B.E. (Civil Engineering) Seventh Semester (C.B.S.) Summer 2023

Advanced Concrete Structures

P. Pages : 2 **MSP/KS/23/2274**

Time : Four Hours Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.
12. IS456-2000, IS.815 P-3, IS3370 Interaction charts may be consulted.

1. Design a circular water tank with flexible base with a storage capacity of 3.5lakhs liters of water. The height of tank is 4.5m and free board of 0.3m. Use M25 grade of concrete and Fe415 grade of steel. Design top dome, ring beam and circular wall. Draw reinforcement details. **14**

OR

2. Design the wall of square water tank for a capacity of $80m^3$. The tank is fixed at base and free at top. The depth of water is 3.5m and the free board is 0.3m. Use M20 grade concrete and Fe415 grade steel. Design for both longitudinal and lateral bending and provide required distribution steel. Design by using IS code or by approximate method. **14**

3. Design an isolated footing for a column 400mm $\times$ 300mm transmitting a load of 1000kN and moment of 80kN.m. The SBC of soil is $200\,kN/m^2$. Use M25 grade of concrete and Fe415 grade of steel. **13**

OR

4. Design a biaxially loaded RCC column subjected to ultimate load of 550kN, ultimate moment of 75kNm about major axis and 60kNm about minor axis. The unsupported length of column is 4m. The size of column is 350 $\times$ 450mm. Use M20 grade concrete and Fe415 grade steel.
Consider effective length is equal to unsupported length. **13**

5. A continuous beam of two span 10m each carrying a factored dead load of 10 kN/m and factored live load of 20kN/m. Draw BMD envelope after 30% moment redistribution. **13**

OR

6. a) Describe about moment curvature relationship with respect to reinforced concrete sections. Also draw the diagram. **5**

b) Sketch the bending moment envelope after 30% maximum redistribution for a fixed ended beam carrying 2 point loads of 10kN each at one-third points and a uniformly distributed load of 2kN/m over a span of 9m. **8**

7. Design a cantilever retaining wall consisting of 4 meter height. Stem retaining a surcharge loading of $12\,\mathrm{kN}/\mathrm{m}^2$. Density of soil is $17\,\mathrm{kN}/\mathrm{m}^3$, angle of repose is 30º, Use M25 grade of concrete and Fe415 grade of steel. Take safe bearing capacity of soil is $200\,\mathrm{kN}/\mathrm{m}^2$. Draw reinforcement details also. **14**

OR

8. Design stem (vertical wall) of a counterfort retaining wall for following requirements. **14**
   i) Height of wall above ground level = 5.5m
   ii) S.B.C of soil at site = $160\,\mathrm{kN}/\mathrm{m}^2$
   iii) Density of soil = $18\,\mathrm{kN}/\mathrm{m}^3$
   iv) Angle of internal friction = 33º
   v) Spacing of counterforts = 3m c/c

   Use M20 grade of concrete and Fe415 HYSD bars. Perform all necessary stability checks. Show the details of reinforcement in the wall consider level backfill.

9. Design a RC portal frame with hinge base is required to suit the following data. **13**
   Spacing of portal frame = 5 meter c/c
   Height of columns = 4 meter
   Distance between column centers = 14 meter
   Live load on roof = $2.5\,\mathrm{kN}/\mathrm{m}^2$
   floor finish = $0.5\,\mathrm{kN}/\mathrm{m}^2$
   Analyse and design the column and hinge of portal frame. Using M20 grade concrete and Fe415 grade of steel. Use I beam = 1.75 I column.

OR

10. Design dog legged stair case (waist type slab) for an office building of 2.5m x 4m to suit the following data: **13**
    Height between the floors = 3.6m
    Provide 100mm bearing at each end
    Live load = $4\,\mathrm{kN}/\mathrm{m}^2$
    Floor finishing load = $1\,\mathrm{kN}/\mathrm{m}^2$
    one end of flight is resting on plinth beam and other on the landing beam at the end of flight. Use M20 grade concrete & Fe415 grade steel.

