L-4/T-1/ARCH **Date : 15/01/2012**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-1 B. Arch. Examinations 2010-2011

Sub : **CE 423** (Structure V: Reinforced Concrete Design)

Full Marks: 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this Section. Answer any **THREE**.

1. (a) Classify the commonly used reinforced concrete floor and roof systems. **(4)**

   (b) What are the advantages and disadvantages of flat plates? What is the main purpose to provide drop panels and column capitals in flat slabs? **(4+3)**

   (c) Design a one way slab as shown in Fig 1 to carry live load of 40 psf and superimposed dead load of 80 psf in addition to its self weight. Use WSD method. Given, $f_c' = 3.5$ ksi, $f_y = 60$ ksi, $E_c = 3600$ ksi and $E_s = 29000$ ksi. **(12⅓)**

2. (a) Why does ACI recommend designing a rectangular slab supported on all sides as one way slab if the aspect ratio of the slab is more than two? Justify your answer with mathematical logic. **(7)**

   (b) Design panel A of he slab system shown in Fig 2 using ACI moment coefficient method. The slab is to carry a service live load of 40 psf and superimposed dead load of 100 psf in addition to its self weight. Follow WSD method. Given, $f_c' = 4$ ksi, $f_y = 60$ ksi, $E_c = 3600$ ksi and $E_s = 29000$ ksi. Use relevant charts for ACI coefficients. **(16⅓)**

3. (a) Draw typically moment variations in column supported two way slabs. **(4)**

   (b) What are the edge restraint conditions considered in distributing total static moment to critical sections in an end span of a slab. Show the distribution factors applied to total static moment in neat sketches. **(6)**

   (c) A flat plate floor system is supported by $18'' \times 18''$ square column spaced in a $20' \times 20'$ grid. The slab is subjected to 40 psf live load and 100 psf superimposed dead load in addition to its own weight. Using Direct Design Method, determine design moments in middle and column strip of an interior panel. **(13⅓)**

4. (a) What are the special advantages of Reinforced Concrete? **(4)**

   (b) Draw typically different types of grid floors. What are the advantages of grid floors? **(3+3)**

   (c) A coffered reinforced concrete grid of overall size 50 ft by 60 ft covers the roof of a conference hall. The ribs are spaced at 5 ft intervals. The live load on the roof is 40 psf and floor finish is 20 psf. Assuming slab thickness as 4 inch, rib width as 8 inch and total depth of ribs as 24 inch, analyze the grid floor for maximum moments and shears using approximate method (Rankine Grashoff theory). **(13⅓)**

Contd P/2

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SECTION – B

There are **FOUR** questions in this Section. Answer any **THREE**.

5. (a) What is reinforced concrete? Compare between USD and WSD method of analyzing and designing R.C.C. structures. **(4)**

(b) Write down the fundamental propositions of behavior or R.C.C. structures under loading. **(3)**

(c) Write down the specification for minimum bar spacing recommended by ACI. **(5)**

(d) Determine the ultimate moment capacity of the beam shown in Fig. 3. Given, $f_c' = 4$ ksi, $f_y = 40$ ksi. **(11⅓)**

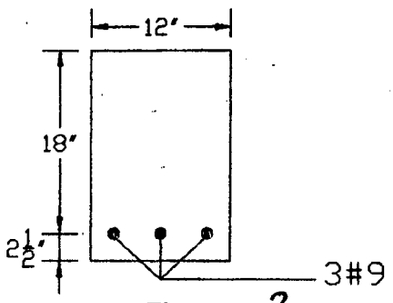

Fig. 3

6. (a) State the sources of uncertainty in the analysis, design and construction of reinforced concrete structures. **(5)**

(b) What do you mean by serviceability and safety requirements of a structure? **(3)**

(c) A rectangular beam has the dimension as shown in Fig. 3. The beam is simply supported and has a span of 20 ft. The beam must resist a live load of w lb/ft and a dead load of (w/2) lb/ft in addition to its self weight. Determine the allowable value of 'w'. Given, $f_c' = 5$ ksi, $f_y = 60$ ksi, n = 9. **(15⅓)**

