1) Explain about periodic track maintenance in detail.

Periodic Maintenance

→ Maintenance of track materials
→ Maintenance of Bridges.
→ Maintenance of rolling stocks.
→ Maintenance bearings & bridges

Maintenance of track materials.

→ The top surface of the rails should be kept at the same level.
→ Ballast under sleepers should be ~~replaced~~ periodically packed.
→ Defective sleepers should be replaced immediately
→ Worn-out rails should be replaced.
→ fastening should be tightened and oiled.

Maintenance of bridges.

→ Proper embankment should be provided near the bridge
→ Avoid scouring near abutments & piers.
→ Flood control measures should be taken near the bridges.
→ Riveted joints should be inspected periodically
→ Bed blocks should be checked regularly

#. Maintenance of rolling stock.

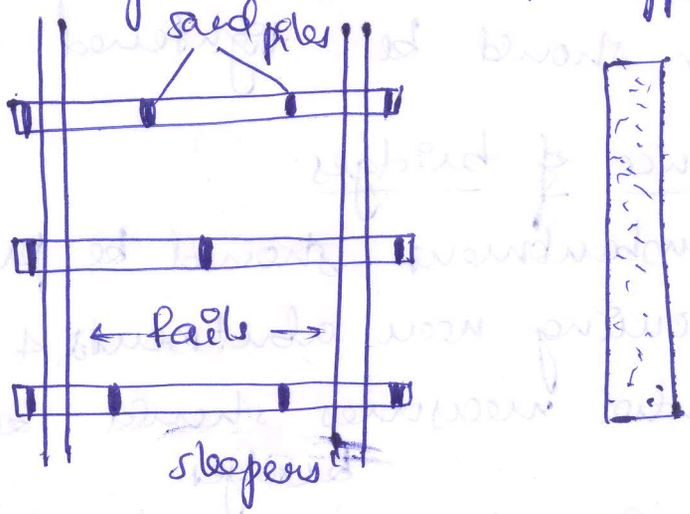
→ Lubrication of all reciprocating parts & bearings.
→ Worn-out parts should be replaced the rolling stock.
→ It is necessary to clean the different parts every day
→ All axles which have run 3,22,000 km should be replaced.

2) a) How will you stabilize the track on poor soil? Discuss any two methods.

i) layer of moorum
ii) Cement grouting
iii) Sand piles
iv) Use of chemicals.

Sand piles:

→ In this method, the vertical bore of about 300 mm dia is made in the ground by driving wooden pile.
→ Wooden pile is then withdrawn and the space is filled with sand and is well-rammed.
→ The functions performed sand piles are
a) they can function as timber piles.
b) they provide good mechanical support.



Use of chemicals.

→ In this method, the chemicals are used in place of cement grout to consolidate the soil.
→ The silicate of soda followed by calcium chloride is effective for sandy soils containing less than 25% clay and silt.

2)
5) Differentiate b/w Monrail and Metrorail.

	Monrail	Metrorail
Rails	Single rail	two rails
Construction time	B/w 3- 4 years.	B/w 5-6 years
Passangers capacity per hour	10,000	40,000
Suitability	Congested area having sharp curve	Open area having no sharp curve
Average speed	65 kmph	100 kmph.
Space occupied	less	more.

3) Calculate the materials required track laying for 1km railway track

① Rails: i) No. of rails per km = $\frac{1000}{\text{length of rail in 'm'}} \times 2$

for BG when rail length = 12.8 m.

$= \frac{1000}{12.8} \times 2 = 156.2 \approx 157$ (say).

ii) Weight of rails tonnes per km.

No. of rails × length of rails in m × $\frac{\text{weight of rails in kg per m}}{1000}$

(say for laying 90 R type of BG. wt = 44.7 kg/m).

∴ Weight of rails per km = $\frac{157 \times 12.8 \times 44.7}{1000}$

= 90 metric tonnes.

② Sleepers:

No. of sleepers per km = $\frac{1}{2}$ (No. of rails per km) × (m + 1).

M = length of rails in m.
x = Density factor.
sleeper density = (M+x).
for BG. = 12.8 m rail length & x = 4.
No. of sleepers per km = $\frac{157}{12.8} \times (12.8+4) = 1319$.

③ Fish plates : No. of fish plates per km of track.
= 2 × No. of rails per km (ie 2 fishplates per joint)
When number of rails per km = 157 for BG
When No. of fish plates per km of track = 314.

