Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Regular Examination January / February 2011

Subject code: 711906N

Subject Name: Airport Planning and Design

Date: 03 /02 /2011 **Time: 02.30 pm – 05.00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** (i) Enlist advantages and limitations of air transportation. **07**
(ii) Define the following terms and show on a typical sketch, their locations at airport: Runway, Taxiway, Apron gate, Terminal building.

(b) Enlist and explain aircraft characteristics used in airport planning and design. **07**

Q.2 **(a)** Enlist and explain airport site selection criteria. **07**

(b) What are the objectives of forecasting air transport demand? Which are the methods used for air transport demand forecasting? Explain method of trend forecasting. **07**

OR

(b) (i) what are the assumptions made to decide basic runway length? **07**
(ii) Explain the terms: Runway orientation, cross wind component, calm period.

Q.3 **(a)** Explain the importance of wind rose diagram. Draw wind rose diagram from the following data: **07**

Sr. No.	Direction	Percentage of wind		
		6.4–25 km	25-40km	40-60km
1	N	4.80	1.30	0.10
2	NNE	3.70	0.80	0.00
3	NE	1.50	0.10	0.00
4	ENE	2.30	0.50	0.00
5	E	2.40	0.40	0.00
6	ESE	5.00	1.10	0.00
7	SE	6.40	3.20	0.10
8	SSE	7.30	7.70	0.30
9	S	4.40	2.20	0.10
10	SSW	2.60	0.90	0.00
11	SW	1.60	0.10	0.00
12	WSW	3.10	0.40	0.00
13	W	1.90	0.30	0.00
14	WNW	5.00	2.60	0.20
15	NW	4.80	2.40	0.20
16	NNW	7.80	4.90	0.30

Calculate calm period.

(b) Write note: (i) Banglore Airport as a hub airport **07**
(ii) Open sky policy in India

OR

Q.3 **(a)** Find corrected length of runway from the following data: **07**
Airport elevation above MSL=610 m.
Basic runway length = 2500 m.
Monthly mean of average daily temperature = 18° C.
Monthly mean of maximum daily temperature = 28° C for hottest month of the year. Effective gradient = 0.5%.

(b) Why are taxiways provided? Explain factors affecting exit taxiway layout or locations. **07**

Q.4 **(a)** Explain the terms *Practical capacity* and *Saturation Capacity* .Enlist and explain factors affecting airport capacity. **07**

(b) Explain the landing interval model for capacity evaluation with space-time diagram. **07**

OR

Q.4 **(a)** Explain handbook method (FAA) for runway capacity evaluation. **07**

(b) Determine hourly capacity of a single runway (10000 ft long) in VFR conditions. The other relevant data are: (i) Aircraft mix : Type A = 35 %, Type B= 30 %, Type C = 30 %, Type D = 5 % (ii)Exit taxiway location 4500ft and 10000ft from arrival threshold, (iii) Percentage arrival 50% and touch and go 15%, Use the **Fig. 1.** **07**

Q.5 **(a)** Write note on: ***Basic aircraft parking configurations*** and ***terminal design concepts.*** **07**

(b) Explain runway pavement markings and taxiway lightings with appropriate sketches. **07**

OR

Q.5 **(a)** Give general design principles of Airport Drainage system. **07**

(b) (i) Explain equivalent annual departures of design aircraft. How is design aircraft selected? **07**

(ii) An airport pavement is to be designed for the traffic mix tabulated below. Convert the traffic to equivalent DC-8-61 aircraft departures

Aircraft (Wheel configuration)	Departures R	Load per Wheel, W	Conversion Factor, C
CV-880 (Dual tandem)	3800	21800	1.00
DC-8-61 (Dual)	12000	25200	0.60
DC-8-61 (Dual tandem)	3500	39400	1.00

Design runway pavement for CBR of sub grade 5.50%. Use design chart given in **Fig.2.**

