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Family Name	
Given Names	
Student Number	
Teaching Period	Semester 1, 2017

FINAL EXAMINATION	DURATION
ENG412 – Road and Traffic Engineering	Reading Time: 10 minutes
	Writing Time: 120 minutes

INSTRUCTIONS TO CANDIDATES

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a CLOSED BOOK examination

Any non-programmable calculator is permitted

No handwritten notes are permitted

No dictionaries are permitted

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
No additional printed material is permitted	1 x 16 Page Book 1 x Scrap Paper Formula Sheet/s

**THIS EXAMINATION IS PRINTED
DOUBLE-SIDED.**

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SECTION A (Each question worth 4 Marks)

Attempt all questions.

1. Discuss the use of the C.B.R. value in the design of pavement.
2. Discuss some of the defects you will encounter in maintenance of roads.
3. What is the use of a grader and a scraper in the construction of road?
4. Briefly explain the Marshall test. Discuss the use of the test.
5. Outline three methods by which the viscosity of bitumen can be reduced to facilitate its application.
6. Discuss the functions of a primer in bituminous surfacing.
8. A drainage system is an important part of any road. Discuss its functions.
9. Explain the concept of “equivalent standard axle”.
10. List the pre-construction activities which will be necessary for a new road deviation in a rural area.

SECTION B (Each question is worth 15 Marks)

Attempt all questions

1.

Calculate the design traffic for the following case:

Nature of road – Dual carriageway urban freeway

AADT (Year) – 18,000 (5years ago)

Percent HV – 6%

Growth rate – 4%

Design period in years – 20

Assume 50/50 split and urban arterial

Assume each direction of flow has 2 lanes and 70% of heavy vehicles carried by heavy vehicle lane.

Given: $g = 1.2$, $ESA = 1.8$, $CGF = 30$

$ESA/day = (AADT \times DF) \times (\%HV/100) \times LDF \times (ESA \text{ per HV})$

$N_{DT} = ESA/day \times 365 \times CGF$

2.

(a) Given ALD of 10mm and a daily traffic volume of 300 vehicles determine the application rate of nominal 20 mm aggregate and residual bitumen for single application seal. The aggregate is rounded river gravel.

Given $V_a = +0.01$, $V_i = -0.01$ and $V_f = 0.185$.

(b) Design a pavement is to be designed for a road with design traffic of 9×10^5 ESA and subgrade modulus 50MPa (CBR 5). Available materials are a base of CBR 80 and a sub-base of CBR 20.

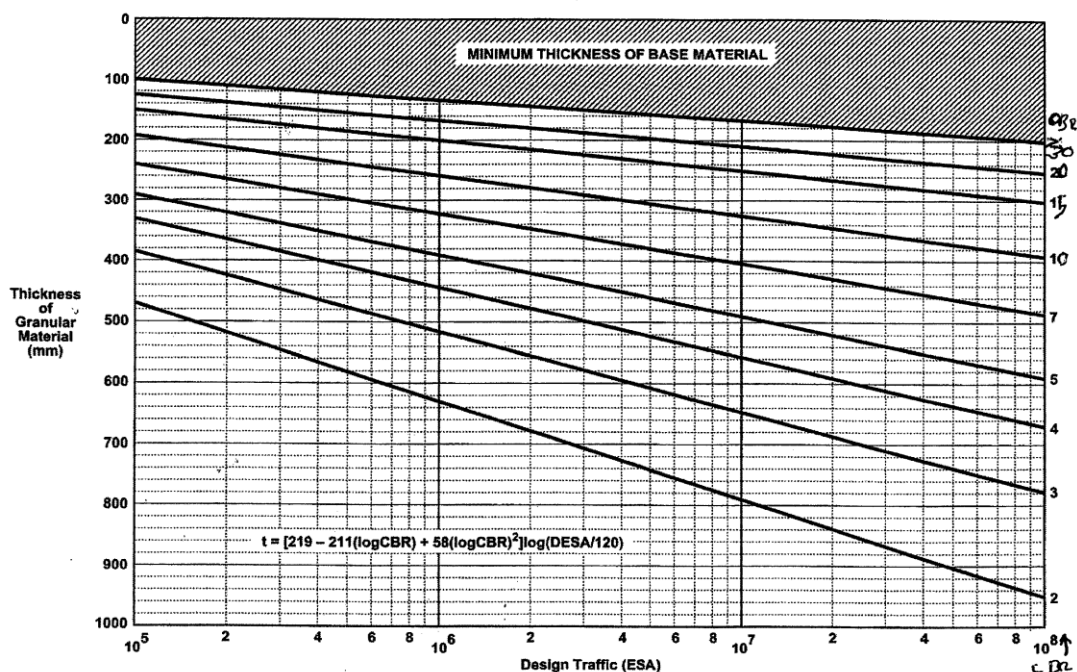


Chart from Ausroad Manual

3.

A certain grading of aggregates is available to you for the roads in a new residential sub division. You are to use graphical method of aggregate blending to get the specified grading of the aggregate. Discuss the steps in aggregate blending to arrive at the desired grading.

4.

(a) Compaction is a mechanical process in which the particles of a material are rearranged or packed to reduce air voids, thus increasing the density of the material. In general, greater the compaction, the stronger the material.

1. Discuss the factors that affect compaction
2. Discuss the different kind of machinery you can use to achieve the compaction desired.

(b) Discuss the steps involved in maintenance planning to ensure best value for the limited funds available is achieved.