UNIT 9

Modern Buildings – Need for Repair and Renovation

1. Answer the following questions:

a) What building materials are most commonly used for the construction of buildings?
b) What do you know about concrete? Specify its properties.
c) What kind of structures is concrete mostly used for?

2. Skim the text below and say what issue it deals with.

3. Read the text now and underline all words that are new to you. Find them in a dictionary/vocabulary.

A large proportion of building stock worldwide consists of modern system-built structures put up in the last 40 years. These typically involve components such as concrete panels and concrete frames, with various claddings. Such buildings are now manifesting serious defects; and as they are often too expensive to replace, there is a strong economic incentive for developing methods of rehabilitating them to extend their useful life.

Modern buildings suffer from a variety of physical problems. Most of these are connected with the structure and the external envelope. It was expected that a building's services, such as the heating and ventilating systems, would become obsolescent at least once and possibly twice during the life of the structure. What was not envisaged is that the envelope and, in some cases, the structure itself would show signs of obsolescence after only 20 to 30 years.

Although not one building owner, designer or builder would categorically predict the structural life of a building; the expectation is that it would last for at least 60 years. In the first place the basic structure and envelope should continue in good order, independent of economic, functional life or social factors.

As the focus is on framed and panel buildings, the main problems are with the concrete structures. Concrete is not the extraordinary material it was thought to be in the 1950s and 60s. It was considered to be strong, long lasting, and inert and would require no maintenance. It is possible to produce concrete to meet these performance requirements and it is still very much a common material for tall-framed structures. Far more is now known about the behaviour of concrete, and it can be designed to meet specific requirements. Quality control during placing can ensure that the design criteria are met and that the concrete will perform to expectations. Unfortunately the level of design knowledge and site controls existing in the 1950s and 60s was not high, but perhaps more significantly, information they already had was not applied. For example, the phenomenon of concrete shrinkage was known, but little or no allowance was made in a structure to accommodate this. An exaggerated example was found in a building constructed of large pre-cast concrete panels. They were erected very soon after casting and were cured during the early years of the building's occupancy. The central heating systems dried out the panels. The problem manifested itself after about four or five

years according to the findings of the lift maintenance engineers. Since the early days of its occupancy, the lifts were constantly jamming. On most occasions the engineers had to adjust the runners relative to their fixing to the lift's shaft walls. Eventually, they used up all the adjustment and reported back to the owners. In total they had to reduce the lift run by 75 mm. In other words the 10-storey building had shrunk by 75 mm. This was attributed to concrete shrinkage.

The problems in a structure could be:

- deflection in beams and floors due to weak design / unforeseen loading
- concrete creep
- corrosion of the reinforcement
- insufficient steel reinforcement
- inadequate / insufficient fixings between structural elements
- corrosion of ties and fixings
- misalignment of pre-cast concrete panels
- inadequate movement joints between claddings and the structure
- poor sealants and joint design between the pre-cast panels and/or components
- poor site quality control
- degradation of components due to lack of maintenance
- low standards of insulation leading to internal condensation
- surface finish failure
- distortion of panels.

There are also problems with other building structures like steel-framed buildings and timber-framed structures. Steel framed buildings are not exhibiting the range of failures associated with concrete structures, but there are a few examples of defects in steel- framed houses. As would be expected, the defects are primarily ones relating to corrosion. The most vulnerable point is where the columns are connected to the foundations. Rising damp, unventilated space and unprotected steel can produce corrosion. The use of untreated timber in frames until the late 1970s must cause concern regarding the durability of timber-framed structures. If these are sound, then water cannot penetrate to the timber members and start the decay process.

From the list of defects presented it is evident that the range is wide and that their effects can be catastrophic. Problems not confined to concrete structures, and timber and steel-framed buildings show various forms of degradation. The effect of poor workmanship and design can exacerbate the problems. In some cases these may initiate the defect. The incidence of faults in traditional housing is apportioned 50% to design, 40% to workmanship and 10% to materials. User behaviour can affect all building types, and physical problems should be placed in the context of patterns of use.