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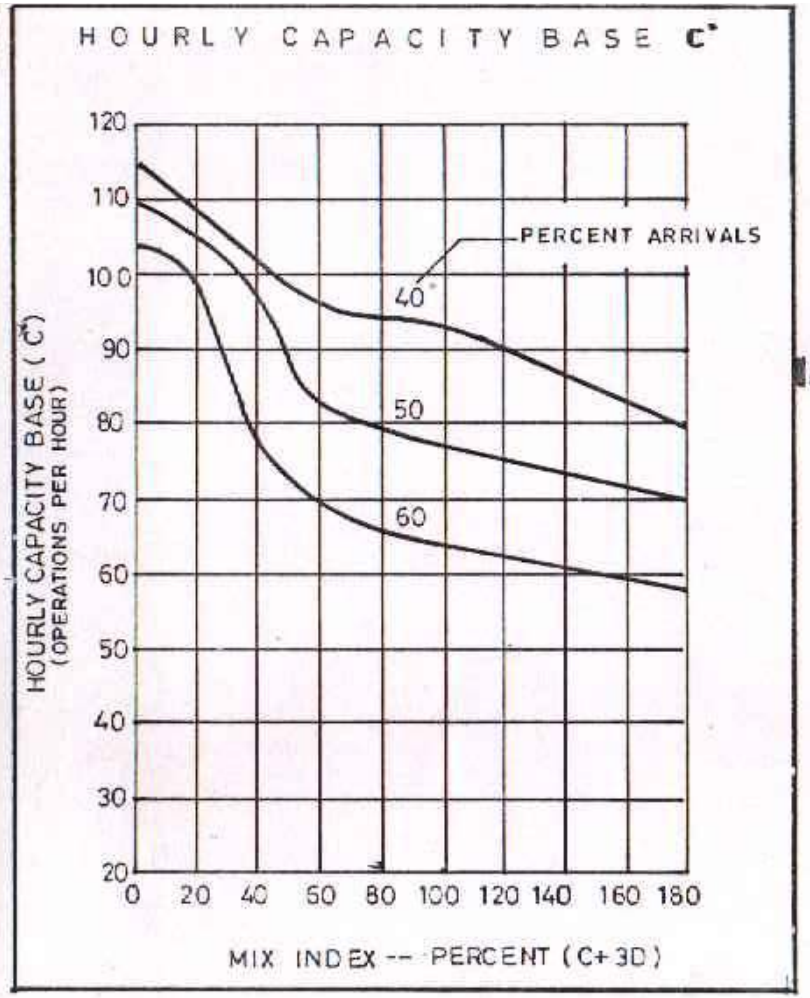

Fig.1 Hourly Capacity

TOUCH & GO FACTOR T

PERCENT TOUCH & GO	MIX INDEX -- PERCENT(C+3D)	TOUCH & GO FACTOR T
0	0 TO 100	1.00
1 TO 10	0 TO 70	1.03
11 TO 20	0 TO 70	1.06
21 TO 30	0 TO 40	1.13
31 TO 40	0 TO 10	1.26
41 TO 50	0 TO 10	1.33

C' X T X E = HOURLY CAPACITY

EXIT FACTOR E

TO DETERMINE EXIT FACTOR E

1. DETERMINE EXIT RANGE FOR APPROPRIATE MIX INDEX FROM TABLE BELOW
2. FOR ARRIVAL RANWAYS, DETERMINE THE AVERAGE NUMBER OF EXITS (N) WHIEH ARE: (A) WITHIN APPROPRIATE EXIT RANGE AND (B) SEPARATED BY AT LEAST 750 FEET
3. IF N IS 4 OR MORE, EXIT FACTOR = 1.00
4. IF N IS LESS THAN 4 DETERMINE EXIT FACTOR FROM TABLE BLEOW FOR APPROPRIATE MIX INDEX AND PERCENT ARRIVALS

MIX INDEX -- PERCENT(C+3D)	EXIT RANGE (FEET FROM THRESHOLD)	EXIT FACTOR E								
		40% ARRIVALS			50% ARRIVALS			60% ARRIVALS		
		N=0	N=1	N=2 OR 3	N=0	N=1	N=2 OR 3	N=0	N=1	N=2 OR 3
0 TO 20	2000 TO 4000	0.86	0.88	0.94	0.80	0.85	0.93	0.71	0.83	0.93
21 TO 50	3000 TO 5500	0.84	0.91	0.98	0.71	0.85	0.92	0.71	0.85	0.92
51 TO 80	3500 TO 6500	0.81	0.91	0.97	0.76	0.85	0.91	0.75	0.84	0.91
81 TO 120	5000 TO 7000	0.83	0.90	0.95	0.80	0.86	0.92	0.80	0.87	0.92
121 TO 180	5500 TO 7500	0.93	0.99	1.00	0.84	0.94	0.98	0.85	0.94	0.96

