

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1 BURP. Examinations 2022-2023

Sub: **PLAN 211 (Urban Planning Principles)**

Full Marks: 210

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 questions.**

1. (a) "Cities are where the battle for sustainable development will be won or lost." - Explain this statement. (12)
- (b) Briefly explain how urban planning can be a powerful tool to make cities inclusive, safe, resilient and sustainable. (23)
2. (a) Interpret the factors you would consider to ensure an appropriate scale of development in city centres. (10)
- (b) Through planning interventions, safer streets can be ensured in grid cities. Explain with an example. (10)
- (c) Illustrate the developability of land with examples. (15)
3. (a) As an urban planner, you need to balance between development and the environment. Interpret briefly how you would integrate ecological values into land use planning. (15)
- (b) You are assigned to design a residential neighborhood in Uttara. What principles would you apply for residential development? (20)
4. (a) Explain briefly why specific planning guidelines are needed for industrial development. (10)
- (b) In the light of Delhi TOD principles, develop at least three guidelines for implementing TOD around the MRT stations of Dhaka. (15)
- (c) Compare the features of "rectangular pattern" and "radial pattern" of city forms with examples. (10)

**PLAN 211**

**SECTION – B**

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

5. (a) Analyze the urban forms of South Asia and explain how do they reveal the imprint of both indigenous and colonial forces. (15)
- (b) Illustrate the four key elements of public space. (13)
- (C) Demonstrate the economic value of wetland. (7)
6. (a) Kevin Lynch reported that users understood their surroundings in consistent and predictable ways forming mental maps with five role in the interpretation of the city - Illustrate these five elements in the context of Dhaka. (20)
- (b) Ethnic, religious and caste segregation was evident and neighborhoods are formed in specific areas -Explain the statement in relation to the Bazaar Model of Indian cities. (15)
7. (a) Briefly discuss the context where you can apply the following conservation tools for historic buildings. (12)
- (i) Restoration
- (ii) Adaptive reuse
- (b) Classify open spaces according to the extent of utility and services rendered by them. (15)
- (c) Kevin Lynch's goal was to combat Modernism's unified, monolithic depersonalized city through reasserting the human role in the interpretation of the city-illustrate with examples. (8)
8. (a) HABITAT III declared that " Healthy urban policies can significantly reduce infectious and non-communicable diseases and enhance wellbeing"- interpret he statement. (15)
- (b) Briefly discuss the strategies adopted in the following planning documents to protect wetlands of Dhaka. (10+10=20)
- (i) Dhaka Metropolitan Development Plan (1995-2015)
- (ii) Dhaka Detailed Area Plan (2022-2035)

**SECTION – A**There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) "A sample is not just a subset of the population but a representative subset." – Explain the statement with an example. (5)
- (b) The following table shows the frequency distribution of floor area of houses among 280 households in an area.

Floor Area (sq.ft.)	Number of Households
100 to 300	90
300 to 600	30
600 to 900	30
900 to 1200	82
1200 to 1500	48

- (i) Prepare a histogram and an ogive using the table. (10+10=20)
- (ii) Discuss the benefits of the ogive over the histogram. (5)
- (c) Explain the term "Kurtosis". (5)
2. (a) Explain the four levels of measurement for data with examples. (4×2.5=10)
- (b) The following table shows the income distribution of households (sample) in a country. Answer the following questions using the table:

Income Levels (Tk.)	Number of Households
< 5,000	118
5,000 – 10,000	54
10,001 – 20,000	45
20,001 – 30,000	36
30,001 – 40,000	40
40,001 – 50,000	10
50,001 – 1,00,000	8
1,00,001 – 5,00,000	6

- (i) Compute the mean household income. (10)
- (ii) Compute the median (taking class width = 10,000 Tk.) household income. (10)
- (iii) Which of the two (mean and median) do you think is a better measurement of the central tendency for the given data? Explain your opinion. (5)

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3. (a) What types of graphs will you use to display the variables (if single variables) or the relationship between the variables listed below? **(4×5=20)**

- (i) Income (Tk.) vs. Vehicle Ownership (Yes/No)
- (ii) Gender vs. Occupation
- (iii) Travel Time (s)
- (iv) Calories Consumed (kcal) vs. Weight Gained (kg)
- (v) Toilet Types vs. House Rent (Tk.)

