

**Iqra National University**  
**Department of Civil Engineering**  
**Final-Term Examination- 2020**

**Course Title: Transportation Planning and Management**

**Total Marks: 50**

**Instructor: M.Majid Naeem**

**Note: Attempt all questions.**

**Q1:** Calculate the trips distribution of each zone. Note: (Impedance exponent is 3) (15)

Zone i		Productions	Attractiveness	Interzonal Impedance, j							
S.No	Name			1	2	3	4	5	6	7	8
1	Peshawar	67000	45	45	30	45	37	60	240	45	480
2	Charsadda	63300	37	30	30	25	30	45	220	60	500
3	Mardan	59400	24	45	25	30	15	30	195	85	535
4	Nowshera	56200	28	37	30	15	25	30	180	105	547
5	Swabi	53100	24	60	45	30	30	35	170	115	580
6	Abbottabad	50300	14	240	220	195	180	170	27	280	725
7	Kohat	47800	21	45	60	85	105	115	280	30	440
8	D.I Khan	51500	13	480	500	535	547	580	725	440	25

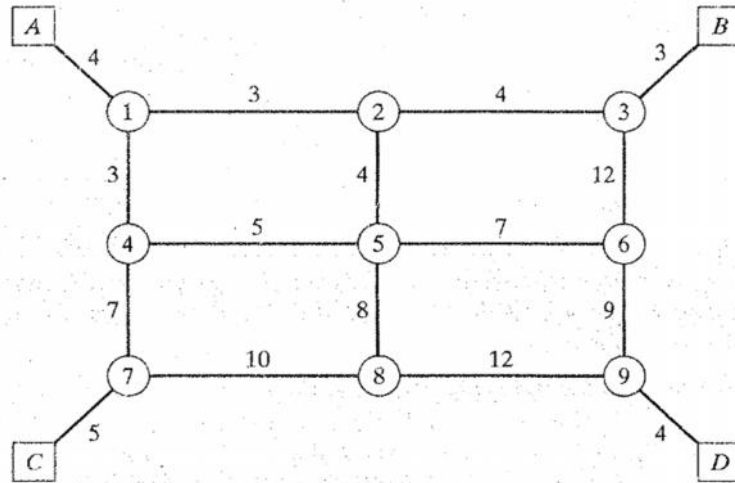
**Q2:** The choice transport modes of a city includes: Autos (A), Light Circular Rail (LCR), Local Buses (LB), Riding Bikes (RB) and Fast Rail (FR). The utility functions of each mode are:

S.No	Mode	Utility functions	C	A	W	R
1	Autos	$3.2 - 0.85C - 0.015A - 0.5W - 0.035R$	300	6	4	25
2	Light Circular Rail	$1.0 - 0.35C - 0.025A - 0.7W - 0.055R$	70	7	10	30
3	Local Buses	$1.7 - 0.15C - 0.075A - 0.9W - 0.075R$	50	10	15	40
4	Riding Bikes	$1.3 - 0.17C - 0.012A - 0.0W - 0.095R$	45	1	0	20
5	Rapid Rail	$1.5 - 0.25C - 0.095A - 0.6W - 0.025R$	90	5	20	15

Where C is the cost in Rupees, A, W & R are access, waiting & riding times in minutes respectively.

- Based on an estimate a population of 30,000 individuals will head for CBD each morning to run there business, how many individuals will choose a particular transport mode & what amount of revenue will be generated? (5)
- If the government subsidizes Light Circular Rail by 30%, Local Buses by 20% and Rapid Rail by 10% what will be the model split and how much revenue will be generated? (5)
- If the government also introduce a subway train in combination with above subsidized rates (As in part-b) having utility function as  $U = 1.2 - 0.22C - 0.015A - 0.65W - 0.020R$  & other attributes as  $C=80, A=4, W=5$  and  $R=10$  and also increase the autos and riding bike cost by 15% and 5% respectively. Will there be any effect on revenue generation? (5)

**Q3:** Find link array and minimum impedance tree originating from Zone-A for the network described below. (10)



Assign the following interzonal vehicular-trips originating from Zone-A per hour to the above network.

Interzonal vehicular-trips originating from Zone-A			
<i>j</i>	<i>B</i>	<i>C</i>	<i>D</i>
$Q_{Aj}$	900	1200	1750

If the travel time at practical capacity of link (5-6) 36.24-miles long is as shown in the network diagram above with assigned traffic of 75000 veh/day. What is the link operating speed with  $\alpha = 0.25$  and  $\beta = 6$ .

**Q4:** The City government wants to start a transit service between three cities A, B & C. The alternatives are having the following attributes.(10)

S.No	Alternative (X)	Initial Cost (million)	Annual Operating Cost (million)	Annual Maintenance (million)	Annual Salvage value (million)	Annual revenue generation (million)	Useful life (Years)	Interest rate, i%
1	CNG Bus	60	16.048	7.99	7.04	25	11	7
2	Bus Rapid Transit	50	19.589	12.116	11	27	12	7
3	Light Rail	66	19.554	16	14	29	12	5
4	Fast Train	95	31.132	19.345	17	45	14	8
5	Metro	70	25	19.535	16	35	18	6

Using Net Present Value which alternative will you recommend and why?

Reference Material:

1. Class Lectures/Presentations/Video demonstrations
2. Engineering Transportation Engineering & Planning by Papacostas
3. Transportation Engineering by C Jotin Khisty & B. Kent Lall
4. Highway Traffic Analysis and Design 2nd Edition By R. J. Salter
5. Transport Planning and traffic engineering Edited by C A O Flaherty
6. Principles of Engineering Economics with Applications By Zahid A. Khan, Arshad N. Siddiquee, Brajesh Kumar, Mustufa H. Abidi