4. How do you plan renovation of a building destroyed in fire. Explain with the case study of Vigyan Bhawan, New Delhi or any other similar case study. **15**

Unit III

5. An appraisal of two alternative renovation projects is being carried out. Given the following cas flow, calculate the most economical plan using present value analysis. Use i = 10% per year. **15**

	Project A	**Project B**
Initial investment	70,000	80,000
Yearly operating cost	15,000	10,000
Major maintenance (every 3 years)	5,000	3,000
Yearly revenue	20,000	25,000
Life	4 Years	4 Years

6. (a) A contractor has been awarded to do a renovation project that requires procurement of equipment. Two brands A and B are available to perform the job.

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M. Tech. EXAMINATION, May 2019

(Second Semester)

(C. Scheme) (Main Only)

CONSTRUCTION & REAL ESTATE MANAGEMENT

MCRM604C

Renovation and Reconstruction

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All

questions carry equal marks. Calculator may used for attempting numerical questions. Illustrations may be used wherever applicable.

Unit I

1. (a) Any building (including its services) when built has certain objectives and during its total economic life, it has to be maintained in proper condition to meet those objectives. In the light of this statement discuss types of maintenance with examples as given in the National Building Code of India 2016.

(b) Discuss Model-I of deterioration of Reinforced Cement Concrete (RCC) as given by the CPWD handbook on repair and rehabilitation of RCC buildings. What is capillary porosity of concrete ?

7½+7½=15

2. (a) What are the objectives of condition survey of a building structure ? Explain types of foundation failures and it will come under which class of five classes ('Class 0' to 'Class 4') of damages as given by CPWD hadbook on repair and rehabilitation of RCC buildings.

(b) Illustrate with sketches Non-Destructive Evaluation (NDE) test to determine in-situ corrosion potential assessment given by the CPWD handbook on repair and rehabilitation of RCC buildings ?**7½+7½**

Unit II

3. Write short notes on any *three* of the following repair methods :

(a) Underpinning

(b) Dry mix and Wet mix Shotcrete

(c) Fibre wrap technique

(d) Chemical and Electro-chemical Methods of Repair **5+5+5=15**

(ii) Replace the tarfelt water proofing treatment with UV ray and abrasion resistant thin water proofing polymeric membrane after cleaning surface and preparing the same by filling the depressions, preparing slopes of valley drains, etc.

(iii) North light windows to be treated with silicon sealants.

(iv) Provide a remodeled and improved the expansion joint.

(c) The repairs to be done as under :

(i) Existing tarfelt treatment to be removed and roof surface to be cleaned.

(ii) The roof surface to be carefully inspected and all affected area to be marked.

(iii) All fasteners and fittings to be removed and replaced by small size fasteners and fittings.

Brand A requires an investment of INR 400000, while brand B requires an investment of INR 650000. The annual savings generated by brands A and B are given in the Table. Which brand of equipment should the contractor choose if the interest rate is ten per cent ?

Option	1	2	3
Brand A	200000	200000	200000
Brand B	255000	225000	225000

(b) Discuss dismantling sequence and safety precaution in dismantling project of steel building. **15**

Unit IV

7. The structural repairs of RCC is a specialized works primarily involving three stages : **15**

(a) Field investigation and determination of causes and their extent

(b) Identification of repair system, framing of specification and acceptance criteria

(c) Execution of repairs.

The first two stages require higher levels of intellectual inputs from experienced technical personnel (consultants). As project manager, what criteria and respective weightage you would give for short listing of consultants for repair, rehabilitation and retrofitting of RCC buildings ? **15**

8. A single storeyed industrial structure 4.9 m high shutter flnished RCC framed shell structure with 80 mm thick shell roof (as shown in figure). The structure was constructed in 1970 and distress was noticed and investigated in 1998. The expansion joints are provided in form of GI sheet cradle filled with bituminous board and top sealant. How would you develop preliminary Work Breakdown Structure (WBS is developed from top to bottom) and network for this project ? Relevant information is given below and any other data required may be assumed : **15**

(a) The distress is at initial stage and following are the most probable causes :

(i) Failure of expansion joints due to corrosion and damage to Gl sheet cradle caused ingress of rain water.

(ii) Failure of existing tarfelt treatment and exposure of concrete surface of shell roof at places.

(iii) Entry of rain water through overlaps and leakage through cracked and /or honey combed RCC shell roof at shuttering joints of shutter finished surface.

(b) The following repair methods are recommended :

(i) Remove tarfelt treatment and injection grout all cracks and honey combed concrete with non-shrink polymer modified cement grout.

(iv) Holes of fasteners and fittings to be plugged with polymer modified cement mortar.

(v) V-grooves to be made along the cracks and aluminium nipples to be fixed along the grooves and on honey combed RCC surface, if any.

(vi) Non-shrink polymer modified cement grout to be injected through nipples and nipples to be cut and sealed with non-shrink suitable compound.

(vii) Then entire roof to be cleaned by wire brushes and depressions to be filled with polymer modified cement mortar over a bonding coat of polymer modified cement slurry.

(viii) After curing, specified waterproofing treatment to be applied to the surface.

(ix) Expansion joints shall cleaned properly improved to work effectively.

(x) Drain between the two shells to be treated with water proofing treatment as explained above and wearing surface to be treated with 10 mm thick 1 : 3 polymer modified cement mortar, upto a height of 150 mm above the bed level of drain.

(xi) The gap of windows and walls to be filled with suitable polymer compound.

(xii) Proper checks on quality/progress to be maintained.