Sketch a diagram for each of your selected graphs and explain your reasons for selecting the particular graph.

(b) You want to measure the relative variation in incomes of people living in Dhaka compared to those living in Sylhet. You calculated the mean income of a sample of 280 individuals from Dhaka to be Tk. 20,000 and the mean of a sample of 310 individuals from Sylhet to be Tk. 32,000. You found that the standard deviation of income in Dhaka and Sylhet was Tk. 71,000 and Tk. 68,000, respectively. Compute the appropriate statistic to measure the relative variation between the two groups and interpret your results. **(10+5=15)**

4. (a) You have collected data on slum dweller's duration of stay in slums. The following table gives the distribution of data for 220 respondents. **(15+8=23)**

Duration of Stay (year)	Number of Respondents
0 to 5	24
6 to 10	62
11 to 15	56
16 to 20	33
21 to 25	25
Greater than 25	20

Compute the skewness of these data using moments and interpret your results.

(b) The following data gives the waiting time (seconds) at any intersection for 12 pedestrians. **(12)**

5	17	14	10	60	25	30	3	31	19	50	16
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Prepare a box-and-whisker plot using the data.

**PLAN 291**

**SECTION - B**

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

All formulae are provided at the end. The necessary tables are attached.

5. (a) Estimate is a population parameter and estimator is a sample statistic. Explain the statement with two examples. (10)
- (b) Table 1 shows the observed hailstorm occurrence over a 35 year period for Rajshahi District.

Table 1

No. of Hailstorm	0	1	2	3	4	5+
Observed frequency of year	7	14	9	3	2	0

- (i) Calculate the probability values for each number of hailstorm occurrence and illustrate the results graphically. (12)
- (ii) Tabulate the observed and expected frequencies of hailstorm occurrence per year period for Rajshahi District. (5)
- (iii) Interpret the findings received in (i) and (ii). (8)
6. (a) Purposive sampling is a non-probability kind of sampling, even then it is acceptable for three situations. Explain the situations with relevant examples. (12)
- (b) Sample statistics are random variables. Explain the statement with an example. (8)
- (c) In an observational study at Khulna District, 43% of the men were observed not adopting hygiene practices in their daily life. Assume that the percentage of all Bangladeshi men who do not adopt hygiene practices in their daily life is 43%. Let  $\hat{p}$  be the proportion in a random sample of 110 Bangladeshi men who do not adopt hygiene practices in their daily life. Calculate the probability that the value of  $\hat{p}$  will be (15)
- (i) Less than 0.30,
- (ii) Between 0.45 and 0.50.

7. (a) A local LP gas dealer of a small town wants to estimate the average amount of gas that people in that town use in a one-month period. The dealer asked 44 randomly selected customers to keep a diary of their usage, and found that these people use 18 kg LP gas during a one-month period, where the standard deviation is 3.2 kg. Develop a 95% confidence interval for the average monthly gas usage by people in the town. (13)
- (b) Explain the differences between the probability distribution of a discrete random variable and that of a continuous random variable. (10)
- (c) A construction zone on a highway has a posted speed limit of 40 miles per hour. The speeds of vehicles passing through this construction zone are normally distributed with a mean of 45 miles per hour and a standard deviation of 4 miles per hour. Find the percentage of vehicles passing through this construction zone that are (12)
- (i) exceeding the posted speed limit,
- (ii) travelling at speed between 55 and 60 miles per hour.

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8. (a) Explain the differences between the stratified and cluster sampling with relevant examples. (10)

(b) (i) Recently the cost of health care has risen sharply for a large number of families of a small town. A random sample of 36 families selected from the town showed that they spend an average of Tk. 5312 per month on health care. It is known that the standard deviation of health care expenses of all families of the town is Tk. 540. Develop a 98% confidence interval for the mean health care expenditure per month incurred by all families in the town. Assume that the monthly health care expenditure of all families in this area have a normal distribution. (10)

(ii) Suppose the confidence interval obtained in 8.(b)(i) is too wide. How can the width of this interval be reduced? Discuss all possible alternatives. (5)

(c) A review of emergency room records at a rural hospital was performed to determine the probability distribution of the number of patients entering the emergency room during a one-hour period. Table 2 lists the distribution.