11. Design a combined rectangular footing for two column A and B carrying loads of 1000kN each of service. The size of both columns is 400mm x 400mm. The center to center distance of column is 4.0m. Take SBC of soil as $180\,\mathrm{kN}/\mathrm{m}^2$ and unit weight of soil as $18\,\mathrm{kN}/\mathrm{m}^3$. Angle of repose = 30º, use M20 grade concrete and Fe415 steel. **13**

OR

12. Design a combined footing for two columns A and B carrying load of 800kN and 1200kN at 4.8m apart. Column A is 350 x 350mm and B is 450 x 450mm. The length of footing is restricted to 6m. The SBC of soil is $140\,\mathrm{kN}/\mathrm{m}^2$. Use M20 grade of concrete and Fe500 steel. **13**

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B.E. (Civil Engineering) Seventh Semester (C.B.S.) Summer 2023

Estimating and Costing

P. Pages : 4 **MSP/KS/23/2275**

Time : Four Hours Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
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6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
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9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Explain the various types of estimates with suitable example. **7**

b) Prepare a preliminary estimate of multi Storeyed office building having carpet area of 2,200 sq.m. 35% the building area will be taken up by corridors, verandah, lavatory, staircase etc. and 10% of the built up area will be occupied by walls. Assume plinth area rate to be Rs. 6000/- per sq. m. and also provide for water supply, sanitary fittings & electric installations, contingencies and other services. **6**

OR

2. a) Calculate the volume of earthwork in a road embankment with the following details: **10**

i) Formation width = 10.0m

ii) Side slope in filling = 2:1 and in cutting = 1.5:1

iii) One chain length = 30.0m

iv) Transverse slope is 1 in 40

Distance (m)	G. L. (m)	F. L. (m)
0	136.00	135.20
30	135.00	135.40
60	135.60	135.60
90	135.80	135.80
120	136.00	136.00
150	136.20	136.20
180	136.40	136.40

b) State the method for calculating the earthwork for a road embankment and road cutting. **3**

3. a) Estimate the quantity for the following items of work for the given building plan & typical. **8**

Wall section of figure (I).

i) Earth work in excavation in foundation trenches.

ii) Second class brickwork in CM 1:6 in foundation and plinth.

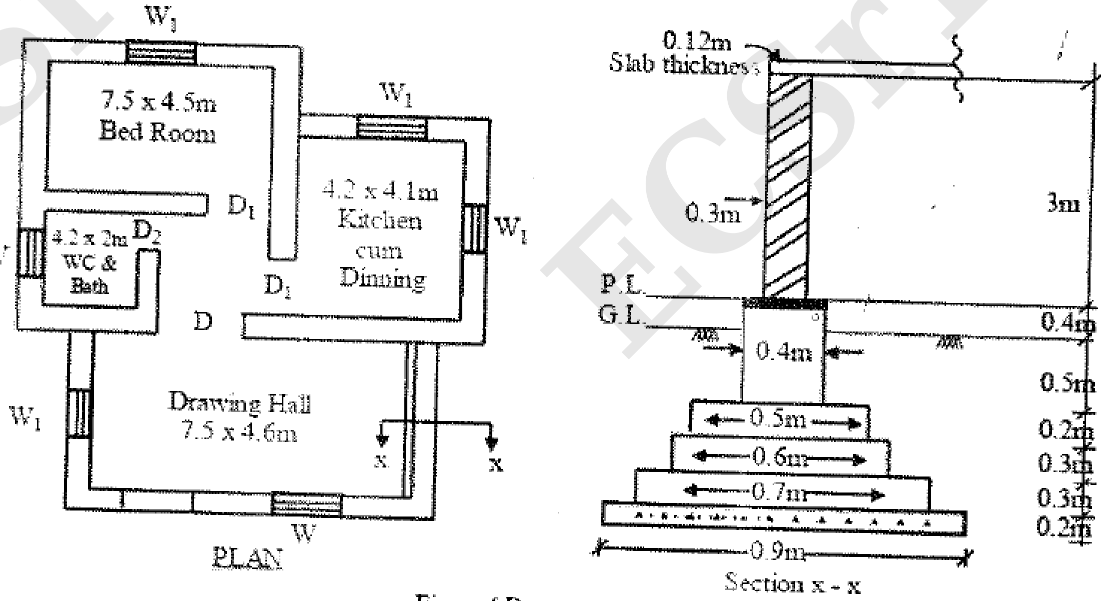

Figure (I)

