M. E. CONSTRUCTION ENGINEERING 2ᴺᴰ YEAR 1ˢᵀ SEMESTER - 2023

SUBJECT: Design of structure with special emphasis for Repair & Retrofitting.

Time : Three Hours   **Full Marks : 100**

Use a separate Answer-Script for each part

Part - I (Marks : 50)

Answer all

6+(4X6)=30

1.A) Why retrofit design is required for a structure ?

B) A proposed (G+5) storied 'Burn Unit' in a Govt Hospital , after construction of (G+3) floor was found to be design deficient in column, beam and slab. The construction was stopped and retrofit measures were requested for. Give basic methods of Retrofit Measures With (Pencil) Sketches in your way of column, beam and slab.

20

2. A R.C.C building was constructed during early eighties. Severe distresses were observed recently in structural members . As per reliable data and further investigations, following data were collected.
Original size of column: 400 X 550Sq mm
After deterioration , size =350X500 Sqmm

Initial
Grade of concrete =M20
Grade of steel-Fe 415

After NDT
Grade of concrete =M15
Grade of steel-Fe415
The owner is interested to get it ready through retrofit design. Design(Retrofit) the column with above data. Assume any suitable data **NOT** given.

Ref. No.PG /CT /T/213B/2024

M. E. CONSTRUCTION ENGINEERING 2ND YEAR 1ST SEMESTER - 2023

SUBJECT: Design of structure with special emphasis for Repair & Retrofitting.

Time : Three Hours   Full Marks : 100

Use a separate Answer-Script for each part

Part - II (Marks : 50)

Question No.		Marks
	Answer any two	
Q1.	A reinforced concrete rectangular simply supported beam of span 4.5 m is spaced @ 3.5 m apart. The thickness of beam including 110 mm thick slab is 450 mm. Thickness of floor finish is 75 mm. The beam was designed to carry live load of intensity 2.5 KN/m^2. It is to be strengthened to carry live load of 6 KN/m^2. Develop a suitable retrofitting scheme using CFRP. Thickness of beam is 300 mm.	25

Grade of conc.:   M 30

Grade of reinf.:   Fe 500

Main reinf.:   3 nos. 20 T.

Shear reinf.   8 T @ 150 C/C

Clear cover: 30 mm

Properties of CFRP:

Properties of   CFRP

Thickness per ply	0.32
f^*_{fu} =	1200.00 N/mm^2
ε^*_{fu} =	0.021 mm/mm
Efu =	100.00 KN/mm^2

Question No.		Marks
Q2.	Using the data given in question 1 above, develop a suitable scheme for shear strengthening of the beam if the beam has to carry live load of intensity 8.5 KN/m^2.	25
Q3.	A RCC Column over a RCC footing is to be strengthened for the requirements given below:	25

Size of Column: 300 mm x 300 mm

Existing Load: 300 KN

Proposed Load: 500 KN

Original size of Footing : 2250 mm x 2250 mm

Original thickness of Footing: 300 mm

M. E. CONSTRUCTION ENGINEERING 2ND YEAR 1ST SEMESTER - 2023

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Time : Three Hours   Full Marks : 100

Use a separate Answer-Script for each part

Part - II (Marks : 50)

	Question No.		Marks
		Grade of Concrete : M 25	
		Grade of Reinf.: Fe 500	
		Allowable bearing pressure: 80 KN/m^2	
		Reinforcement in the existing footing: 12 T @ 125 C/C both ways.	