HOURLY CAPACITY IN VFR FOR RUNWAY OPERATIONS (FAA)

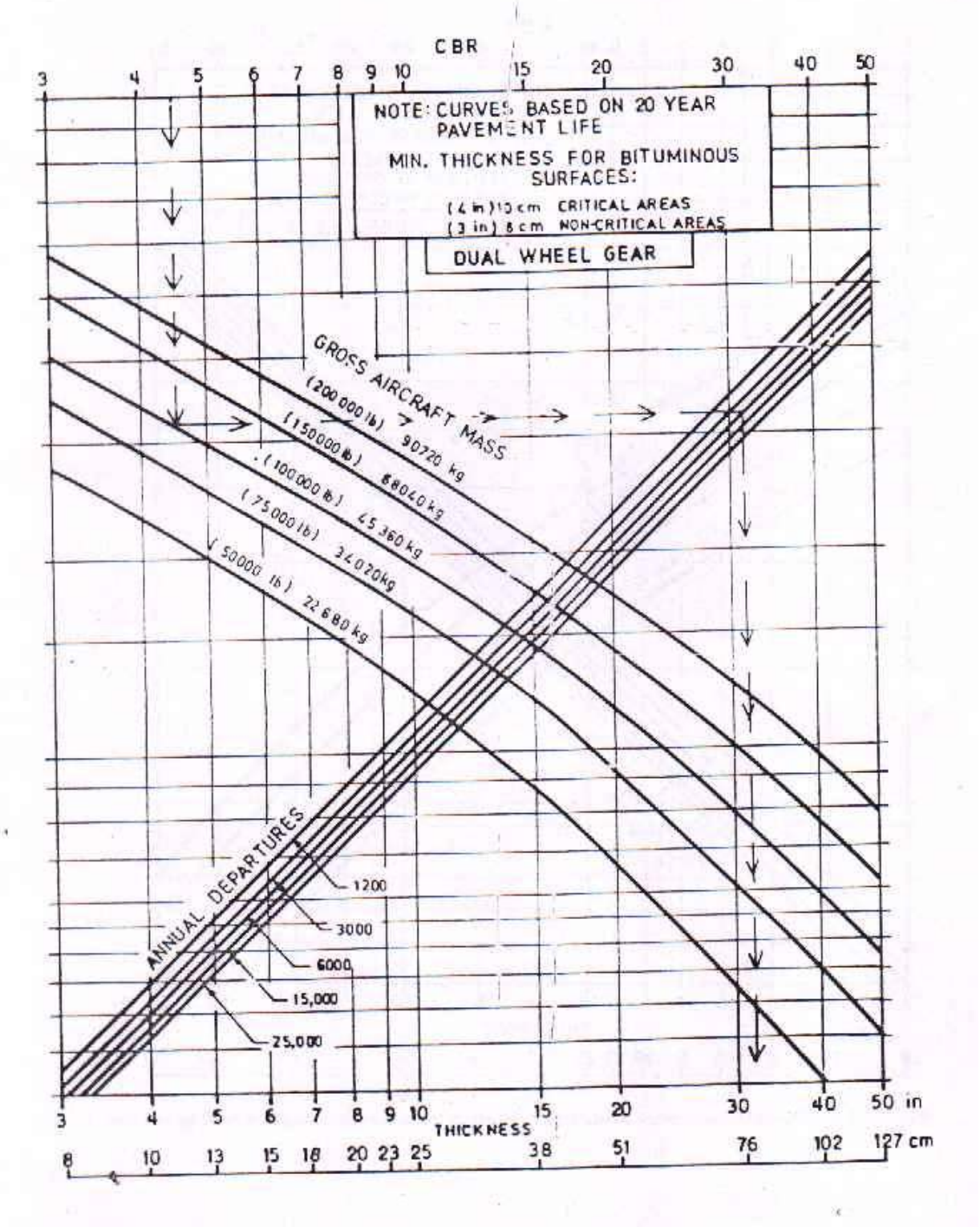

Fig.2 Flexible Design Curves for critical areas dual wheel gear