



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017**

COURSE NAME : HIGHWAY TECHNOLOGY AND TRAFFIC MANAGEMENT

COURSE CODE : BNP20303

PROGRAMME CODE : BNA/ BNB/ BNC

EXAMINATION DATE : JUNE 2017

DURATION : 3 HOURS

INSTRUCTION : ANSWER **THREE (3)** QUESTIONS FROM **PART A** AND **TWO (2)** QUESTIONS FROM **PART B**

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

PART A

- Q1** (a) The alignment of the highway will pass through stiff clay or dense sand with CBR value > 15 .
- (i) Evaluate the benefit that will be taken from this condition (4 marks)
 - (ii) In the condition where the road should pass through the peat problematic soil, describe your solution. (3 marks)
- (b) Answer the following :
- (i) Differentiate the CBR and AIV value. (3 marks)
 - (ii) Describe **THREE (3)** functions of geotextile and sketch the position in flexible pavements. (3 marks)
- (c) In the construction of asphalt concrete (AC) as parts of flexible pavement :
- (i) Differentiate the function of binder coarse and wearing coarse (4 marks)
 - (ii) List **FOUR (4)** specifications of bitumen. (2 marks)
- Q2** (a) Distinguish the function of dowell and tie bar in rigid pavement. (5 marks)
- (b) Evaluate the difference between AASHTO 1993 and JKR 2013 method (5 marks)
- (c) Explain the important factor of humidity in rigid and flexible pavement (5 marks)
- (d) Explain the following terms :
- (i) Equivalent Single Axle Load (ESAL)
 - (ii) Initial Present Serviceability Index (PSI_i)
 - (iii) Resilient modulus of asphalt concrete (M_R)
 - (iv) Reliability (R)
 - (iv) Load transfer coefficient.
- (5 marks)

- Q3** (a) In construction of wearing course,
- (i) Elaborate the process in AMP to obtain asphalt concrete (2 marks)
 - (ii) List down the construction sequenches of wearing course. (2 marks)
- (b) With the aid of a sketch,
- (i) Explain each **one (1)** necessary tests to control the quality of flexible pavement construction: **subgrade, subbase, base, binder and wearing coarse.** (3 marks)
 - (ii) Arrange the steps to construct rigid pavement. (2 marks)
- (c) In construction of subgrade :
- (i) In what condition the capping layer should be applied ? (2 marks)
 - (ii) One of the quality control of subgrade and subbase or base coarse is Field density test, Formulate how to correlate field density, optimum moisture content and CBR value. (4 marks)
- (d) Suppose you are a Project Manager of the Contractor company to construct highway of flexible pavement from A to B (50 km away). Based on the fundamental concept of construction management which requires at least 5 m (man,material, machine, method, money), set-up the gant chart and schedule of heavy equipment. (5 marks)
- Q4** (a) In Pavement Management System,
- (i) Define PSI and PCI (2 marks)
 - (ii) Discuss the structural and functional evaluation in Pavement management syatem. (3 marks)
- (b) Differentiate non destructive and destructive tests in structural evaluation of pavement. (5 marks)

- (c) Pavement condition survey is used to obtain pavement rating to determine Pavement Condition Index (PCI) as mentioned in ASTM 6433-07. Set-up the procedure to determine PCI. (4 marks)

- (d) Pavement Distress is usually caused by traffic loading, temperature, moisture or sub-gred movement. Discuss why the following defects occur and discuss the repairs to be done. (6 marks)
 - (i) Crocodile cracks
 - (ii) Corrugation

PART B

- Q5**
- (a) Differentiate between Transportation System Management (TSM) and Transportation Demand Management (TDM). (4 marks)

 - (b) Identify **FOUR (4)** examples of the TDM to enhance the flow of vehicle mobility. (4 marks)

 - (c) Explain what is Integrated Transport Information System (ITIS), name **TWO (2)** examples of ITIS implementation. (4 marks)

 - (d) Fill in the blank of the **Table Q(5)**, each **ONE (1)** objective and **TWO (2)** techniques of Traffic Management.

Table Q(5) : Objectives and Technique of Traffic Management

Category	Objectives	Techniques
Capacity improvement		
Priority allocation		
Restraint		

(6 marks)

- (e) Parking and Pedestrian are integral parts of Transport Management, elaborate why this is important, summarize **TWO (2)** reasons each. (2 marks)

- Q6** (a) Briefly explain **THREE (3)** warrants before come to a decision to install signal control. (4 marks)
- (b) Explain **FOUR (4)** principle ways of safe of intersection design. (4 marks)
- (c) Select the most effective ways of ITS to reduce traffic accident in Kluang - Bt pahat road network (4 marks)
- (d) Explain Intelligent Traffic Managemnt System (4 marks)
- Q7** (a) Elaborate **TWO (2)** impacts of water to the following :
- (i) Highway surface. (2 marks)
- (ii) Highway structures. (2 marks)
- (iii) Subgrade soil. (2 marks)
- (b) With the aids of sketches, distinguish the surface, sub-surface and cross drainage. (4 marks)
- (c) With the aids of sketches, compare the following terms of maintenance work in hill roads :
- (i) Slope maintenance
- (ii) Drainage maintenance
- (iii) Sub-surface drainage maintenance
- (iv) Gutter maintenance
- (v) Splash block maintenance (10 marks)
- Q8** (a) The expression of $V = R^2 / (127(e + f))$ is important in geometric design, elaborate each of parameters. (3 marks)

- (b) A vehicle traveling at 80 km/hr wants to overtake a slower vehicle in front. The speed of the oncoming vehicle is 70 km/hr. Calculate the minimum passing sight distance required for this maneuver.
(Assume the acceleration, a is 1.0 m/s^2 , and the speed difference between the faster vehicle and the slower vehicle is 16 km/h).
(7 marks)
- (c) A horizontal curve is designed with a 800 meter radius. The curve has a tangent of 120 m and the PI is at station $202 + 50$. Determine the stationing of PT.
(7 marks)
- (d) Describe the superelevation, horizontal alignment and vertical alignment.
(3 marks)

-END OF QUESTIONS-

FINAL EXAMINATION

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Formula :

$$e = AL/800 ; y_n = 4e(x/L)^2 ; Lx = LP - y_n$$

$$SSD = 0.278 tV + \frac{V^2}{254 \left(f \pm \frac{n}{100} \right)}$$

$$S > L ; M = \frac{L(2S - L)}{8R}$$

$$S < L ; M = \frac{S^2}{8R}$$