7. (a) Classify different types of load that act on R.C.C structures. **(3)**

(b) Draw the elastic and inelastic stress distribution in a homogeneous beam. **(4)**

(c) A simply supported 'T' beam has an effective flange width of 45 inch, web width of 12 inch and flange thickness of 5 inch. The depth of web below the flange is 22 inch. The reinforcement is 4#9 bars in one row, the center of which is 3 inch above the bottom of the beam. Determine the maximum allowable uniformly distributed load which can be superimposed on the beam. Given, $f_c' = 4$ ksi, $f_y = 60$ ksi, n = 9. **(16⅓)**

Contd P/3

CE 423

8. (a) A simply supported rectangular beam 12 inch wide having an effective depth of 22 inch carries a total working load of 5.8 k/ft on a 25 ft clear span. Using vertical stirrups with f_v = 20 ksi, design the web or shear reinforcement. **(12)**

   (b) Calculate the moment capacity of the doubly reinforced beam section shown in Fig. 4. Use WSD method. Given, f'_c = 4 ksi, f_y = 60 ksi, n = 10. **(11⅓)**

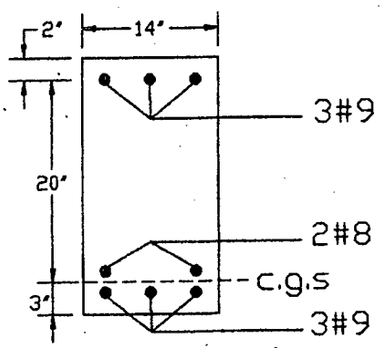

Fig. 4

(P-4) CE423/A2

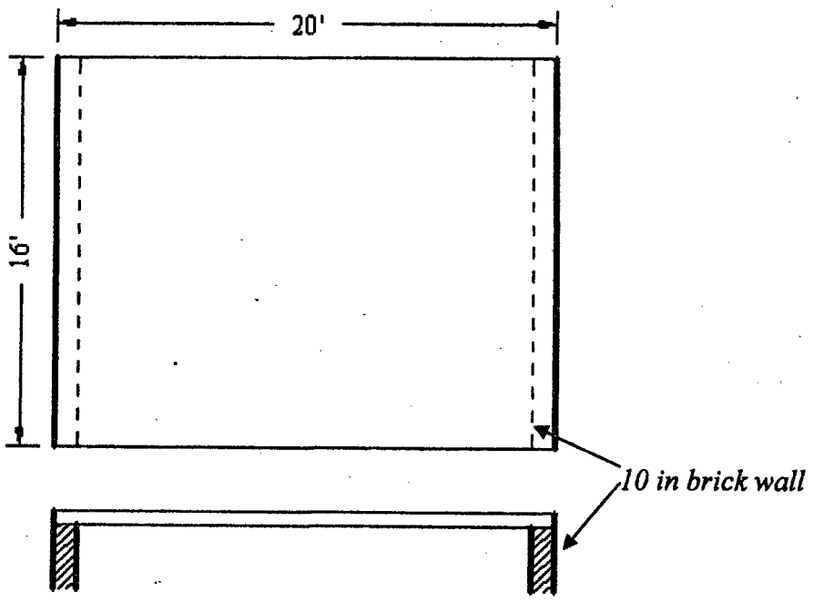

Fig. 1

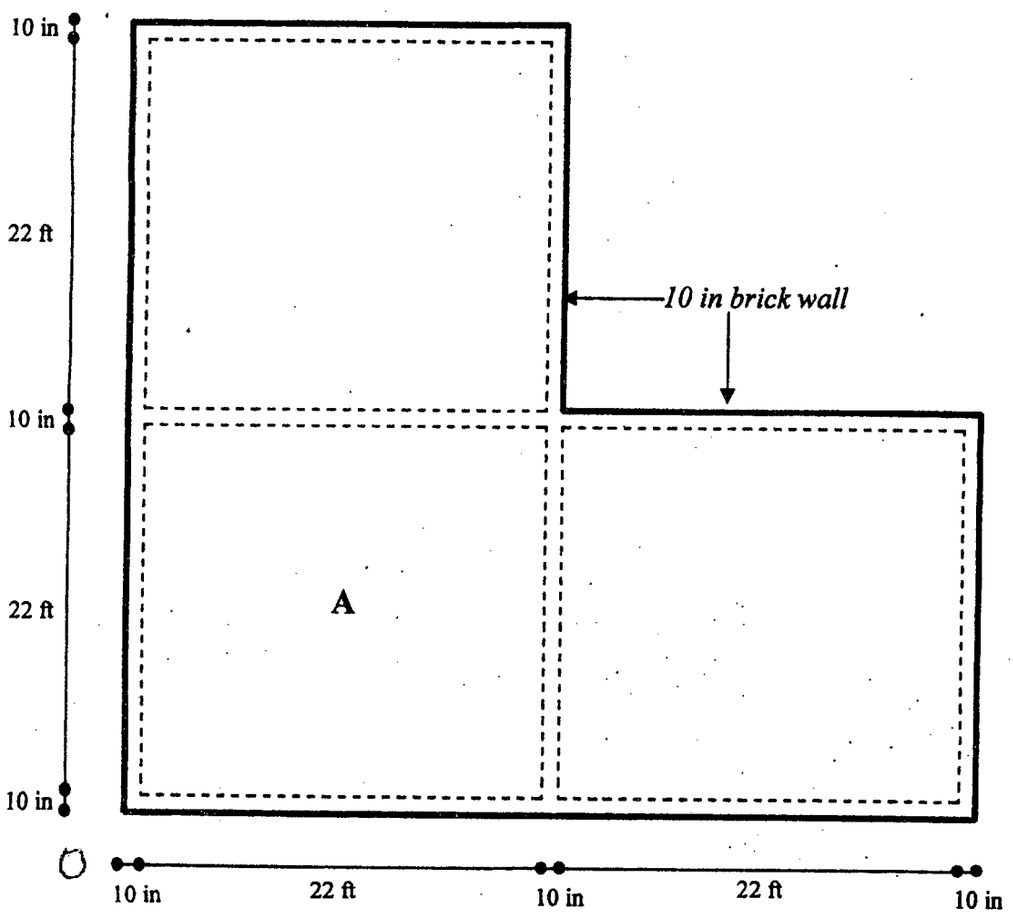

Fig. 2

Table 5.2 Coefficients for negative moments in slabs†

$M_{a,neg} = C_{a,neg} w l_a^2$
