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Q:1

Given Data:-

60000 vehicles monthly (30 days)

Peak flow rate of 550 vehicles @ 15-min

Required:

Number of vehicles moving per lane per hour in each direction?

Peak hour factor PHF = ?

Sol:-

60000 vehicles met in 30 days

So: vehicle per day $= \frac{60000}{30} = 2000$ / days

Now

Per hour $= \frac{2000}{4} = 23.3 \cong 84$ veh/hr.

Consider three lines in each direction so total six lanes for both direction.

So $\frac{84}{6} = 14$

Hence 14 vehicles are moving per lane per hour in each direction.

To Find P.H.F = ?

$$P.H.F = \frac{\text{Hourly values}}{4 \times \text{maximum 15 min volume with in hour}}$$

$$= \frac{141}{4 \times 550}$$

$$\boxed{P.H.F = 0.0063}$$

↓

Ans

Q:2:

Calculate TNS and SNS from the given data.

Vehicle number	Distance in meters	Travel time in seconds	Speed km/h
1	1400	1.31	64.122
2	1400	1.51	55.629
3	1200	1.11	64.865
4	1500	0.90	100.000
5	1600	1.12	85.714
6	1200	1.52	71.053
7	1200	1.45	40.655
8	950	0.90	63.333
9	1175	1.33	53.008
10	1200	1.13	63.717
11	1300	1.30	60.000
12	1400	1.20	70.000
13	1800	1.24	87.097
14	1700	1.11	91.892
15	1200	1.00	108.000
16	2100	1.12	112.500
17	1200	0.87	82.759
18	1700	1.40	72.857
19	1600	1.21	79.339
20	1700	0.55	185.451

Unit conversion (4) 7883

vehicle	Distance (KM)	Time (hour)	speed KM/hr
1	1.400	0.02183	64.122
2	1.400	0.025167	55.629
3	1.200	0.018500	64.865
4	1.500	0.01500	100.00
5	1.600	0.018667	85.714
6	1.800	0.025333	71.053
7	1.200	0.024167	49.655
8	0.950	0.01500	63.333
9	1.175	0.0022167	53.008
10	1.200	0.018833	63.717
11	1.300	0.021667	60.000
12	1.400	0.020000	70.000
13	1.800	0.020667	87.097
14	1.700	0.0185	91.812
15	1.800	0.016667	108.000
16	2.100	0.018667	112.500
17	1.200	0.014500	82.759
18	1.700	0.02337	72.857
19	1.600	0.0201667	79.339
20	1.700	0.0091667	185.455
Total	29.525	0.572188	1620.495

Average	1.47625	$\frac{0.572160}{20} = 0.028603$	$\frac{1620.955}{20} = 81.0497$

Find TMS

As we know that

$$TMS = \frac{\sum_i \left(\frac{x}{t_i}\right)}{n} = \frac{\frac{1620.995}{0.572168}}{20}$$

$$\Rightarrow \frac{2833.07525}{20} = \boxed{141.6537 \text{ km/hr}}$$

Find SMS

As we know that

$$\Rightarrow SMS = \frac{x}{\frac{\sum t_i}{n}} = \frac{xn}{\sum_i t_i}$$

$$\Rightarrow \frac{20 \times 1.47625}{0.572168} = \boxed{51.6019 \text{ km/hr}}$$

Q:3 :- Explain Railway engineering in details.

Ans: **Railway Engineering :-**

The branch of Civil Engineering which deals with the Planning design, construction, operation and maintenance of the railway tracks for safe and efficient movement of trains (People and goods) is called Railway Engineering.

History of railway Engineering:

→ The history of railway is closely linked with the development of civilization.

→ As the necessity arose, human beings developed various methods of transporting goods from one place to another.

→ Then efforts were made to replace animal power with mechanical power.

→ In 1769 Nicholas Cugnot, a Frenchman carried out the Pioneering work of developed steam energy

→ The work had very limited success and it was only in 1804 that Richard Trevithick designed and constructed a stream locomotive.

→ The first railway line in India was opened in 1853.