Table 2

Patient per hour	0	1	2	3	4	5	6
Probability	0.2725	0.3543	0.2303	0.0998	0.0324	0.0084	0.0023

(i) Graph the probability distribution. (4)

(ii) Determine the probability that the number of patients entering the emergency room during a randomly selected one-hour period is – (6)

- 2 or more,
- exactly 5,
- at most 1.

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**Formulae**

The following formulae consider usual notations.

$$P(A) = f / n$$

$$p(X = x) = \frac{\lambda^x e^{-\lambda}}{x!} \quad \mu = \lambda \quad \sigma = \sqrt{\lambda}$$

$$\bar{x} = \frac{\sum x_i}{n} \quad s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

$$z = \frac{x - \mu}{\sigma}$$

$$\mu_{\bar{x}} = \mu \quad \text{and} \quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \quad \text{or} \quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$$

$$\mu_{\hat{p}} = p \quad \text{and} \quad \sigma_{\hat{p}} = \sqrt{\frac{pq}{n}} \quad \text{or} \quad \sigma_{\hat{p}} = \sqrt{\frac{pq}{n}} \sqrt{\frac{N-n}{N-1}}$$

$$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}}$$

$$z = \frac{\hat{p} - p}{\sigma_{\hat{p}}}$$

$$\bar{x} \pm z \sigma_{\bar{x}}$$

$$\bar{x} \pm t s_{\bar{x}}$$

$$\hat{p} \pm z s_{\hat{p}}$$

$$\sigma_{\bar{x}} = \sigma / \sqrt{n}$$

$$s_{\bar{x}} = \frac{s}{\sqrt{n}}$$

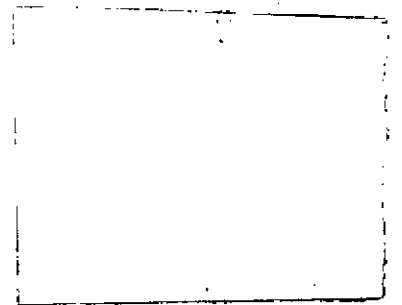
$$s_{\hat{p}} = \sqrt{\hat{p}\hat{q}/n}$$

$$E = z \sigma_{\bar{x}}$$

$$E = t s_{\bar{x}}$$

$$E = z s_{\hat{p}}$$

$$\sqrt{df / (df - 2)}$$



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= 6 =

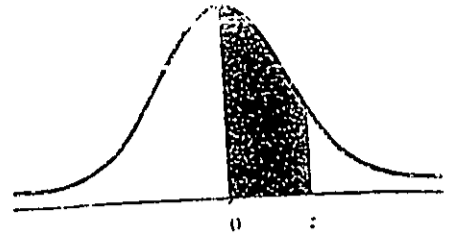


Table A The Normal Table

Note: To get A for a given value of Z, insert a decimal point before the four digits. For example, Z=1.43 gives A=0.4236.

