

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

The abbreviations have their usual meaning.

1. (a) Explain with examples the trend line methods of population projection. (20)
 (b) Why the understanding of population projection is important for planners? (7)
 (c) Write short note on 'cohort'. (5)
 (d) Transform the following equations in the form of linear regression equations. (1 1/2 × 2 = 3)

(i) $y = \alpha + \frac{\beta}{\sqrt{x}}$

(ii) $y = \alpha + \frac{\beta}{x + v} + u$

2. Following data are collected from annual reports of a real estate firm. The table shows the number of dwelling units sold in the last 10 years.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
No. of dwelling Units sold out	16	21	9	18	15	20	10	18	17	24

- (a) Set the trend line using ordinary least square (OLS) method. (15)
 (b) Calculate the estimated sales for the given years. (10)
 (c) Calculate cyclical variation in the data using 'percent of trend' and 'relative cyclical residual' method. (10)
3. (a) The following information are calculated from 10 randomly selected taxi passengers of a region.

$$\begin{aligned} \sum X &= 420, & \sum Y &= 1922, & \sum XY &= 84541 \\ \sum X^2 &= 18228, & \sum Y^2 &= 395024 \end{aligned}$$

Where, X is the length of trip made by taxi (meter) and Y is taxi-fare.

- (i) Calculate the value of 'co-efficient of determination' and 'correlation co-efficient'. (4+2=6)
 (ii) Interpret the value of both the co-efficients as derived in question no. 3(a)(i). (2+4=6)
 (iii) Test the hypothesis, $H_0 : \beta = 6$ against the alternative hypothesis $\beta > 6$ at the 5% significance level. Here, β stands for the regression co-efficient. (16)
 (b) State the advantages of both parametric and non-parametric tests. (7)

PLAN 293

4. (a) A state commission, designed to monitor energy consumption, assembled the following seasonal data on natural gas consumption (in millions of cubic feet):

Year	Winter	Spring	Summer	Fall
2007	293	246	231	282
2008	301	252	227	291
2009	304	259	239	296
2010	306	265	240	300

Using the data, the percentage of actual to moving average value for each quarter is calculated. The values are summarized in the following table:

Year	Winter	Spring	Summer	Fall
2007	---	---	87.5	106.11
2008	113.16	94.51	84.66	108.03
2009	111.87	94.57	86.99	107.34
2010	110.62	95.58	---	---

- (i) Determine the modified seasonal indices and the seasonal indices. (12)
 - (ii) Deseasonalize the data regarding natural gas consumption. (8)
 - (iii) What could be other uses of seasonal indices? Explain with example. (5)
- (b) Distinguish between – (5×2=10)
- (i) Standard deviation and standard error of estimates.
 - (ii) target and control variable.

SECTION – B

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

5. (a) Starting salary of planning graduates working in a city A are assumed to be the same as the starting salary of planning graduates in city B. A random sample of 41 planning graduates from city A produced a mean salary of Taka 10,250/- per month and a standard deviation of Taka 200/-. A random sample of 33 planning graduates from city B produced a mean salary of Taka 10,150/- and a standard deviation of Taka 180/-. Test the hypothesis using 5% significance level. (17 1/2)
- (b) The new director of the waste management department of a municipality is interested in the proportion of the residents of the municipality who are totally satisfied with the performance of his department. The previous director had 86 percent of the residents totally satisfied and the new director feels that the same is true to day. The new director sampled 187 residents of the municipality and found 157 were totally satisfied with his department's activities. At the 1 percent significance level, is there evidence that what the new director feels is valid? (17 1/2)

PLAN 293

6. The following table shows the number of apartments of same size and quality sold by a real estate company in three different locations of Dhaka. A planner wants to know whether there is variation among the locations in terms of the average number of apartments sold.