$D = 1.5 \times 2.1m$
$D_1 = 1.2 \times 2.1m$
$D_2 = 1.0 \times 2.1m$
$v = 0.25 \times 0.25m$

$W = 1.2 \times 1.5m$
$W_1 = 1.0 \times 1.5m$

b) Workout the quantity of steel reinforcement in bar bending schedule for RCC beam of size 230mmx350mmx4800mm. It has 2 Nos. of 16mmϕ straight & 2 Nos. of 12mmϕ bent up at bottom and 2 Nos. 10mmϕ at top. M.S reinforcement with 6mmϕ stirrups @ 200mm%. Assume cover as 25mm throughout (top, bottom, & side). **6**

OR

4. a) Figure (I) shown building plan & typical wall section prepare Centre line plan and estimate. **8**
The quantities of the following item of work.

i) Brickwork in super structure.

ii) Internal plaster of wall surface.

b) A RCC slab overall size 3300mm x 6800mm x 130 mm is provided with 16 mm Φ as main steel reinforcement bent up alternately and placed @ 140 mm c/c. Alternate bars are bent up at 540 mm from the outer edge of the slab. Distribution steel bars are of 6 mm Φ @ 180 c/c. Assume cover as 20 mm throughout. Calculate the quantities of steel reinforcement in bar bending schedule. (All steel bars are of mild steel) **6**

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5. a) Explain the terms "administrative Approval" & "Technical sanction". **6**

b) Explain the term of contract, enlist the various types of contract, explain anyone of them. **7**

OR

6. a) Write short notes on **any two.** **6**

i) Earnest money Deposits.

ii) Security Deposits.

iii) Arbitration.

iv) Defect Liability period.

b) Enlist an information to be included while drafting tender notice. **7**

7. a) What do you understand by specification. What are the objectives of specification. **6**

b) Explain 'Direct & Indirect charges'. **7**

OR

8. a) Enlist the different types of specification. What are the objectives of specification. **6**

b) Draft detailed specification for the following items **any two.** **7**

i) Brick Masonry in CM I : 6 in superstructure.

ii) 12mm thick internal cement plaster to wall surface.

iii) 10cm thick cement concrete following (1 : 3 : 6).

9. a) Define Rate analysis. Explain factor affecting it. **6**

b) Work out rate analysis for the following items **any two.** **8**

i) RCC work (1:2:4) in slab with 1.2% steel reinforcement.

ii) Brick masonry (Brick size 200mm x 10mm x 10mm) in CM 1:4.

iii) 12mm thick plaster in CM 1:2.

OR

10. a) Write short notes on: **6**

i) Overhead costs

ii) Task work of labour.

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b) Calculate the rate per unit item of the following **any two.** **8**

i) RCC work (1:2:4) in column with 6% steel reinforcement including shuttering in column.

ii) 12cm thick cement concrete flooring.

iii) Stone masonry in super structure CM 1:3.

11. a) What is valuation? Explain in brief, the purpose of valuation. **6**

b) Differentiate clearly with suitable example between cost, value & price. **7**

OR

12. Write short notes on **any three.** **13**

i) Market value & Book value.

ii) Cost value & price.

iii) Direct & Indirect charge.

iv) M.A.S. Account.

v) Depreciation and obsolescence.

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B.E. (Civil Engineering) Seventh Semester (C.B.S.) Summer 2023

Elective-I : Advanced Traffic Engineering

P. Pages : 3 **MSP/KS/23/2277**

Time : Three Hours Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
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3. Solve Question 3 OR Questions No. 4.
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9. Assume suitable data whenever necessary.