$M_{b,neg} = C_{b,neg} w l_b^2$ where w = total uniform dead plus live load

Ratio $m = \frac{l_a}{l_b}$		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
1.00	$C_{a,neg}$		0.045		0.050	0.075	0.071		0.033	0.061
	$C_{b,neg}$		0.045	0.076	0.050			0.071	0.061	0.033
0.95	$C_{a,neg}$		0.050		0.055	0.079	0.075		0.038	0.065
	$C_{b,neg}$		0.041	0.072	0.045			0.067	0.056	0.029
0.90	$C_{a,neg}$		0.055		0.060	0.080	0.079		0.043	0.068
	$C_{b,neg}$		0.037	0.070	0.040			0.062	0.052	0.025
0.85	$C_{a,neg}$		0.060		0.066	0.082	0.083		0.049	0.072
	$C_{b,neg}$		0.031	0.065	0.034			0.057	0.046	0.021
0.80	$C_{a,neg}$		0.065		0.071	0.083	0.086		0.055	0.075
	$C_{b,neg}$		0.027	0.061	0.029			0.051	0.041	0.017
0.75	$C_{a,neg}$		0.069		0.076	0.085	0.088		0.061	0.078
	$C_{b,neg}$		0.022	0.056	0.024			0.044	0.036	0.014
0.70	$C_{a,neg}$		0.074		0.081	0.086	0.091		0.068	0.081
	$C_{b,neg}$		0.017	0.050	0.019			0.038	0.029	0.011
0.65	$C_{a,neg}$		0.077		0.085	0.087	0.093		0.074	0.083
	$C_{b,neg}$		0.014	0.043	0.015			0.031	0.024	0.008
0.60	$C_{a,neg}$		0.081		0.089	0.088	0.095		0.080	0.085
	$C_{b,neg}$		0.010	0.035	0.011			0.024	0.018	0.006
0.55	$C_{a,neg}$		0.084		0.092	0.089	0.096		0.085	0.086
	$C_{b,neg}$		0.007	0.028	0.008			0.019	0.014	0.005
0.50	$C_{a,neg}$		0.086		0.094	0.090	0.097		0.089	0.088
	$C_{b,neg}$		0.006	0.022	0.006			0.014	0.010	0.003