Location-A	Location-B	Location-C
40	24	50
30	36	56
48	20	60
36	30	64

- (a) State the null hypothesis and alternate hypothesis. (5)
- (b) Calculate the SST, SSE and SS_{total} . (15)
- (c) Develop an ANOVA table. (10)
- (d) At the 0.05 significance level, is there a difference in the mean number of apartments sold in three locations? (5)

7. A sample of people was asked by a research team to rate the ethical standards of various professional groups. Some of the results are shown below:

Professional Groups	Ethical Standards		
	High	Average	Low
Medical doctors	36	110	40
Lawyers	48	86	54
Professor	106	70	20
Business executive	28	86	36

- (a) State the null and alternative hypotheses. (5)
- (b) Compute the Chi-square statistic. (20)
- (c) At the 0.10 significance level, test whether the selected professions are related with respect to ethical standards. (10)

8. An urban planner carried out a sample survey in a ward of Dhaka city to have an idea about the satisfaction levels of the residents of the ward regarding supply of water, electricity and gas. The table below shows the results of the survey:

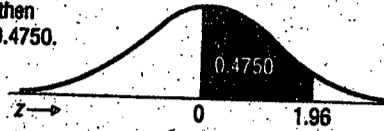
Supply of	Frequency of Responses		
	Satisfied	Not satisfied	Total
Water	120	180	300
Electricity	100	190	290
Gas	160	120	280
Total	380	490	870

- (a) Construct a suitable scale and specify the computational formula. (10)
- (b) Compute the satisfaction indexes. (20)
- (c) Interpret the results. (5)

Appendix D

Areas under the Normal Curve

Example:
If $z = 1.96$, then
 $P(0 \text{ to } z) = 0.4750$.

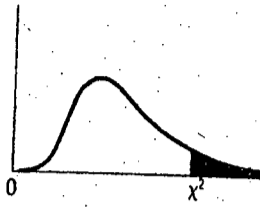


z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

Appendix B

Critical Values of Chi-Square

This table contains the values of χ^2 that correspond to a specific right-tail area and specific number of degrees of freedom.



Example: With 17 *df* and a .02 area in the upper tail, $\chi^2 = 30.995$

Degrees of Freedom, <i>df</i>	Right-Tail Area			
	0.10	0.05	0.02	0.01
1	2.706	3.841	5.412	6.635
2	4.605	5.991	7.824	9.210
3	6.251	7.815	9.837	11.345
4	7.779	9.488	11.668	13.277
5	9.236	11.070	13.388	15.086
6	10.645	12.592	15.033	16.812
7	12.017	14.067	16.622	18.475
8	13.362	15.507	18.168	20.090
9	14.684	16.919	19.679	21.666
10	15.987	18.307	21.161	23.209
11	17.275	19.675	22.618	24.725
12	18.549	21.026	24.054	26.217
13	19.812	22.362	25.472	27.688
14	21.064	23.685	26.873	29.141
15	22.307	24.996	28.259	30.578
16	23.542	26.296	29.633	32.000
17	24.769	27.587	30.995	33.409
18	25.989	28.869	32.346	34.805
19	27.204	30.144	33.687	36.191
20	28.412	31.410	35.020	37.566
21	29.615	32.671	36.343	38.932
22	30.813	33.924	37.659	40.289
23	32.007	35.172	38.968	41.638
24	33.196	36.415	40.270	42.980
25	34.382	37.652	41.566	44.314
26	35.563	38.885	42.856	45.642
27	36.741	40.113	44.140	46.963
28	37.916	41.337	45.419	48.278
29	39.087	42.557	46.693	49.588
30	40.256	43.773	47.962	50.892