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0000	0040	0080	0120	0160	0199	0239	0279	0319	0359
0.1	0398	0438	0478	0517	0557	0596	0636	0675	0714	0753
0.2	0793	0832	0871	0910	0948	0987	1026	1064	1103	1141
0.3	1179	1217	1255	1293	1331	1368	1406	1443	1480	1517
0.4	1554	1591	1628	1664	1700	1736	1772	1808	1844	1879
0.5	1915	1950	1985	2019	2054	2088	2123	2157	2190	2224
0.6	2257	2291	2324	2357	2389	2422	2454	2486	2517	2549
0.7	2580	2611	2642	2673	2704	2734	2764	2794	2823	2852
0.8	2881	2910	2939	2967	2995	3023	3051	3078	3106	3133
0.9	3159	3186	3212	3238	3264	3289	3315	3340	3365	3389
1.0	3413	3438	3461	3485	3508	3531	3554	3577	3599	3621
1.1	3643	3665	3686	3708	3729	3749	3770	3790	3810	3830
1.2	3849	3869	3888	3907	3925	3944	3962	3980	3997	4015
1.3	4032	4049	4066	4082	4099	4115	4131	4147	4162	4177
1.4	4192	4207	4222	4236	4251	4265	4279	4292	4306	4319
1.5	4332	4345	4357	4370	4382	4394	4406	4418	4429	4441
1.6	4452	4463	4474	4484	4495	4505	4515	4525	4535	4545
1.7	4554	4564	4573	4582	4591	4599	4608	4616	4625	4633
1.8	4641	4649	4656	4664	4671	4678	4686	4692	4699	4706
1.9	4713	4719	4726	4732	4738	4744	4750	4756	4761	4767
2.0	4772	4778	4783	4788	4793	4798	4803	4808	4812	4817
2.1	4821	4826	4830	4834	4838	4842	4846	4850	4854	4857
2.2	4861	4864	4868	4871	4875	4878	4881	4884	4887	4890
2.3	4893	4896	4898	4901	4904	4906	4909	4911	4913	4916
2.4	4918	4920	4922	4925	4927	4929	4931	4932	4934	4936
2.5	4938	4940	4941	4943	4945	4946	4948	4949	4951	4952
2.6	4953	4955	4956	4957	4959	4960	4961	4962	4963	4964
2.7	4965	4966	4967	4968	4969	4970	4971	4972	4973	4974
2.8	4974	4975	4976	4977	4977	4978	4979	4979	4980	4981
2.9	4981	4982	4982	4983	4984	4984	4985	4985	4986	4986
3.0	4987	4987	4987	4988	4988	4989	4989	4989	4990	4990
3.1	4990	4991	4991	4991	4992	4992	4992	4992	4993	4993
3.2	4993	4993	4994	4994	4994	4994	4994	4995	4995	4995
3.3	4995	4995	4996	4996	4996	4996	4996	4996	4996	4997
3.4	4997	4997	4997	4997	4997	4997	4997	4997	4998	4998
3.5	4998	4998	4998	4998	4998	4998	4998	4998	4998	4998

The area, A, stays at 0.4998 until Z=3.09. From Z=3.09 to 3.90 A=0.4999. For Z > 3.90, A=0.5000, to four decimal places.  
 From Leon F. Marzillier, *Elementary Statistics* ©1990 by Wm. C. Brown Publishers

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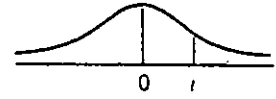


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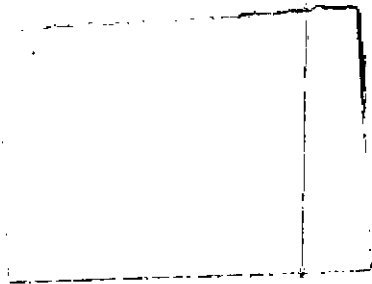
Table V The t Distribution Table

The entries in this table give the critical values of t for the specified number of degrees of freedom and areas in the right tail.



df	Area in the Right Tail under the t Distribution Curve					
	.10	.05	.025	.01	.005	.001
1	3.078	6.314	12.706	31.821	63.657	318.309
2	1.886	2.920	4.303	6.965	9.925	22.327
3	1.638	2.353	3.182	4.541	5.841	10.215
4	1.533	2.132	2.776	3.747	4.604	7.173
5	1.476	2.015	2.571	3.365	4.032	5.893
6	1.440	1.943	2.447	3.143	3.707	5.208
7	1.415	1.895	2.365	2.998	3.499	4.785
8	1.397	1.860	2.306	2.896	3.355	4.501
9	1.383	1.833	2.262	2.821	3.250	4.297
10	1.372	1.812	2.228	2.764	3.169	4.144
11	1.363	1.796	2.201	2.718	3.106	4.025
12	1.356	1.782	2.179	2.681	3.055	3.930
13	1.350	1.771	2.160	2.650	3.012	3.852
14	1.345	1.761	2.145	2.624	2.977	3.787
15	1.341	1.753	2.131	2.602	2.947	3.733
16	1.337	1.746	2.120	2.583	2.921	3.686
17	1.333	1.740	2.110	2.567	2.898	3.646
18	1.330	1.734	2.101	2.552	2.878	3.610
19	1.328	1.729	2.093	2.539	2.861	3.579
20	1.325	1.725	2.086	2.528	2.845	3.552
21	1.323	1.721	2.080	2.518	2.831	3.527
22	1.321	1.717	2.074	2.508	2.819	3.505
23	1.319	1.714	2.069	2.500	2.807	3.485
24	1.318	1.711	2.064	2.492	2.797	3.467
25	1.316	1.708	2.060	2.485	2.787	3.450
26	1.315	1.706	2.056	2.479	2.779	3.435
27	1.314	1.703	2.052	2.473	2.771	3.421
28	1.313	1.701	2.048	2.467	2.763	3.408
29	1.311	1.699	2.045	2.462	2.756	3.396
30	1.310	1.697	2.042	2.457	2.750	3.385
31	1.309	1.696	2.040	2.453	2.744	3.375
32	1.309	1.694	2.037	2.449	2.738	3.365
33	1.308	1.692	2.035	2.445	2.733	3.356
34	1.307	1.691	2.032	2.441	2.728	3.348
35	1.306	1.690	2.030	2.438	2.724	3.340