1. a) Explain in detail Vehicular characteristics. **7**

b) Analyse the following spot speed data and Find: **6**

i) Lower and upper speed limits

ii) Medium speed

iii) Design speed

Speed Group (kmph)	Frequency
10 – 20	03
20 – 30	16
30 – 40	80
40 – 50	72
50 – 60	71
60 – 70	30
70 – 80	10
80 – 90	02

OR

2. a) Explain in detail Road User characteristics. **7**

b) The following data represents volume in PCU of average four runs in a moving observer study. Analyse the data for **6**

i) Directional Flow

ii) Directional Journey Speed

iii) Directional Running Speed

Length of section = 1.40 km

Run Direction	Travel Time	Vehicle meet from opposite direct	No. of vehicle		Stopped Time sec.
			Overtaking	overtaken	
N	150	76	04	05	07
S	140	88	08	11	08

3. On a motorway, the numbers of vehicles arriving from one direction in successive 10 seconds interval was counted and recorded in table. **13**

Vehicle arriving in 10 sec interval	Frequency
0	12
1	25
2	32
3	20
4	09
5	04
6	02
7 or more	0

Find out the mean rate of arrival and with the help of poissonian distribution, compare the observed frequency with theoretical frequency.

OR

4. a) The spot speed at a particular location are normally distributed with a mean of 51.8 kmph and a standard deviation of 8.2 kmph. What is the probability that, **7**

i) The speed exceeds 65 kmph

ii) The speed lies between 40 kmph and 70 kmph

iii) What is the 85th percentile speed?

b) Discuss the methods available for conducting of spot speed studies. **6**

5. Explain in details: **14**

i) Drive ways

ii) Grade separated intersections

iii) At – grade intersections

iv) Level of service concept

OR

6. a) Define intersection. What are the basic principles to be followed in the design of intersection? **7**

b) Draw neat sketches of various types of grade separated intersections showing on it all the traffic movements. **7**

7. a) Draw neat sketch of various types of traffic sign and write in detail about general principles of traffic signing. **7**

b) Design two phase traffic signal using Webster's method. The average normal flow of traffic on two roads A & B during a design period are 405 and 310 PCU/hour respectively. The saturation flows are 1200 and 1150 PCU/hours. All red time required is 10 sec. **6**

OR

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8.	a)	What is signal co-ordination? Explain in brief various types of co-ordination systems used?	**6**
	b)	The 15 min traffic count on cross road 1 & 2 during peak hour are observed as 170 and 135 vehicles respectively. If the amber times required are 4 & 3 seconds respectively for two roads based on approach speed. Design the signal timing by trial cycle method. Assume average time headway of 2.5 sec during rephase. Draw phase diagram.	**7**

9. a) The accident records for three consecutive years at an uncontrolled junction indicates following number of accidents. **8**

Year	No. of Accidents
2013	05
2014	10
2015	15

Calculate the probability of 6 accidents occurring per year at that site.

b) Explain collision diagram with neat sketch. **5**

OR

10. a) Write short note on 3 E's of traffic management. **6**

b) It is observed that an average a vehicle driver drives 5000 km during the year. The probability of having accident is 70 per 200 million vehicle kilometers. What is the probability of a driver having at least two accidents during his driving career extending to 20 yrs. **7**

11. a) What are various types of parking facilities designed for traffic needs? Compare on street and off street parking. **7**

b) Determine the number of parking stalls that can be accommodated in a curb length of 200 m (stall size 2.5 m x 5.0 m) if the angle of parking is 45º. Draw the layout for above. **7**

OR

12. Write a note on **any three.** **14**

i) Mass Transportation Modes

ii) Condition Diagram

iii) Problem related with urban traffic

iv) Intelligent transport system.

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B.E. (Civil Engineering) Seventh Semester (C.B.S.) Summer 2023

Elective-I : Air Pollution & Solid Waste Management

P. Pages : 2
Time : Three Hours

MSP/KS/23/2278
Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
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1. a) Define air pollution classify air pollutants giving the various sources. **6**

b) i) What is photochemical smog? **7**

ii) Effect of air pollution on plants.

