MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

	MUST KNOW CONCEPTS	MKC
CIVIL		2021-22

Course Code & Course Name	**:**	**169CEE27 & RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING**

Year/Sem/Sec : III/VI

S.No.	Term	Notation (Symbol)	Concept / Definition / Meaning / Units / Equation / Expression	Units
Unit-I : RAILWAY PLANNING				
1.	Permanent way	-	Rails, fitted on sleepers and resting on ballast and sub grade	-
2.	Gauge	-	Distance between inner or running faces of two track rails.	-
3.	Rails	-	The rails on the track can be considered as steel girders for the purpose of carrying axle loads.	-
4.	The different types of rail sections	-	Double headed rails, Bull headed rails,Flat footed rails	-
5.	The different types of rail joints	-	Suspended rail joints,Bridge joints.	-
6.	Creep	-	Longitudinal movement of rails with respect to sleepers in a track.	-
7.	Classify sleepers	-	Wooden sleepers ,Metal sleepers ,Concrete sleepers	-
8.	Fish plates	-	Rail joints to maintain the continuity of the rails	-
9.	Spikes	-	Be strong enough to hold the rail in position.	-
10.	Use of Keys	-	Keys are small tapered pieces of timber on steel to fix rails to chairs on metal sleepers.	-
11.	The different materials used for Ballast	-	Broken stone, Gravel. Ashes (or) Clinker.	-
12.	Track alignment	-	Center line of the railway track on the ground	-

13.	The different surveys required for railway projects	-	Traffic survey, Reconnaissance survey.	-
14.	Super elevation	-	Centrifugal force acting horizontally at the center of gravity	-
15.	The different types of curves	-	Simple curve,Compound curve,Parabolic curve.	-
16.	Points and crossings	-	Imposing restrictions over turnouts, which necessarily retard the movements.	-
17.	The two types of Switches	-	Stub switch,Split switch.	-
18.	Crossings	-	Two rails intersect each other at an angle.	-
19.	Classify the Crossings	-	Spring or movable wing crossing,Ramped crossing.	-
20.	Diamond crossing	-	Straight tracks or curved tracks of the same or different gauges cross each other at an angle less than 90 degree	-
21.	Cross-over in track junction	-	Two adjacent parallel or diverging tracks, which may be straight or curved	-
22.	Ladder tracks	-	The straight track in continuation of a turnout	-
23.	Platforms	-	A raised level surface, from where either passengers board	-
24.	Station yards	-	Receiving, storing, making up new trains,	-
25.	Buffer stop	-	The dead end of a siding or the end of any track	-
Unit-II : RAILWAY CONSTRUCTION AND MAINTENANCE				
26.	Construction of new railway track	-	Earth work ,Plate Laying, Laying of ballast on the track.	-
27.	Equlibrium of Super Elevation	-	$E = \frac{V^2}{Gr} = \frac{v^2}{127r}$	-
28.	Types of Gradient	-	Ruling gradient,Limiting	-

			gradient,Exceptional gradient	
29.	DTM	-	Digital terrain modelling	-
30.	Disadvantages of Timber Sleepers	-	Liable to catch fire,They do not resist creep	-
31.	Advantages of Steel Sleepers	-	Have a useful life of 20-25 years.	-
32.	Advantages of Cast Iron Sleepers	-	Long life upto 50-60 years	-
33.	Advantages concrete sleeprs	-	Durable with life range from 40-50 years	-
34.	Area	-	The reconnaissance survey should be carried out for the entire area and not along the line.	-
35.	Existing roads	-	Road alignments are seldom useful for the construction of a railway line.	-
36.	Starting of route	-	A sudden rise of fall. He must ascertain whether the route is bad for a long distance thereafter.	-
37.	Survey route	-	Each route should be surveyed independently from either end.	-
38.	Occular illusion	-	Estimating wrong length,Estimatingwrong curvature	-
39.	Horizontal scale	-	1:2000	-
40.	Vertical scale	-	1:200	-
41.	Location survey	-	Office location survey,Field location survey	-
42.	Edm	-	Electromagnetic distance measurement	-
43.	Effect on interlocking	-	The interlocking mechanism of the points and crossings pets disturbed creep	-
44.	Stock rail	-	It is the running rail against which a tongue rail operates.	-
45.	Methods of Tunneling	-	Tunneling in hard rocks,Tunneling in soft rocks	-