DISTRIBUTION OF χ^2

Degrees of Freedom	Probability						
	.50.	.30.	.20.	.10.	.05.	.02.	.01.
1	.455	1.074	1.642	2.706	3.841	5.412	6.635
2	1.386	2.408	3.219	4.605	5.991	7.824	9.210
3	2.366	3.665	4.642	6.251	7.815	9.837	11.345
4	3.357	4.878	5.989	7.779	9.488	11.668	13.277
5	4.351	6.064	7.289	9.236	11.070	13.388	15.086
6	5.348	7.231	8.558	10.645	12.592	15.033	16.812
7	6.346	8.383	9.803	12.017	14.067	16.622	18.475
8	7.344	9.524	11.030	13.362	15.507	18.168	20.090
9	8.343	10.656	12.242	14.684	16.919	19.679	21.666
10	9.342	11.781	13.442	15.987	18.307	21.161	23.209
11	10.341	12.899	14.631	17.275	19.675	22.618	24.725
12	11.340	14.011	15.812	18.549	21.026	24.054	26.217
13	12.340	15.119	16.985	19.812	22.362	25.472	27.688
14	13.339	16.222	18.151	21.064	23.685	26.873	29.141
15	14.339	17.322	19.311	22.307	24.996	28.259	30.578
16	15.338	18.418	20.465	23.542	26.296	29.633	32.000
17	16.338	19.511	21.615	24.769	27.587	30.995	33.409
18	17.338	20.601	22.760	25.989	28.869	33.346	34.805
19	18.338	21.689	23.900	27.204	30.144	33.687	36.191
20	19.337	22.775	25.038	28.412	31.410	35.020	37.566
21	20.337	23.858	26.171	29.615	32.671	36.343	38.932
22	21.337	24.939	27.301	30.813	33.924	37.659	40.289
23	22.337	26.018	28.429	32.007	35.172	38.968	41.638
24	23.337	27.096	29.553	33.196	36.415	40.270	42.980
25	24.337	28.172	30.675	34.382	37.652	41.566	44.314
26	25.336	29.246	31.795	35.563	38.885	42.856	45.642
27	26.336	30.319	32.912	36.741	40.113	44.140	46.963
28	27.336	31.391	34.027	37.916	41.337	45.419	48.278
29	28.336	32.461	35.139	39.087	42.557	46.693	49.588
30	29.336	33.530	36.250	40.256	43.773	47.962	50.892

Appendix L is abridged from Table IV of Fisher and Yates: *Statistical Tables for Biological, Agricultural, and Medical Research*, published by Oliver and Boyd Ltd., Edinburgh, and by permission of the authors and publishers.