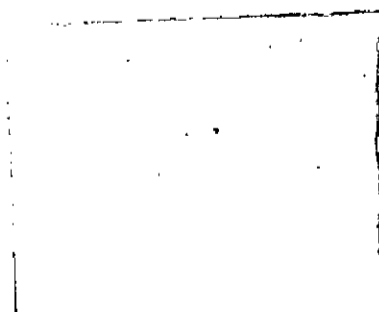
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Area in the Right Tail under the <i>t</i> Distribution Curve						
<i>df</i>	.10	.05	.025	.01	.005	.001
36	1.305	1.688	2.028	2.434	2.719	3.333
37	1.305	1.687	2.025	2.431	2.715	3.326
38	1.304	1.686	2.024	2.429	2.712	3.319
39	1.304	1.685	2.023	2.426	2.708	3.313
40	1.303	1.684	2.021	2.423	2.704	3.307
41	1.303	1.683	2.020	2.421	2.701	3.301
42	1.302	1.682	2.018	2.418	2.698	3.296
43	1.302	1.681	2.017	2.416	2.695	3.291
44	1.301	1.680	2.015	2.414	2.692	3.286
45	1.301	1.679	2.014	2.412	2.690	3.281
46	1.300	1.679	2.013	2.410	2.687	3.277
47	1.300	1.678	2.012	2.408	2.685	3.273
48	1.299	1.677	2.011	2.407	2.682	3.269
49	1.299	1.677	2.010	2.405	2.680	3.265
50	1.299	1.676	2.009	2.403	2.678	3.261
51	1.298	1.675	2.008	2.402	2.676	3.256
52	1.298	1.675	2.007	2.400	2.674	3.255
53	1.298	1.674	2.006	2.399	2.672	3.251
54	1.297	1.674	2.005	2.397	2.670	3.248
55	1.297	1.673	2.004	2.396	2.668	3.245
56	1.297	1.673	2.003	2.395	2.667	3.242
57	1.297	1.672	2.002	2.394	2.665	3.239
58	1.296	1.672	2.002	2.392	2.663	3.237
59	1.296	1.671	2.001	2.391	2.662	3.234
60	1.296	1.671	2.000	2.390	2.660	3.232
61	1.296	1.670	2.000	2.389	2.659	3.229
62	1.295	1.670	1.999	2.388	2.657	3.227
63	1.295	1.669	1.998	2.387	2.656	3.225
64	1.295	1.669	1.998	2.386	2.655	3.223
65	1.295	1.669	1.997	2.385	2.654	3.220
66	1.295	1.668	1.997	2.384	2.652	3.218
67	1.294	1.668	1.996	2.383	2.651	3.216
68	1.294	1.668	1.995	2.382	2.650	3.214
69	1.294	1.667	1.995	2.382	2.649	3.213
70	1.294	1.667	1.994	2.381	2.648	3.211
71	1.294	1.667	1.994	2.380	2.647	3.209
72	1.293	1.666	1.993	2.379	2.646	3.207
73	1.293	1.666	1.993	2.379	2.645	3.206
74	1.293	1.666	1.993	2.378	2.644	3.204
75	1.293	1.665	1.992	2.377	2.643	3.202
∞	1.282	1.645	1.960	2.326	2.576	3.090

This is Table A of Appendix C.



BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1 BURP Examinations 2022-2023

Sub: **HUM 179** (Sociology)

Full Marks: 210

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) 'Everything is connected to everything else' – explain this statement in terms of human ecology. Describe the urban ecological process. (12)
- (b) Define global warming. What are the negative impacts of global warming? (15)
- (c) Briefly discuss the disposable society. (8)
2. (a) Demonstrate the anomie condition and deviant behavior of a society. (10)
- (b) How do different modes of socially accepted means and goals create deviance in a society? Explain with Merton's anomie theory of deviance. (15)
- (c) Write down the features of white-collar crime. (10)
3. (a) What are the advantages and disadvantages of a megacity? (10)
- (b) Discuss the different sources of social change. (15)
- (c) Describe the different evolutionary stages of cities on the basis of Mumford's theory. (10)
4. Write short notes on any **THREE** of the following – (35)
  - (a) Demographic Transition Theory
  - (b) 4R (Reuse, reduce, recycle, refuse)
  - (c) Features of capitalism
  - (d) Social consequences of the Industrial Revolution

**SECTION – B**There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Demonstrate the underlying factors that contributed to the development of sociology as an independent discipline. (20)
- (b) In what ways does the interactionist theoretical perspective illuminate the dynamics of social relationships across diverse cultural contexts? (15)

**HUM 179/URP**

6. (a) 'The history of all hitherto existing society is the history of class struggles' – explain this statement on the basis of Karl Marx's view of social stratification. (15)
- (b) Write down the social significance of ascribed status and achieved status. (10)
- (c) Explain caste system and social class system of social stratification with examples. (10)
7. (a) Illustrate the nature of absolute poverty and relative poverty. (10)
- (b) Briefly discuss Lee's theory of migration. (10)
- (c) Critically evaluate the roles of different agents of socialization. (15)
8. Write short notes on any THREE of the following: (35)
- (a) Types of social mobility.
- (b) Sub culture, counter culture and ethnocentrism.
- (c) Sociological imagination.
- (d) Primary socialization and re-socialization.
-

**SECTION – A**There are **FOUR** questions in this section. Answer any **THREE**.

(Assume reasonable values for missing data, if any)

1.

	C <sub>3</sub> S	C <sub>2</sub> S	C <sub>3</sub> A	C <sub>3</sub> AF
Type III	60	15	10	8
Type IV	25	50	5	12

**Table: 1**The chemical components of Type III and Type IV Portland cement are given in **Table:**1. According to **Table: 1** answer (a) and (b).

(a) Show a comparison between these two types of cement according to the rate of strength development and heat of hydration with proper justification. (7 ½)

(b) Relate the use of Type III Portland Cement in different construction sites according to its chemical components given in **Table: 1**. (6)

(c) Explain the process of hydration with necessary diagrams. (6)

(d) How do you prevent immediate stiffening of the cement paste? (4)

2. Two concrete mixtures have shown two different distresses during the plastic stage as described below.

**Mixture A:** Different constituents of the heterogeneous mixture have been separated so that their distribution is no longer uniform.**Mixture B:** Water rose to the surface of freshly placed concrete.(a) What is the process described for **Mixture A** and what are the causes behind it? (2+5 ½)(b) What are the effects of **Mixture B**? (5)(c) When will **Mixture B** show laitance property? What is the effect of it? (2+4)

(d) Explain briefly the factors affecting the workability of concrete. (5)

3. (a) Explain the use of ferro-cement for repairing non-structural distresses. Draw a typical section of ferro-cement and list the component materials of ferro-cement. (4+5 ½)

(b) Why does corrosion occur in metal? What measures should be taken to prevent corrosion in Steel members? (4+5)

(c) What are the disadvantages of using FRP as reinforcements? (5)

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4. (a) What are the uses of FRP in Civil Engineering? (5)
- (b) What are the problems and solutions associated with the lack of durability of concrete? (5 ⅓)
- (c) Differentiate between creep and fatigue properties of concrete. Explain the effect of the Water/Cement Ratio on strength of concrete. (6+3)
- (d) At 8% moisture content the bulking of fine aggregate is 33% and the bulking of coarse aggregate is 11%. Suppose the real mix ratio based on dry volume of aggregate is 1:2:4; what will be the field mix ratio at 8% moisture content? (4)