46.	Railway station	-	Flag station, Block station	-
47.	Outer	-	First stop signal& warner also.	-
48.	Starter	-	A starter signal is also provided on a double-line section.	-
Unit-III : AIRPORT PLANNING				
49.	Airport planning	-	Airport planning requires more intensive	-
50.	Airport master plan	-	The form and structure of the ultimate development of the airport.	-
51.	Advantages of air transport	-	Continuous journey, Emergency use,Saving in time	-
52.	Disadvantages of air transport	-	Unsafe,Weather conditions	-
53.	The drawings should be prepared for construction of new airport	-	Drainage plan, Grading plan, Lighting plan	-
54.	Apron	-	It loading and unloading of cargo and passengers	-
55.	Wind coverage	-	The percentage of time in a year during which the crosswind component remains within the limit of 25km p.h..	-
56.	Types of parking of aircraft	-	Apron,ramp	-
57.	Basic patterns of runway	-	Parallel runways ,Intersecting	-
58.	The main function of hangar	-	To provide an enclosure for housing and repairing of the aircraft.	-
59.	Crosswind component	-	The velocity of the inclined opposing wind, its component V sinθ,	-
60.	The factors should be consider for layout of taxiway	-	Busy airports, crossing, Higher turn-off speeds, Route	-
61.	Airport capacity	-	The number of aircraft movement, which an airport can handle within a specified period of time.	-

62.	The advantages of head wind	-	During landing, it provides a breaking effect and the aircraft comes to a stop in a short length of the runway.	-
63.	The corrections required for runway length	-	Correction for elevation ,Correction for gradient	-
64.	Holding apron.	-	The portion of paved area which is provided adjacent to the ends of runway incase of busy airports is known as the holding apron.	-
65.	The necessity of surveying in construction of new airport	-	To give an idea of the meteorological conditions prevailing at the proposed site	-
66.	Wind rose diagram	-	The diagram showing direction, duration and intensity of wind	-
67.	The aims of Airport drainage	-	It increases the efficiency of the airport Safe functioning of the aircraft.	-
68.	Clear zone.	-	The term clear zone is used to indicate the innermost portion of the approach zone and it is to be provided at the ends of runways.	-
69.	The two types of zoning	-	Land-use zoning, Height zoning	-
70.	Turning zone.	-	Trouble in smooth working of aircraft experienced at the start of the takeoff	-
71.	The purposes of installing visual aids at the airport	-	To satisfy the visual requirements for takeoff and taxiing.	-
72.	The airport markings	-	Apron marking,Wind direction indicator	-
73.	Hangar	-	The large shed erected at the airport for the purpose of housing.	-
74.	The guidance and information required by the pilots during landing operation	-	Alignment guidance ,Height information ,Visual parameters	-
75.	The factors, which affect the type and intensity of airport lighting	-	Amount of traffic, Availability of power	-

Unit-IV : AIRPORT DESIGN				
76.	The elements of airport lightings	-	Approach lighting,Apron and hanger lighting	-
77.	Heliport.	-	The area for landing and taking off helicopter is known as heliport.	-
78.	Factors which affect the size of an apron	-	Gate position, Number of gates,	-
79.	Terminal building.	-	Facilities to all passengers, for serving as office for airport management.	-
80.	Two arrangements adopted for approach lighting	-	Calvert system,icasystem	-
81.	Visibility.	-	It is the distance from which a human can see a 25 candela light.	-
82.	Ceiling.	-	The meteorological visibility is also generally associated with the height of the underside of a dense cloud above the airport surface .	-
83.	The systems of aircraft parking	-	Frontal or linear system, Pier or finger system	-
84.	The importances of air traffic control	-	It avoids the possibility of occurrence of the accidents in the air.	-
85.	Three components of an air traffic control	-	Control centers,control towers	-
86.	Types of air traffic control	-	En route aids or airway aids ,Landing aids	-
87.	Passenger flow	-	Uninterrupted flow route is formed for the passengers	-
88.	Airfield consisting	-	Landing strip, consisting of a runway, shoulders and stop-ways	-
89.	Terminal area	-	Terminal building,Aircraft service facilities	-
90.	Taxiway	-	Taxiway is a strip connecting runway with one another and with the aircraft-parking apron.	-
91.	Soil survey	-	To determine soil type and ground water table	-

92.	Open-v runways	-	Runways in different directions which do not intersect are referred to as open-V runways.	-
93.	Runway dimensions	-	Type of aircraft, its take-off and landing caracteristics	-
94.	The processing system	-	The terminal is used to process passengers and baggage for the interface with aircraft and the ground transportation modes	-
95.	Airport use	-	Whether for civilian or for military operations.	-
96.	Ground accessibility	-	The site should be so selected that it is readily accessible to the users	-
97.	Alignment	-	Breakwater is to have straight converging arms so that the angle of inter section does not exceed 60 degrees.	-
98.	Solvent action of sea water	-	This quality of sea water causes damage to the materials of construction	-
99.	Classification of breakwaters	-	Heap or mound breakwater,Mound with superstructure	-
100.	Wharves	-	Platforms or landing places are necessary for ships to come, for purposes of embarkation, etc. At the same time.	-
Unit-V : HARBOUR ENGINEERING				
101.	Advantages of water transport	-	Cheapest mode of transport ,High load carrying capacity	-
102.	Harbour	-	Protected Naturally (or) artificially from action of wind and waves	-

