

**MASTER OF CONSTRUCTION ENGINEERING 4<sup>th</sup> SEM. EXAMINATION, 2017**

**Repair & Retrofitting Technique – II**

Times : Three hours

Part -I

Full Marks : 100

Answer any **two questions**. Explain your answer with **neat sketches** as necessary

1.
  - a) Distinguish between **Repair and Retrofitting** of structures in the context of Seismic considerations? 5
  - b) What are the different seismic **Performance levels** of a structure? 4
  - c) What are the different steps to be undertaken for **detailed 'Seismic Evaluation'** of existing building structures? 6
  - d) Discuss on **global seismic retrofit strategies** of multi-storied R.C.C buildings. 10
  
2.
  - a) Discuss on the different aspects of **seismic disaster mitigation**. 5
  - b) How does seismic **base isolation** reduce damage and discuss on the design principle of seismic isolation in the context of **force displacement trade-off**? 8
  - c) Compare critically between **base isolation and conventional retrofitting** technique of buildings. Indicate **short & long term** benefits and goal of base isolation. 7
  - d) Discuss on the issues of **practical limitation, suitability** of application, **constructability and design** aspect of base isolation retrofitting technique. 5
  
3.
  - a) Discuss '**Non-Linear Static Analysis**' for Seismic evaluation of a building indicating its **objectives** in the context of **seismic retrofitting** of structure?  
What are the expected outcomes of the analysis? 12
  - b) Discuss **Capacity, Demand spectrum** and **performance point** of Push-Over Analysis of a structure. 6
  - c) Discuss '**Re-pointing Technique**' for retrofitting of **brick masonry walls**. 7

Answer any two questions.

**PART - II**

Assume relevant data wherever required with justification.

Q-1. Design a flexible road pavement for a stretch of National Highway passing through Kharagpur in West Bengal with an initial traffic of 2500 CVPD having a subgrade CBR of 4%. Find out the crust thickness of pavement indicating materials and modulus of constituent layers. Find out the remaining life of pavement against cracking if the modulus of bituminous base becomes half of its design value. Assume tyre pressure as 0.7 MPa. (25)

Q-2. (a) Describe fatigue failure in concrete pavement as explained in IRC-58-2015. (10)

(b) Why Deflectometer is considered as a more reliable tool for condition monitoring of bituminous as well as concrete road pavement. (15)

Q-3. (a) Define Roughness index. Describe the specification of Roughness index for different types of pavement surface. (6)

(b) Explain the minimum strength requirement of PQC for high volume and low volume roads with reasons. (7)

© Write notes on (i) Cement stabilized subbase (ii) Debonding layer (ii) RAP (4 x 3)