**SECTION – B**

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

5. (a) What is the difference between wood and timber? What is the difference between rough timber and converted timber? Briefly describe the forms of timber in chronological order. (8)
- (b) Draw the structure of a tree. What are the sources of timber suitable for civil engineering applications? Write down some advantages and disadvantages of timber. (7)
- (c) What are the mechanical properties of wood? Briefly describe the mechanical properties which are commonly measured for design requirements. (8 ⅓)
6. (a) What are the benefits of using lime as a building material? Explain the lime and lime mortar cycle. (7)
- (b) What are the different types of lime? Briefly describe the different types of lime with comparison. (6)
- (c) What is calcination? Briefly describe the common types of kiln used for calcination process? What are the factors on which the kiln selection depends? Which kiln would you choose for the calcination process? (10 ⅓)
7. (a) What are the advantages of using brick as a construction element? What is the standard brick size used in our country as per P.W.D? (4)
- (b) Classify bricks based on physical and mechanical properties. Briefly describe the bricks used for load bearing walls and partition walls. (5)
- (c) What are the chief ingredients of a burnt clay brick? A burnt clay brick sample was found to be of bluish color and brittle. Briefly describe the chief ingredients, the excess of which might have led to such observation. (5)

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**Contd ... Q. No. 7**

(d) Five first class brick samples are tested for absorption and compressive strength. Bricks are cut into identical halves along the length. The dimensions of the half used for compressive strength test are designated as 'Side 1'. The dimensions of the half used for absorption test are designated as 'Side 2'. Following results are obtained from the test. (9 1/3)

Sample	Dimension (inch)				Observed Load (lb)	SSD Weight of Brick (lb)
	Side 1		Side 2			
	Length	Width	Length	Width		
1	4.55	4.6	4.5	4.55	52245	3.65
2	4.5	4.55	4.5	4.5	50562	3.61
3	4.6	4.55	4.6	4.55	52132	3.57
4	4.5	4.6	4.55	4.55	53671	3.67
5	4.5	4.5	4.6	4.6	52456	3.55

Compression testing machine calibration equation:  $Y \text{ (lb)} = 1.0452X - 6.7481$

Calculate compressive strength and absorption capacity of brick. Assume unit weight of the brick = 100 lb/ft<sup>3</sup> and average depth of each brick = 2.75 inch.

8. (a) Classify sand according to the Unified Soil Classification System (USCS) under ASTM D 2487 and mention their uses. (5)
- (b) What is Fineness Modulus of aggregate? What are the standard sieve sizes used for determining the Fineness Modulus of fine aggregates? (3)
- (c) Write down some deleterious substances which are found in aggregates. (5)

A test on specific gravity determination is conducted on a coarse aggregate sample. The following observations were made from the test:

Oven dry weight of sample: 3970 gm

The weight of water in the permeable pores: 15 gm

Air dry weight of sample: 3980 gm

The weight of water occupying a volume equal to that of an oven-dry aggregate: 1500 gm

Calculate the following properties of the sample:

- (i) Apparent Specific Gravity (OD Basis),  $S_a$
- (ii) Bulk Specific Gravity (OD Basis),  $S_d$
- (iii) Bulk Specific Gravity (SSD Basis),  $S_s$

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**Contd ... Q. No. 8(c)**

(d) Estimate the mix ratio of Aggregates 1, 2, 3 and 4 to obtain the aggregate blend to meet the specification. Also, determine the % passing for the combined aggregate in each sieve.

(10 1/3)

Sieve Size		% Passing				Specifications
mm	inch	Aggregate 01	Aggregate 02	Aggregate 03	Aggregate 04	% Passing
175	7	100	-	-	-	
150	6	98	-	-	-	
100	4	30	100	-	-	
75	3	10	92	-	-	70
50	2	2	30	100	-	
37.5	1.5	0	6	94	-	24
25	1	0	4	36	100	
19	3/4	0	0	4	92	8
9.5	3/8	0	0	2	30	
4.75	No. 4	0	0	0	2	

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