DISTRIBUTION OF F
F₁ (ROMAN TYPE) AND F₂ (BOLD FACE TYPE) POINTS FOR THE DISTRIBUTION OF F

TABLE IV(b) Values of $F_{0.01}$ †

Degrees of freedom for denominator	Degrees of freedom for numerator																		
	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	4.052	5.000	5.403	5.625	5.764	5.859	5.928	5.982	6.023	6.056	6.106	6.157	6.209	6.235	6.261	6.287	6.313	6.339	6.366
2	98.5	99.0	99.2	99.2	99.3	99.3	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.5	99.5	99.5	99.5	99.5	99.5
3	34.1	30.8	29.5	28.7	28.2	27.9	27.7	27.5	27.3	27.2	27.1	26.9	26.7	26.6	26.5	26.4	26.3	26.2	26.1
4	21.2	18.0	16.7	16.0	15.5	15.2	15.0	14.8	14.7	14.5	14.4	14.2	14.0	13.9	13.8	13.7	13.7	13.6	13.5
5	16.3	13.3	12.1	11.4	11.0	10.7	10.5	10.3	10.2	10.1	9.89	9.72	9.55	9.47	9.38	9.29	9.20	9.11	9.02
6	13.7	10.9	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.72	7.56	7.40	7.31	7.23	7.14	7.06	6.97	6.88
7	12.2	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.47	6.31	6.16	6.07	5.99	5.91	5.82	5.74	5.65
8	11.3	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.67	5.52	5.36	5.28	5.20	5.12	5.03	4.95	4.86
9	10.6	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.11	4.96	4.81	4.73	4.65	4.57	4.48	4.40	4.31
10	10.0	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.71	4.56	4.41	4.33	4.25	4.17	4.08	4.00	3.91
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.40	4.25	4.10	4.02	3.94	3.86	3.78	3.69	3.60
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.16	4.01	3.86	3.78	3.70	3.62	3.54	3.45	3.36
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	3.96	3.82	3.66	3.59	3.51	3.43	3.34	3.25	3.17
14	8.86	6.51	5.56	5.04	4.70	4.46	4.28	4.14	4.03	3.94	3.80	3.66	3.51	3.43	3.35	3.27	3.18	3.09	3.00
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.67	3.52	3.37	3.29	3.21	3.13	3.05	2.96	2.87
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.55	3.41	3.26	3.18	3.10	3.02	2.93	2.84	2.75
17	8.40	6.11	5.19	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.46	3.31	3.16	3.08	3.00	2.92	2.83	2.75	2.65
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.37	3.23	3.08	3.00	2.92	2.84	2.76	2.67	2.57
19	8.19	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.30	3.15	3.00	2.92	2.84	2.76	2.67	2.58	2.49
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.23	3.09	2.94	2.86	2.78	2.69	2.61	2.52	2.42
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.17	3.03	2.88	2.80	2.72	2.64	2.55	2.46	2.36
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.12	2.98	2.83	2.75	2.67	2.58	2.50	2.40	2.31
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	3.07	2.93	2.78	2.70	2.62	2.54	2.45	2.35	2.26
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.03	2.89	2.74	2.66	2.58	2.49	2.40	2.31	2.21
25	7.77	5.57	4.68	4.18	3.86	3.63	3.46	3.32	3.22	3.13	2.99	2.85	2.70	2.62	2.53	2.45	2.36	2.27	2.17
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.84	2.70	2.55	2.47	2.39	2.30	2.21	2.11	2.01
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.66	2.52	2.37	2.29	2.20	2.11	2.02	1.92	1.80
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.50	2.35	2.20	2.12	2.03	1.94	1.84	1.73	1.60
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.34	2.19	2.03	1.95	1.86	1.76	1.66	1.53	1.38
∞	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.18	2.04	1.88	1.79	1.70	1.59	1.47	1.32	1.00

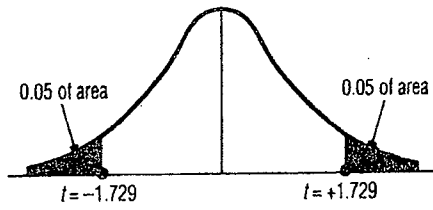
Table A.7 Critical Values F_{α, ν_1, ν_2} for the F Distribution

$\alpha = .05$

$\nu_1 \backslash \nu_2$	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.26	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	4.26	3.40	3.01	2.76	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.96	1.94	1.89	1.84	1.79	1.73
25	4.24	3.39	2.99	2.76	2.59	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	4.23	3.37	2.98	2.74	2.57	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.20	1.00

Appendix Tables

(continued)



Appendix Table 2

Areas in Both Tails Combined for Student's *t* Distribution

Example:
 To find the value of *t* that corresponds to an area of 0.10 in both tails of the distribution combined, when there are 19 degrees of freedom, look under the 0.10 column, and proceed down to the 19 degrees of freedom row, the appropriate *t* value there is 1.729.