4. The above text contains numbers. Say what the numbers relate to.

5. Answer the following questions:

a) What are the problems modern buildings suffer from?
b) Were these problems expected? Specify.
c) What are the expectations for the structural life of a building?
d) What kind of material was concrete considered to be and when was it so considered?
e) What problems does concrete manifest?

f) Give 5 examples of problems that may appear in a structure.
g) What are the problems of steel structures related to?
h) What is the condition for timber-framed structures to stay sound?

6. Read the text again paragraph by paragraph and make a note of 1 to 3 sentences covering the main points of each paragraph.

7. Fill in the missing prepositions.

1) Modern buildings suffer ____ a variety ____ physical problems.
2) These problems are connected ____ the structure and the external envelope.
3) It was expected that the structural life ____ a building would last ____ at least 60 years.
4) Designers and builders now know more ____ the behaviour ____ concrete.
5) Large precast concrete panel buildings were erected very soon ____ casting and cured _____ the early years ____ building occupancy.
6) The central heating dried ____ the panels.
7) The 10-storey building had shrunk ____ 75 mm.
8) This was attributed ____ concrete shrinkage.
9) The incidence ____ faults ____ traditional housing is apportioned 50% ____ design, 40% ____ workmanship and 10% ____ materials.
10) Physical problems ____ buildings should be placed ____ the context ____ pattern ____ use.

Verbs are often used with certain prepositions that cannot be replaced at random, e.g., <u>suffer from</u>, <u>connected with/to</u>, if we want to keep the meaning. Phrasal verbs change their meaning according to the preposition following them. Therefore, it is important to note the verb + preposition and its meaning in a given context.

8. Find the following phrasal verbs in the text. Write sentences of your own using these phrasal verbs to show that you understand their meaning.

consist of
put up
dry out
use up
to be attributed to
to be associated with

9. Find the words <u>meet (met)</u>, <u>run</u>, and <u>sound</u> used in the text and explain their meaning. What other meanings can these words have? Write sentences that show the differences in meanings.

10. Fill in the missing form.

VERB	**NOUN**
repair	_____
_____	renovation
replace	_____
extend	_____
_____	expectation
_____	maintenance
perform	_____
require	_____
_____	control
_____	behavior
_____	shrinkage
accommodate	_____
fail	_____
reinforce	_____
_____	penetration

Vocabulary

apportion, v.	rozdeliť (rovnomerne), rozvrhnúť, prideliť
attribute, v.	pripisovať, prisudzovať
beam	nosník, trám, klada
cladding	obvodový plášť, vonkajší plášť, obklad
component	dielec, zložka
confine, v.	obmedzovať sa (na)
creep	dotvarovanie, stekanie
damp	vlhkosť, vlhko, zrazená para
decay	kazenie sa, rozklad, hnitie
deflection	vychyľovanie, odchýlka, odklonenie
distortion	deformácia, skrútenie, pokrivenie
envelope	obvodový plášť, výmurovka, obal
envisage, v.	predvídať
exacerbate, v.	rozjatriť, aktivovať, znova vyvolať
exaggerate	preháňať, nadsadzovať
exhibit, v.	vystavovať, vystaviť, predvádzať
finish	povrchová úprava, náter, lak
fixing	upevnenie, spevnenie, kotvenie, votknutie
frame	kostra, skelet, rám
frame construction	rámová konštrukcia
incentive	podnet
inert	nehybný, neutrálny, odolný
jam, v.	zablokovať, zatarasiť sa, zapchať sa
lift run	výťahová lišta, drážka, dráha
manifest, v.	vykazovať, vyznačovať sa
misalignment	nevyrovnanosť, porušenie súososti
obsolescent	zastaralý, stárnuci
occupancy	obývanie, osídlenie, nasťahovanie sa
precast	prefabrikovaný
put up	postaviť, vztýčiť, zdvihnúť
rehabilitate	obnoviť, opraviť
reinforcement	výstuž, vystuženie, spevnenie
runner	vodiaca lišta, pojazdná kladka
sealant	tmel, tesniaci prostriedok
sound	1. zdravý, 2. zvuk
stock	zásoba
tie	väzník, tiahlo, väzný trám, priečny trám
timber	rezivo, drevo (stavebné)
vulnerable	citlivý, zraniteľný, exponovaný
workmanship	Prevedenie (práce), remeselnícka práca, zručnosť, dielo