TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
ECE 2318: TRANSPORTATION ENGINEERING I
END OF SEMESTER EXAMINATION
SERIES: sept 2017
TIME: 2 HOURS

Instructions to Candidates
You should have the following for this examination
 -*Answer Booklet, examination pass and student ID*
This paper consists of four questions.
Answer question ONE (COMPULSORY) and any other TWO questions
Do not write on the question paper.

QUESTION ONE (COMPULSORY)
As part of class practical, a group of 3rd year JKUAT civil engineering students collected the data outlined in Table Q1. If the exercise required that the confidence level be 95% and the limit of acceptable error be 1.5 km/h, determine whether these students collected the pre-requisite minimum data.   (21 marks)

Table Q1: Speed data obtained by 3rd year JKUAT students.

Car No	Speed (mi/h)	Car No	Speed (mi)h)	Car No	Speed (mi/h)	Car No	Speed (mi/h)
1	46.1	23	47.8	45	35.1	67	53.4
2	54.2	24	47.1	46	44.0	68	53.4
3	52.3	25	34.8	47	45.8	69	62.1
4	57.3	26	52.4	48	54.0	70	48.2
5	46.8	27	49.1	49	54.1	71	56.6
6	57.8	28	37.1	50	45.7	72	61.8
7	36.8	29	65.0	51	55.2	73	48.7
8	55.8	30	49.5	52	45.4	74	52.1
9	43.3	31	52.2	53	54.3	75	48.8
10	55.8	32	48.4	54	50.2	76	60.1
11	39.0	33	42.8	55	55.1	77	63.4
12	53.7	34	49.8	56	41.1	78	49.8
13	40.8	35	48.6	57	45.2	79	52.0
14	54.5	36	41.2	58	44.6	80	48.6
15	51.6	37	48.0	59	38.3	81	45.4
16	51.7	38	58.0	60	50.8	82	48.5
17	50.3	39	49.0	61	51.8	83	56.4
18	59.8	40	41.8	62	50.1	84	49.2
19	40.3	41	48.3	63	42.1	85	56.0
20	55.1	42	45.9	64	54.0	86	49.2
21	45.0	43	44.7	65	36.3		
22	48.3	44	49.5	66	44.3		

a) Having identified the desired survey population and selected a sampling unit, it is necessary to obtain a sampling frame from which to draw the sample. Outline FOUR deficiencies that these sampling frames suffer from.
   (6 marks)
b) Distinguish between a simple random sampling and stratified random sampling types of sampling methods   (3 marks)

ATTEMPT ANY TWO QUESTIONS
QUESTION TWO
a) Outline FOUR uses of transport demand models   (6 marks)

b)Prior to collecting and summarizing data for urban transportation forecasting process ,it is usually necessary to delineate the study area boundaries and to further subdivide the area into

traffic analysis zones (TAZ) for these zones is based on.
(4 marks)

c) Table Q2 shows data that have been collected for travel between suburban zone W and a downtown zone Z. If median income per year is £ 24000 and an exponent value of 2.0 is used for work travel, determine the percentage of work trips made by auto and transit if total trips between W and Z are given as 1000. Use the Quick Response system (QRS) method.
(10 marks)

Table Q2: Travel data between zones W and Z

	Auto	Transit
Distance	10 miles	8 miles
Cost per mile	£ 0.15	£ 0.10
Excess time	5 min	8 min
Parking cost	£ 1.5	
Speed	30 mi/h	20mi/h

QUESTION THREE.

a) Outline the following data collection techniques;
   i)   Observation technique
   ii)   Interview technique   (12 marks)
b) Enumerate the advantages and possible constraints of the techniques in (a) above
(8 marks)

QUESTION FOUR

a) To determine a representative value for ADT on 100 highway links that have similar volume characteristics, it was decided to collect 24-hour volume counts on a sample of these links. Estimates of mean and standard deviation of the link volumes for the type of highways in which these links are located are 32,500 and 5,500 respectively. Determine the minimum number of stations at which volume counts should be taken if a 95-5 precision level is required with 10% allowable error.
(9 marks)

b) Outline types of periodic volume counts   (6 marks)
c) State FIVE logistical impacts of intermodal facilities.   (5 marks)

Table A.1   Level of Significance for One-Tailed Test (continued)

	.250	.100	.050	.025	.010	.005	.0025	.0005
			Level of Significance for a Two-Tailed Test					
Degrees of Freedom	.500	.200	.100	.050	.020	.010	.005	.001
22.	.686	1.321	1.717	2.074	2.508	2.819	3.119	3.792
23.	.685	1.319	1.714	2.069	2.500	2.807	3.104	3.768
24.	.685	1.318	1.711	2.064	2.492	2.797	3.091	3.745
25.	.684	1.316	1.708	2.062	2.485	2.787	3.078	3.725
26.	.684	1.315	1.706	2.056	2.479	2.779	3.067	3.707
27.	.684	1.314	1.703	2.052	2.473	2.771	3.057	3.690
28.	.683	1.313	1.701	2.048	2.467	2.763	3.047	3.674
29.	.683	1.311	1.699	2.045	2.462	2.756	3.038	3.659
30.	.683	1.310	1.697	2.042	2.457	2.750	3.030	3.646
35.	.682	1.306	1.690	2.030	2.438	2.724	2.996	3.591
40.	.681	1.303	1.684	2.021	2.423	2.704	2.971	3.551
45.	.680	1.301	1.679	2.014	2.412	2.690	2.952	3.520
50.	.679	1.299	1.676	2.009	2.403	2.678	2.937	3.496
55.	.679	1.297	1.673	2.004	2.396	2.668	2.925	3.476
60.	.679	1.296	1.671	2.000	2.390	2.660	2.915	3.460
65.	.678	1.295	1.669	1.997	2.385	2.654	2.906	3.447
70.	.678	1.294	1.667	1.994	2.381	2.648	2.899	3.435
80.	.678	1.292	1.664	1.990	2.374	2.639	2.887	3.416
90.	.677	1.291	1.662	1.987	2.368	2.632	2.878	3.402
100.	.677	1.290	1.660	1.984	2.364	2.626	2.871	3.390
125.	.676	1.288	1.657	1.979	2.357	2.616	2.858	3.370
150.	.676	1.287	1.655	1.976	2.351	2.609	2.849	3.357
200.	.676	1.286	1.653	1.972	2.345	2.601	2.839	3.340
∞	.6745	1.2816	1.6448	1.9600	2.3267	2.5758	2.8070	3.2905