Degrees of Freedom	Area in Both Tails Combined			
	0.10	0.05	0.02	0.01
1	6.314	12.706	31.821	63.657
2	2.920	4.303	6.965	9.925
3	2.353	3.182	4.541	5.841
4	2.132	2.776	3.747	4.604
5	2.015	2.571	3.365	4.032
6	1.943	2.447	3.143	3.707
7	1.895	2.365	2.998	3.499
8	1.860	2.306	2.896	3.355
9	1.833	2.262	2.821	3.250
10	1.812	2.228	2.764	3.169
11	1.796	2.201	2.718	3.106
12	1.782	2.179	2.681	3.055
13	1.771	2.160	2.650	3.012
14	1.761	2.145	2.624	2.977
15	1.753	2.131	2.602	2.947
16	1.746	2.120	2.583	2.921
17	1.740	2.110	2.567	2.898
18	1.734	2.101	2.552	2.878
19	1.729	2.093	2.539	2.861
20	1.725	2.086	2.528	2.845
21	1.721	2.080	2.518	2.831
22	1.717	2.074	2.508	2.819
23	1.714	2.069	2.500	2.807
24	1.711	2.064	2.492	2.797
25	1.708	2.060	2.485	2.787
26	1.706	2.056	2.479	2.779
27	1.703	2.052	2.473	2.771
28	1.701	2.048	2.467	2.763
29	1.699	2.045	2.462	2.756
30	1.697	2.042	2.457	2.750
40	1.684	2.021	2.423	2.704
60	1.671	2.000	2.390	2.660
120	1.658	1.980	2.358	2.617
Normal Distribution	1.645	1.960	2.326	2.576

F. VII
15.12.14

L-2/T-2/Burp

Date : 15/12/2014

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-2 B. Urp. Examinations 2012-2013

Sub : **PLAN 215** (Urban Planning Techniques)

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) Draw a neat diagram and explain the sequences of land use plan making process for residential land use. (20)
- (b) What are the recommended order of categories of land uses for urban land use design? (6)
- (c) What do you understand by the term "Transit Oriented Development?" (9)

2. (a) Briefly explain the concept of "Ecological footprint". (9)
- (b) Many city authorities offer incentives to developers to encourage 'Smart Growth', discuss with three examples of such programs. (7)
- (c) Briefly discuss the laws and policies to conserve and manage flood zones of Dhaka Metro Area. Give example of three development management tools which can be applied to save these flood zones. (10+9)

3. (a) Why "urban agenda" have become the priority of governments, local authorities and non-government organization? (5)
- (b) Compare the urbanization characteristics of 'first world' and 'third world'. (10)
- (c) Discuss the key features of urbanization in Bangladesh and associated consequences. (20)

4. (a) Explain the statement "The land use design and the development management plan should be mutually supportive". (9)
- (b) Briefly discuss on "program of actions" which is included in the development management plan. (17)
- (c) Explain the terms "Land mark" and "node" according to Kevin Lynch. (9)

SECTION - B

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

5. What is the meaning of "Structure" in the system of Structure Planning? What are the functions and contents of a Structure Plan? (35)

PLAN 215

6. (a) What is the concept of Site and Service scheme? What are the major elements, actors and actions in Site and Service Scheme? **(4+8=12)**
- (b) Briefly explain the crucial elements of Land Readjustment Techniques. **(5)**
- (c) What are the prerequisites to make a Land Readjustment project fruitful in urban area? **(18)**
7. (a) Define Master Plan. Explain the reasons behind inappropriateness of the conventional methods of master plan. **(3+12=15)**
- (b) What are the types of local plans? Give a brief outline of the different area characteristics of an urban area. **(6+14=20)**
8. (a) What are the problems for which Urban Renewal becomes necessary? Briefly discuss the renewal methods to address those problems. **(6+6=12)**
- (b) 'Land value is inversely related to property tax' - briefly explain. How does taxation help to control Land Speculation, inflation and monopoly ownership of urban property? **(3+6=9)**
- (c) Write down the applications of density zoning. What is the working procedure for Land Readjustment? **(7+7=14)**
-

SECTION – A

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

1. (a) What is a geographic information system (GIS) and why is it important? What is special about it? (15)
- (b) Describe the two methods of representing geographic data in GIS. (15)
- (c) Explain with examples the 'Continuous surface' and the 'discrete surface' of visualizing spatial data. (5)