Table 5.3 Coefficients for dead-load positive moments in slabs†

$M_{a,pos,d} = C_{a,d} w l_a^2$
$M_{b,pos,d} = C_{b,d} w l_b^2$ where w = total uniform dead load

Ratio $m = \frac{l_a}{l_b}$		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
1.00	$C_{a,d}$	0.036	0.018	0.018	0.027	0.027	0.033	0.027	0.020	0.023
	$C_{b,d}$	0.036	0.018	0.027	0.027	0.018	0.027	0.033	0.023	0.020
0.95	$C_{a,d}$	0.040	0.020	0.021	0.030	0.028	0.036	0.031	0.022	0.024
	$C_{b,d}$	0.033	0.016	0.025	0.024	0.015	0.024	0.031	0.021	0.017
0.90	$C_{a,d}$	0.045	0.022	0.025	0.033	0.029	0.039	0.035	0.025	0.026
	$C_{b,d}$	0.029	0.014	0.024	0.022	0.013	0.021	0.028	0.019	0.015
0.85	$C_{a,d}$	0.050	0.024	0.029	0.036	0.031	0.042	0.040	0.029	0.028
	$C_{b,d}$	0.026	0.012	0.022	0.019	0.011	0.017	0.025	0.017	0.013
0.80	$C_{a,d}$	0.056	0.026	0.034	0.039	0.032	0.045	0.045	0.032	0.029
	$C_{b,d}$	0.023	0.011	0.020	0.016	0.009	0.015	0.022	0.015	0.010
0.75	$C_{a,d}$	0.061	0.028	0.040	0.043	0.033	0.048	0.051	0.036	0.031
	$C_{b,d}$	0.019	0.009	0.018	0.013	0.007	0.012	0.020	0.013	0.007
0.70	$C_{a,d}$	0.068	0.030	0.046	0.046	0.035	0.051	0.058	0.040	0.033
	$C_{b,d}$	0.016	0.007	0.016	0.011	0.005	0.009	0.017	0.011	0.006
0.65	$C_{a,d}$	0.074	0.032	0.054	0.050	0.036	0.054	0.065	0.044	0.034
	$C_{b,d}$	0.013	0.006	0.014	0.009	0.004	0.007	0.014	0.009	0.005
0.60	$C_{a,d}$	0.081	0.034	0.062	0.053	0.037	0.056	0.073	0.048	0.036
	$C_{b,d}$	0.010	0.004	0.011	0.007	0.003	0.006	0.012	0.007	0.004
0.55	$C_{a,d}$	0.088	0.035	0.071	0.056	0.038	0.058	0.081	0.052	0.037
	$C_{b,d}$	0.008	0.003	0.009	0.005	0.002	0.004	0.009	0.005	0.003
0.50	$C_{a,d}$	0.095	0.037	0.080	0.059	0.039	0.061	0.089	0.056	0.038
	$C_{b,d}$	0.006	0.002	0.007	0.004	0.001	0.003	0.007	0.004	0.002

†A crosshatched edge indicates that the slab continues across, or is fixed at, the support; an unmarked edge indicates a support at which torsional resistance is negligible.

