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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

COURSE NAME : RAILWAY MAINTENANCE
COURSE CODE : BNT 42303
PROGRAMME : BNT
TEST DATE : JULY/AUGUST 2023
DURATION : 3 HOURS
INSTRUCTION :
1. ANSWER **FOUR (4)** FROM **FIVE (5)** QUESTIONS
2. THIS TEST IS CONDUCTED VIA **CLOSED BOOK.**
3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

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- Q1** A land-based transport system that is fixed to a specific route and carries both passengers and cargo in specialized containers can be referred to as a railway. This system is powered by high-capacity traction mechanisms and governed by safety systems with a high level of reliability.
- (a) List **THREE (3)** Objectives of railway maintenance. (3 marks)
- (b) Categories **FOUR (4)** type of railway maintenance programs in maintenance action plan (12 marks)
- (c) Debate the elements of effective maintenance management as listed below
- (i) maintenance policy, (3 marks)
- (ii) work order system, and (3 marks)
- (iii) job planning. (4 marks)
- Q2** To ensure a dependable and secure railway service, it is crucial to maintain the equipment in good working condition, and regular maintenance is a necessary component to accomplish this goal.
- (a) Describe the function of Systems Assurance in ensuring safety, reliability, and compliance in railway operations. (4 marks)
- (b) Debate the best practices for Reliability, Availability, Maintainability, and Safety (RAMS) regarding Systems Assurance in the rail industry. (10 marks)
- (c) Justify strategies can railway operators adopt to optimize the cost and performance of their asset management activities, given the challenge of balancing maintenance of aging infrastructure with investments in new assets such as upgraded rolling stock. Use **Figure Q2 (c)** for your reference. (11 marks)

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- Q3** (a) Analyse the differences between Critical Path Method (CPM) and Project Evaluation and Review Technique (PERT).
(6 marks)
- (b) A railway Maintenance, Repair, and Overhaul (MRO) firm is tendering for a significant restoration project on a railway line. The project encompasses a range of activities as listed in **Table Q3**. By using CPM Precedence Method;
- (i) Diagram the Project Network
(6 marks)
- (ii) Determine the Total Project Completion Time Using a Backward Pass
(5 marks)
- (iii) Determine the slack for each Activity.
(5 marks)
- (iv) The Critical Path
(3 marks)
- Q4** (a) An aging railway tunnel needs repairs to maintain its structural integrity and ensure the safety of passengers, railway workers, and the public. However, the tunnel is a critical part of the rail network and shutting it down for repairs could have significant impacts on rail service and the wider transportation network. As the manager of the railway company, you are tasked with developing a strategy to address the situation while minimizing disruptions to rail service and ensuring the safety of all stakeholders. List and debate of measures you will implement to maintain uninterrupted rail service while ensuring the safety of passengers, railway workers, and the public.
(16 marks)
- (b) Using appropriate diagram structure explain **THREE (3)** railway infrastructure management functions.
(9 marks)

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- Q5** The Railway Safety guideline aims to offer accredited rail transport operators, as well as those seeking accreditation, direction on developing a safety management system that meets the legal requirements set forth by legislation.
- (a) Define and provide examples of the types of railway incidents below.
- (i) Accident. (2 marks)
 - (ii) Event. (2 marks)
 - (iii) Failure (2 marks)
- (b) Give **TWO (2)** examples of each of causes of accidents in the following classifications.
- (i) Railway infrastructure, (2 marks)
 - (ii) Rolling stock, (2 marks)
 - (iii) Operation, (2 marks)
 - (iv) External causes. (2 marks)
- (c) Discuss and explain the steps involved in an appropriate and robust management of change and safety validation process involved in railway safety risk change. (11 marks)

END OF QUESTIONS

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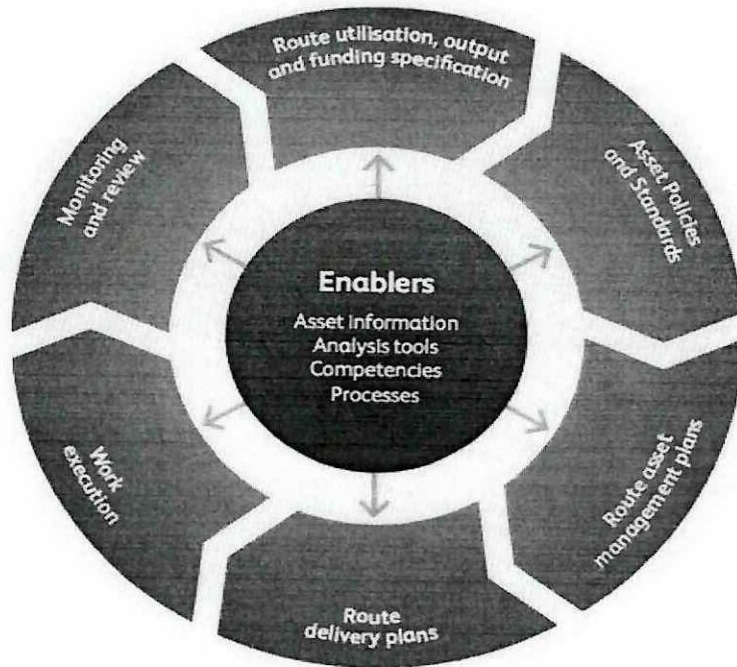


Figure Q2(c)

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Table Q3

| Activity | Immediate Predecessor | Duration (Weeks) |
|----------|-----------------------|------------------|
| A | — | 6 |
| B | — | 8 |
| C | A | 8 |
| D | — | 12 |
| E | C | 6 |
| F | D | 6 |
| G | F | 3 |
| H | B | 4 |
| I | H | 7 |
| End | E,G,I | |

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