2. (a) Discuss with an example the raster overlay technique to derive suitable land for a development purpose. Draw a schematic diagram to explain it. (11)
- (b) Why it is important to create topological relationship between different features? Explain the terms 'Contiguity' , 'area definition' and 'connectivity'. Draw diagrams on your own and show how to build 'arc-node topology', 'polygon-arc topology', 'left-right topology'. (12)
- (c) Discuss the different techniques of measuring shape of a polygon feature in GIS. (12)

3. (a) What do you mean by 'nearest neighbor'? Give a short description on nearest neighbor analysis of GIS. (10)
- (b) What is 'roving window'? Explain the functions of roving window. (10)
- (c) Explain the 'classification' and 're-classification' techniques of different types of GIS data model. (15)

4. Write short notes on the followings (any seven): (7×5=35)
 - (a) Locaiton-allocaiton technique,
 - (b) High-pass filter,
 - (c) Connectivity Analysis,
 - (d) Manhattan distance,
 - (e) Least-cost distance,
 - (f) Kriging,
 - (g) DEM and TIN,
 - (h) IWD and Spline.

PLAN 261

SECTION – B

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

5. (a) Explain in your own words 'spectral signature'. Why it is important to learn about spectral signature? **(3+2)**

(b) You are working over an area of 10,000 sq.km. The scale of your work is 1:5000. You need to have a 3D coverage for analysis. Vendors give you the prices of images for different sensors. The price quoted is provided in the following table. **(3+12)**

Sensor	Price (in \$)
Land Sat MSS	0.07
Land Sat TM	0.16
SPOT HRV	0.35
SPOT HGM	0.45
IKONOS	0.5

- (i) Which image would you buy?
- (ii) Explain the reasons for choosing the image.

(c) Why one need to use false color imaging in remote sensing? **(5)**

(d) How energy interacts with atmosphere? -Explain the effects of scattering on image? **(6+4)**

6. (a) Describe the differences between sensors of Land Sat-7 and Land Sat-8. **(10)**

(b) Why geometric errors occur in image. Write down the characteristics of different levels of 'SPOT Scene' on the basis of radiometric and geometric character. **(14+6)**

(c) Write down the differences among grey level thresholding, level slicing and contrast stretching. **(5)**

7. (a) What is training data set? Write down the sequences an image interpreter follow in selecting training data set. While choosing training data set, what would the image interpreter consider? **(3+16+6)**

(b) The following table provides the error matrix resulting from classifying randomly selected test pixels. Determine the different kinds of accuracy. **(10)**

Land Use Type	A	B	C	D	E
A	250	5	2	5	0
B	23	241	12	70	9
C	10	08	217	23	41
D	17	10	5	202	15
E	8	21	21	42	241

8. (a) Write short notes on the following (Any four): **(4×5)**

- (i) Polar and Geo-stationary Satellite,
- (ii) Digital Image Structure,
- (iii) Radiometry of sensor,
- (iv) Numeric filters,
- (v) EO-1 Satellite Sensors.

(b) Describe the strategies available for image interpreters during visual interpretation of image. **(15)**

SECTION – A

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

1. (a) What do you understand by fiscal policy. Explain the main objectives of fiscal policy. (20)
- (b) "Taxation is the most effective instrument of fiscal policy". Justify the statement. (15)
2. (a) What do you understand by public borrowing? How does public borrowing help in economic development of a developing country like Bangladesh? (20)
- (b) Explain the role of public expenditure in economic development. (15)
3. (a) What are the main sources of government revenue? What new sources do you suggest for raising more revenue for government? (20)
- (b) Explain proportional, progressive, regressive and lump-sum taxes with examples. (15)
4. (a) What do you understand by tax base and tax rate? (10)
- (b) Explain different types of indirect taxes. (10)
- (c) What do you understand by incidence of tax? Explain the role of demand and supply elasticities on incidence of tax. (15)