→ The first train, consisting of one steam engine and four coaches made its maiden trip on 16 April 1853 when it traversed a 21-mile stretch between Bombay (now mumbai) and Thane in 1.25 hours

Components of Railway track:

→ An engineered structure consisting of two metal guiding rails on which vehicle are self Propelled or Pulled by a locomotive is called a railway track.

→ Rails
→ Ballast
→ sleepers
→ Fastenings.

· Rails:

-> Rails are the member of the track laid in two Parallel lines to Provide a continuous and level surface for the movement of trains.

-> To be able to withstand stresses they are made of high carbon steel.

-> it has an inverted I or I shaped cross section.

Ballast:

A device required by electric discharge light source such as fluorescent or HID lamps to regulate voltage and current supplied to the lamp during start and throughout operation.

· sleepers:

It is a component of Permanent way laid transversely under the rails and performing the following functions.

1. To support the rails firmly and evenly.
2. To maintain the gauge of the track correctly
3. To distribute the weight common on the rails over a sufficiently large areas of the ballast.
4. To maintain the track at Proper grade
5. To align the rail Properly.

Fastening:

The act or way of making something fast, or secure. anything used to fasten; bolt, clasp, hook, lock, button.

Example of fastening:

The integral Joints include seams, crimps, snap fits and shrink fit. Some from of mechanical Joining needs to be used where Products need to be taken apart during their normal life.

Q:4 Briefly explain Airport Engineering.

Ans: → Airport Engineering encompasses the planning, design, and construction of terminals, runways and navigation aids to provide safe movement for passenger and freight service.

→ An Airport is a facility where passengers connect from ground transportation to air transportation.

History of Air Transport:

→ The world's first airport was built in 1928 at croydon near London (England).

→ 1903 - first successful flight by wilbur and orville wright at kitty Hawk. North carolina.

→ 1911 - Post was carried by air in india from Allahabad to Naini (Pilot Henri Pequet) crossing Ganga

→ 1912 - Flight between Delhi and karachi.

→ 1954 - Boeing Dash 80 type Prototype B 7.07 first flight.

→ 2008 - Airbus A328 made first flight (one of the biggest passenger air craft i.e 800 pass...

Component of Airport:

1- Runway

2- Taxiway

3- Apron

4- Terminal building

5- control tower

6- Hanger

7- Parking.

1- Runway:

-> Runway is a paved land strip on which landing and take off operation of aircrafts takes place. it is in levelled position without any obstruction on it.

-> special marking are made on the runway to diffrd if from the normal roadway similarly after sunset, specially provided lightings are helped the aircrafts for safe landing.

2- Taxiway:

→ Taxiway is path which connects each end of the runway with terminal area, apron hanger etc.

→ These are laid with asphalt or concrete like runways.

→ In modern airports, taxiway are laid at an angle of 30 degree to the runway so that aircrafts can use it to change from one runway to other easily

3- Apron:

Apron is a place which is used as parking place for aircrafts. it is also used for loading and unloading of aircraft. Apron is generally paved and is located in front of terminal building or adjacent to hangers.

→ The size of area to be alloted for Apron and design of Apron is generally governed by the number of aircrafts and the characteristic of the aircraft.

4- Terminal Building:

→ Terminal building is a place where airport administration facilities take place. In this building. Pre-journey and Post journey checkings of passengers take place.

→ The terminal can house cafes and lounges to serve as waiting areas for passengers. Ticket counters, luggage-check-in or transfer, security check and customs are the basic of all airport.

5- Control Tower:

→ The control tower is a place where aircrafts under a particular zone is controlled whether they are in land or in air. The observation is done by the controller through radars and information is carried through radio.

→ The controller from the control tower observes all the aircraft with in that zone and informs pilots about their airport traffic, landing routes.

6- Hanger:

Hanger is a place where repairing and servicing of aircrafts is done.

→ Taxiway connects the hanger with runway so when a relief needed for an aircraft it can be moved to hanger easily.

→ It is constructed in the form of large shed using steel trusses and frames. Large area should be provided for Hanger for comfortable movement of aircrafts.

7) Parking:

This is a place provided for parking the vehicles of airport staff or passenger which is outside the terminal building or sometimes under the ground of terminal building.