Table 5.4 Coefficients for live-load positive moments in slabs†

$M_{a,pos,s} = C_{a,s} w l_a^2$
$M_{a,pos,l} = C_{a,l} w l_a^2$ where w = total uniform live load

Ratio $m = \frac{l_a}{l_b}$		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
1.00	$C_{a,s}$	0.036	0.027	0.027	0.032	0.032	0.035	0.032	0.028	0.030
	$C_{b,s}$	0.036	0.027	0.032	0.032	0.027	0.032	0.035	0.030	0.028
0.95	$C_{a,s}$	0.040	0.030	0.031	0.035	0.034	0.038	0.036	0.031	0.032
	$C_{b,s}$	0.033	0.025	0.029	0.029	0.024	0.029	0.032	0.027	0.025
0.90	$C_{a,s}$	0.045	0.034	0.035	0.039	0.037	0.042	0.040	0.035	0.036
	$C_{b,s}$	0.029	0.022	0.027	0.026	0.021	0.025	0.029	0.024	0.022
0.85	$C_{a,s}$	0.050	0.037	0.040	0.043	0.041	0.046	0.045	0.040	0.039
	$C_{b,s}$	0.026	0.019	0.024	0.023	0.019	0.022	0.026	0.022	0.020
0.80	$C_{a,s}$	0.056	0.041	0.045	0.048	0.044	0.051	0.051	0.044	0.042
	$C_{b,s}$	0.023	0.017	0.022	0.020	0.016	0.019	0.023	0.019	0.017
0.75	$C_{a,s}$	0.061	0.045	0.051	0.052	0.047	0.055	0.056	0.049	0.046
	$C_{b,s}$	0.019	0.014	0.019	0.016	0.013	0.016	0.020	0.016	0.013
0.70	$C_{a,s}$	0.068	0.049	0.057	0.057	0.051	0.060	0.063	0.054	0.050
	$C_{b,s}$	0.016	0.012	0.016	0.014	0.011	0.013	0.017	0.014	0.011
0.65	$C_{a,s}$	0.074	0.053	0.064	0.062	0.055	0.064	0.070	0.059	0.054
	$C_{b,s}$	0.013	0.010	0.014	0.011	0.009	0.010	0.014	0.011	0.009
0.60	$C_{a,s}$	0.081	0.058	0.071	0.067	0.059	0.068	0.077	0.065	0.059
	$C_{b,s}$	0.010	0.007	0.011	0.009	0.007	0.008	0.011	0.009	0.007
0.55	$C_{a,s}$	0.088	0.062	0.080	0.072	0.063	0.073	0.085	0.070	0.063
	$C_{b,s}$	0.008	0.006	0.009	0.007	0.005	0.006	0.009	0.007	0.006
0.50	$C_{a,s}$	0.095	0.066	0.088	0.077	0.067	0.078	0.092	0.076	0.067
	$C_{b,s}$	0.006	0.004	0.007	0.005	0.004	0.005	0.007	0.005	0.004

†A crosshatched edge indicates that the slab continues across, or is fixed at, the support; an unmarked edge indicates a support at which torsional resistance is negligible.

TABLE
Minimum thickness of slabs without interior beams

	Without Drop Panels			With Drop Panels		
	Exterior Panels		Interior Panels	Exterior Panels		Interior Panels
Yield Stress f_y psi	Without Edge Beams	With Edge Beams*		Without Edge Beams	With Edge Beams*	
40,000	$l_n/33$	$l_n/36$	$l_n/36$	$l_n/36$	$l_n/40$	$l_n/40$
60,000	$l_n/30$	$l_n/33$	$l_n/33$	$l_n/33$	$l_n/36$	$l_n/36$
75,000	$l_n/28$	$l_n/31$	$l_n/31$	$l_n/31$	$l_n/34$	$l_n/34$

* Slabs with beams along exterior edges. The value of α for the edge beam shall not be less than 0.8.

Ref. 1: Design of Concrete Structure, 9th edition, Winter-Nilson, Page 217-219

Ref. 2: Design of Concrete Structure, 13th edition, Nilson-Darwin-Dolan, Page 436

L-4/T-1/ARCH **Date : 21/01/2012**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-1 B. ARCH Examinations 2010-2011

Sub : **ARCH 431** (Environment & Design IV: Landscape Design)

Full Marks: 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **SIX** questions in this Section.
Answer Question No. 5 and any **THREE** questions from the rest.