SECTION – B

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

5. (a) What is Externality? (10)
- (b) Explain the undesirable effect of externality on resource allocation. (10)
- (c) Explain how externality can be internalized by imposing tax and subsidy. (15)
6. (a) Briefly explain the first and second welfare theorem. (10)
- (b) Explain how market system ensures maximum welfare society under appropriate assumptions. (15)
- (c) Which of the welfare theorem provide a rationale for Government intervention in the market system? Explain in short. (10)

HUM 221

7. (a) What do you know by public good? (5)
- (b) Explain how each of the characteristics of public good results in market failure. (10)
- (c) Derive the efficient provision of public good both mathematically and graphically. (20)
8. (a) Discuss different problems and shortcomings associated with majority voting equilibrium. (20)
- (b) What is meant by majority voting equilibrium? What are the advantages of majority voting equilibrium? (15)

L-2/T-2/URP

Date : 16/01/2015

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-2 BURP Examinations 2012-2013

Sub : **HUM 281** (Political Science and Local Government)

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) Discuss the constituent elements of a modern state. (15)
(b) What is constitution? Describe types of constitution with examples. (20)
2. (a) Discuss the characteristics of a unitary state. (15)
(b) Analyze the merits and demerits of presidential form of government. (20)
3. (a) Write down the political rights of a citizen in a state. (10)
(b) Illustrate the nature of dictatorship. (10)
(c) Discuss the functions of the executive in a state. (15)
4. Write short notes on three (3) of the following: (35)
(a) Sovereignty
(b) Independence of Judiciary
(c) Government in South Asia
(d) Federal State.

SECTION – B

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

5. (a) Discuss the salient features of the constitution of Bangladesh. (15)
(b) Analyze the principles of Bangladesh foreign policy. (20)
 6. (a) Describe the functions of hill-district local government institutions in Bangladesh. (15)
(b) Explain the importance of training of the local government functionaries in Bangladesh. (20)
 7. (a) Analyze the constitutional and legal basis of local government in Bangladesh. (10)
(b) Explain the urban local government structure in Bangladesh. (10)
(c) Discuss the constraints of local government institutions in Bangladesh. (15)
 8. (a) Write short notes on any three (3) of the following: (35)
(a) UNO (b) Women in Union Parishad (c) Language Movement (d) Political System of UK.
-

L-2/T-2/ARCH URP

Date : 11/01/2015

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-2 B. Arch Examinations 2012-2013

Sub : ARCH 233 (Landscape Planning and 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 Q. No. **1** and any **TWO** from the rest.

1. Write notes on : (15×2=30)
 - (a) Features of Mughal Garden
 - (b) Italian garden of Renaissance and Late Renaissance period.

2. (a) Define Landscape Design. Mention the objectives of Landscape design. (5)
 - (b) Mention the scope and domain of Landscape Planning. (7)
 - (c) Why is it necessary for planners to learn about Landscape design and planning? (8)

3. (a) "Ecosystems are complex adaptive systems" - explain with examples. (10)
 - (b) Explain how an ecosystem can function as a whole. (10)

4. "A planner needs to know about Bio-diversity in order to design high-functioning landscape" - Explain. (20)

SECTION – B

There are **FOUR** questions in this Section. Answer Q. No. **5** and any **TWO** from the rest.

5. (a) Define landscape conservation. State the key elements of landscape conservation. (5)
 - (b) State the landscape conservation principles. (5)
 - (c) Define-'Ecosystem based conservation planning'. (8)
 - (d) Critically discuss the importance of 'Community-based conservation' in regional planning level. (12)

 6. (a) State the important site considerations during landscape planning process. (12)
 - (b) Mention the steps of the planning process. (8)

 7. (a) What is planting? What are the steps involved in planting? (12)
 - (b) State the factors that distinguish the planting season. (8)

 8. (a) Write short notes on: (10×2=20)
 - (a) Eco-System Services
 - (b) Eco-System of Sal-forest.
-