103.	Port	-	Such as stores, loading of passengers and cargo etc.	-
104.	Sea water waves	-	The periodic rise and fall of sea water Surface	-
105.	Littoral drifts	-	The process of carrying and depositing materials by waves on the shore line.	-
106.	Tidal range	-	The difference in water level of high tide and low tide levels.	-
107.	Break water	-	Harbour waters undisturbed by the effect of waves and winds	-
108.	Different Layout of ports	-	Square layout, Natural,Manmade	-
109.	Docks	-	Wet docks ,Dry docks	-
110.	Quays	-	Loading & Un Loading facilities.	-
111.	Piers	-	Unloading facilities.	-
112.	Pier heads	-	Structure constructed at a tip of break water near the harbor entrance.	-
113.	Dredging	-	It is defines as excavation of bed below water.	-
114.	Design of quay walls	-	Earth pressure at rear,Weight of the wall itself	-
115.	Rubbing strips	-	The fender system adopted for small vessels consists of rubbing strips of timber, coir padding	-
116.	Timber grill	-	Vertical and horizontal timber members fixed to the face piles.	-
117.	Rubber tendering	-	The shapes of rubber fenders may be cylindrical, square, V-shape or cell type.	-
118.	Lighthouse	-	It is a lofty structure popularly built of masonry or reinforced concrete in the shape of a tall tower on a high pedestal.	-
119.	Types of signals	-	Light signals,Fog signals,Audible signals.	-

120.	Harbour size	-	Its mainly depends upon the number and size of ships using it.	-
121.	Harbour depth	-	The cargo handling is done by booms which load in and out of the ships holds	-
122.	Channel depth formula	-	D=d'+h/3+d''	-
123.	Harbour entrance	-	The entrance width depends upon the size of the harbour and type of ships using it.	-
124.	Turning basin	-	Various shapes, depending upon the size of the port and the number and arrangement of ships berths.	-
125.	Bulkheads	-	Structures primarily intended to retain or prevent sliding of the land.	-
Placement Questions				
126.	Moment of Inertia for rectangular	I	$I=bd^3/12$	Mm^4
127.	Bending moment equation	M	$M/I= \sigma_b /y =E/R$	N-M
128.	Section modules	Z	$Z=I/y$	mm^3
129.	Moment of resistance	M	$M= \sigma_b$ X z	N-mm
130.	Maximum bending stress	σ_b max	(M_{max}/I) X y	N/mm^2
131.	Section modules of rectangular	Z	$Z=bd^2/6$	mm^3
132.	Moment of inertia of circular section	I	$\Pi d^4/64 =I$	mm^4
133.	Moment of Inertia of hollow circle	I	$\Pi (D^4-d^4)/64$	mm^4
134.	Section Modules of triangle	Z	$Z_{AB} =bh^3/4$	N/mm^2
135.	Minimum area of steel up to 100 mm thickness	%	0.3 % of Gross cross sectional area	-

136.	Minimum area of steel up to 450 mm thickness	%	0.2 % of Gross cross sectional area	-
137.	Minimum cover to all the reinforcement	Φ	25 mm (or) diameter of main bar	-
138.	The amount of reinforcement for main bars in a slab, is based upon	-	Maximum bending moment	-
139.	The width of the rib of aT-beam is generally kept between	-	1/3 to 2/3 of rib depth	-
140.	The thickness of base of a retaining wall generally is	-	Width of the stem at the bottom	-
141.	Curvature correction	C_L	$0.0785\ D^2$ (Negative)	meter
142.	Refraction correction	Cr	$0.0112\ D^2$ (Positive)	meter
143.	Combined correction	C_L + Cr	$0.0673\ D^2$ (Negative)	meter
144.	Cover for water tank	-	25mm	mm
145.	Cover for retaining wall	-	40mm	mm
146.	Size of concrete cube	-	150mmx150mmx150mm	mm
147.	Shape Factor Value for Circular Section	-	1.698	-
148.	Shape Factor Value for Rectangular Section	-	1.5	-
149.	Shape Factor Value for Diamond Section	-	2	-
150.	Shape Factor Value for Steel I-Beam	-	Ranges from 1.12 to 1.15	-

Faculty Team Prepared **Signatures**

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2. **HoD**