coated	-2