1. Landscape Design appears to have closest relationship with architecture and urban Design-explain. **(17)**

2. What factors determine the character of a landscape design? What are the landscape design approaches available in a given situation? **(10+7=17)**

3. Give a comparative analysis of the English and the French landscape design concepts with suitable examples. **(17)**

4. Write the salient features of Persian landscape design. How did this trend influenced the Mughal landscape? Discuss **(9+8=17)**

5. List and discuss the elements of space organization considered in the landscape design process. **(7+12=19)**

6. What is the law of inter dependence? What are the categories of ecological studies? **(5+12=17)**

SECTION – B

There are **FIVE** questions in this Section.
Answer Question No. 11 and any **THREE** questions from the rest.

7. What do you understand by the term 'Eco-system'? Explain with the help of various bio-chemical cycles, the importance of ecological systems in the landscape design. **(7+10=17)**

8. What are the site planning considerations? List and discuss. **(7+10=17)**

9. What are the generic issues in a site analysis for landscape design? **(17)**

10. What are the aspects that needs to be considered in the successful planting? Discuss the influence of site conditions on the choice of plants and planting? **(7+10=17)**

11. Discuss how the following factors are analyzed in developing criteria for a hypothetical site; View, Noise, Access, Wind, Vegetation, Sunlight, Utility and context. **(19)**

L-4/T-1/ARCH **Date : 24/01/2012**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-1 B. ARCH Examinations 2010-2011

Sub : **ARCH 441** (Art & Architecture-V)

Full Marks: 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this Section. Answer Q. No. 4 & any **TWO** from the rest.

1. Describe Ronchamp chapel, as the first example of Le-Corbusiers work in the post war phase. **(20)**

2. How did claude perrault questioned the authority of normative principles of western classical architecture to validate subjectivity? Explain elaborately. **(20)**

3. What does 'Chicago school' refers to in architecture? Describe the Auditorium Building designed by Adler & Sullivan. **(20)**

4. Write short notes on any two. **(15×2=30)**
   (a) BAUHAUS
   (b) 'IMAGINARY PRISONS' (CARCERI d'INVENZIONE) BY Piranesi.
   (c) Promenade architecture.

SECTION – B

There are **FOUR** questions in this Section. Answer Q. No. 8 & any **TWO** from the rest.

5. What were the three waves of revolutions that shook the foundation of classical art? Describe them with relevant examples. **(20)**

6. Describe 'TUGENDHAT HOUSE' as an adaptation of spatial conception of Barcelona pavilion to a domestic programme. **(20)**

7. Describe 'FALLING WATER' to elucidate Wright's ideal place of living fused into nature. **(20)**

8. Write short notes on any two. **(15×2=30)**
   (a) Le-corbasiers Five points of Architecture
   (b) Deutsche Werkbund
   (c) Abstract Expressionism

L-4/T-1/ARCH **Date : 26/01/2012**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-1 B. Arch. Examinations 2010-2011

Sub : **ARCH 445** (Architectural Conservation)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer **Q. No. 1** and any **TWO** from the rest.

1. Write short notes on – **(30)**

   (a) History of architectural conservation

   (b) Selection criteria for listing of heritage property

   (c) Documentation

2. Describe in brief the laws and codes practiced in Bangladesh related to conservation emphasizing on Building Construction Rules 2008. **(20)**

3. Which aspects determine the degree of intervention? Describe restoration, preservation and reconstruction with example. **(20)**

4. What are the issues related to conservation practice in Bangladesh? Describe the threats to conservation in Bangladesh and approaches to resolve those. **(20)**

SECTION – B

There are **FOUR** questions in this section. Answer **Q. No. 8** and any **TWO** from the rest.

5. Define architectural conservation. What are the values and ethics of architectural conservation? **(23)**

6. Explain the climatic causes of decay in the cultural heritage properties. **(23)**

7. What is the significance of listing in the architectural conservation process? Discuss the methodology of listing. **(23)**

8. Write notes on: **(24)**

   (i) Objectives of Architectural Conservation

   (ii) Stages of reporting and making the initial reports

   (iii) Inspection of doors and windows
