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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2021/2022**

COURSE NAME : INFRASTRUCTURE AND TRACK SYSTEM
COURSE CODE : CNR 10203
PROGRAMME CODE : CNR
EXAMINATION DATE : JANUARY / FEBRUARY 2022
DURATION : 3 HOURS
INSTRUCTION : 1. ANSWER **ALL** QUESTIONS
2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **OPEN BOOK**

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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- Q1 (a)** Using the suitable diagram, draw the basic of track components and briefly describe **TWO (2)** functions of each component. (10 marks)
- (b)** Briefly explain **FIVE (5)** requirements of sleepers. (5 marks)
- (c)** There are two different types of fastener known as ballast profile between fish-plated tracks and long welded rail tracks. Briefly explain the differences with aid of diagram. (4 marks)
- (d)** Rail section are divided into several parts such as head, web, foot, fishing angles and height. Label and briefly describe **THREE (3)** parts of rail section which meet the ideal rail section requirements. (6 marks)
- Q2 (a)** Various types of loads are considered for design of bridge structures. These loads and their combinations decide the safety of the bridge construction during its use under all circumstances. Analyze railway bridge live loads based on BS 5400. (6 marks)
- (b)** **Figure 2(b)** show the single span bridge with length and width of 33 m and 10 m respectively.
- (i)** Assume the selfweight of bridge is 30kN/m^2 , analyze the maximum shear force and the bending moment acting on the bridge. (3 marks)
- (ii)** By combining selfweight and RU loading, calculate the maximum shear force and the bending moment acting on the bridge. (4 marks)
- (iii)** By combining selfweight and RL loading, calculate the maximum shear force and the bending moment acting on the bridge. (4 marks)
- (c)** There are several tunneling method have been use in railway construction. In your opinion, suggest **TWO (2)** suitable tunneling methods for station and tracks. Justify **ONE (1)** of the tunneling method suggested. (8 marks)

- Q3** A group of engineers are assigned to plan and develop a new railway station for Kluang District. This is due to the upgrading work for the Gemas-Johor Bahru Double Tracking Project, to be completed in 2022. As a part of the design team, you are assigned to establish the following needs.
- (a) Explain **THREE (3)** types of platform that exist in railway station. (6 marks)
 - (b) Recommend the criteria of good station design. (6 marks)
 - (c) All railway stations are widely used Automated Fare Collection (AFC) for collecting tickets / tokens. Show the operation and equipment used in AFC. (6 marks)
 - (d) Produce the safety features that has been applied at railway station, inside train and track network. (7 marks)
- Q4** The high-speed rail (HSR) project connecting Singapore and Kuala Lumpur had been initiated previously. This proposal will have seven stops in Malaysia, namely Kuala Lumpur, Putrajaya, Seremban, Ayer Keroh, Muar, Batu Pahat and Nusajaya.
- (a) List **TWO (2)** main benefits in terms of social impact due to the proposed development in Batu Pahat. (5 marks)
 - (b) List **THREE (3)** main benefits of this technology to the passenger if compared to other mode of transportation based on the Japanese experience on Shikansen service. (9 marks)
 - (c) There are concern among Malaysian that the high speed rail maybe unsafe. Explain the Santiago de Compostela, Spain high speed train accident in 2013 and how such this incident could be avoided for the future Malaysia high speed rail. (6 marks)
 - (d) List and predict the construction parameters of high-speed rail to ensure smooth, efficient and safe operation at the designated speed. (5 marks)

-END OF QUESTIONS-

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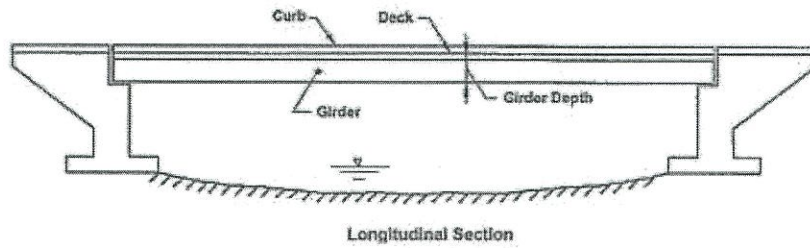


Figure 2(b) : Single Span Bridge