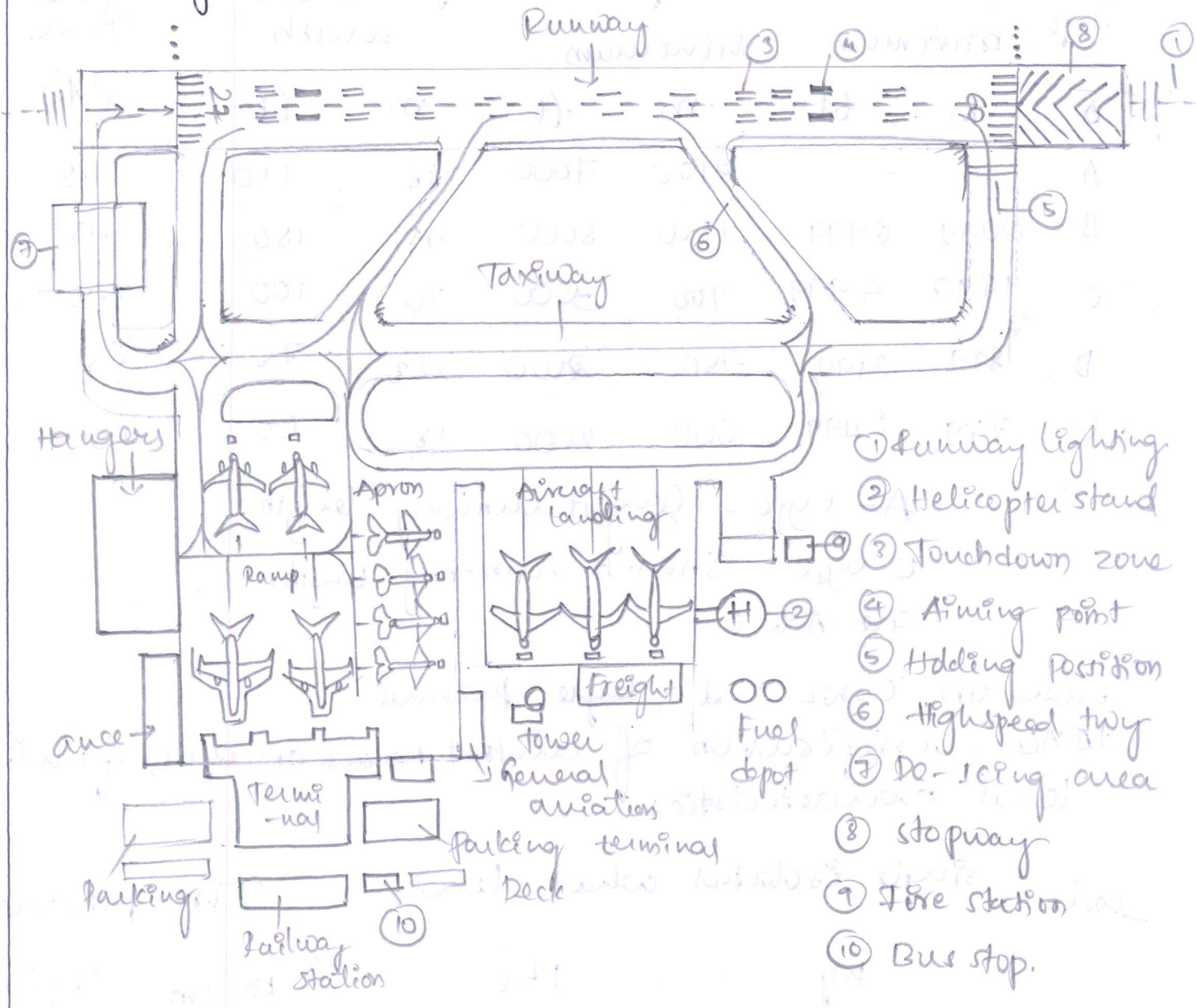
④ Fish bolts : No. of fish bolts per km of track.
= 4 × No. of rails per km (ie 4 fish bolts per joint).
When no. of rails per km = 157 for BG
= 4 × 157 = 628.

⑤ Bearing plates : No. of plates per km depends on designs
Number of bearing plates per km of track is either
= 2 × No. of sleepers per km = 2 × 1319
= 2638 No.'s
Or
= 4 × No. of rails per km = 4 × 157 = 628.

4) What are the factors considered while selecting site for airports.?

→ Regional plan
→ Airport use
→ proximity to other airport
→ Ground accessibility
→ Topography
→ obstructions
→ visibility
→ wind.
→ Noise nuisance
→ Grading drainage and soil characteristics
→ future development
→ Availability of utilities from town
→ Economic consideration.

5) Give a sketch showing the layout of the airport showing its components parts (at least 10 parts).



6) Classify airports based on ICAO regulations.

International Civil aviation organisation (ICAO).

~~#~~ two methods of classification

→ Based on basic runway ~~length~~ length

→ Based on ESWL and tyre position.

Based on runway length.

Summery of runway geometry (ICAO).

Airport type	Basic runway length				Runway permanent width		Maximum longitudinal grade
	maximum		Minimum				
	m	ft	m	ft	m	ft	(%)
A	—	—	2100	7000	45	150	1.5
B	2099	6999	1500	5000	45	150	1.5
C	1490	4999	900	3000	30	100	1.5
D	899	2999	750	2500	22.5	75	2.0
E	749	2499	600	2000	18	60	2.0

A- type - Longest runway length
E type - Shortest runway length.
Code- A to E

Based on ESWL and type pressure
ICAO classification of airport Based on aircraft wheel load characteristics.

Code	Single isolated wheel load		Tire pressure	
	kg	lbs	kg/cm²	lbs/in² (P.S.I)
1	45,000	100000	8.5	120
2	34,000	75,000	7.0	110
3	27,000	60000	7.0	100
4	20,000	45,000	7.0	100
5	13,000	30,000	6.0	85
6	7000	15,000	5.0	70
7	2,000	5,000	2.5	35

Code - 1 to 7