OR

2. a) What are air quality standards for India? **6**

b) Write short notes on- **7**
i) Green house effect ii) Ozone layer depletion

3. a) What is lapse rate? Explain different types of lapse rate. **6**

b) Explain behaviour of stack plume under different atmospheric conditions. **7**

OR

4. a) What are the methods of ambient air sampling? **6**

b) How is the sampling carried for a high volume sampler? **7**

5. a) List the equipment's for particulate control in industries. With sketch & explain working of a cyclone separator. **7**

b) Write a short note on control of automobile exhaust. **7**

OR

6. a) What are the methods for control of noise pollution? **7**

b) What are the basic methods for control of gaseous pollutants? **7**

7.	a)	What are the various sources of generation of solid waste?	**6**
	b)	Explain why the solid waste management is necessary?	**7**

OR

8.	a)	Discuss the factors affecting per capita generation of solid waste.	**6**
	b)	Explain method of determination of chemical & biological characteristics of solid waste and its utility.	**7**
9.	a)	What is heuristic method? Explain principles and steps involved in heuristic method.	**6**
	b)	What are the various tools & equipment's used for solid waste collection?	**7**

OR

10.	a)	Write a note on salvaging of solid waste.	**6**
	b)	Write a note on pyrolysis.	**7**
11.	a)	What is composting? Explain methods of composting.	**7**
	b)	Explain factors affecting composting.	**7**

OR

12.	a)	Discuss site selection process for landfilling.	**7**
	b)	What is incineration? State its basic principles and its advantages & disadvantages.	**7**

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B.E. (Civil Engineering) Seventh Semester (C.B.S.) Summer 2023

Construction Management and Laws

P. Pages : 2

Time : Three Hours

MSP/KS/23/2283

Max. Marks : 80

Notes :
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9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. a) Write a note on features of infrastructure projects. **7**

b) Write down the principles of project finance. **6**

OR

2. a) Explain various models of public private partnership. **7**

b) Write a note on price escalation provision in construction field. **6**

3. a) What do you mean by event in a network? **6**
Define:
i) Tail event, head event and dual role event,
ii) Successor event and predecessor event.

b) Develop a network for the fourteen activities related to a project. The logic in given as below:- **8**
i) A is the initial activity of a project,
ii) B and C can be performed in parallel and are immediate successor to A,
iii) D, E and F follows B,
iv) G follows E,
v) H follows D, but it cannot start until E is completed,
vi) I and J succeed G,
vii) F and J precede K,
viii) H and I precede L,
ix) M succeeds L & K,
x) The last operation N succeeds M and C and project ends.

OR

4. a) Define: **6**

i) Total float ii) Free float

iii) Independent float iv) Interfering float

	b)	The network shown in fig. 1, has the estimated duration for each activity marked. Determine the total float for each activity and establish the critical path. Also determine free float and independent float for each activity. Express activity duration in weeks.	**8**

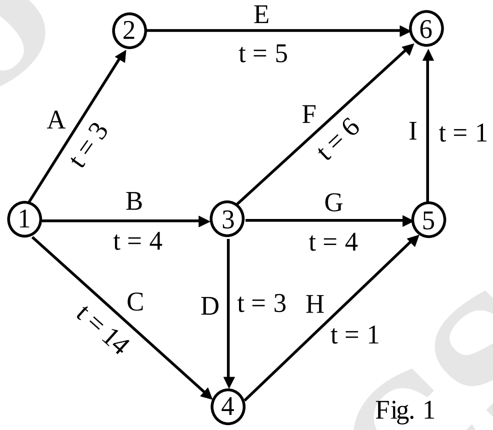

Fig. 1

5.	a)	Write a note on principles of organizing.	**6**
	b)	Write down merits and demerits of Line Organization.	**7**
		OR	
6.	a)	Write down the steps involved in staffing process of manpower management.	**5**
	b)	Explain about power shovel and vibrating roller used as construction equipments.	**8**
7.	a)	Write a note on importance of total quality management for an effective working of organization.	**6**
	b)	What are the causes of accidents and related safety programs followed in construction industry?	**7**
		OR	
8.	a)	How to ensure safety during demolition of a structure?	**6**
	b)	Write down role of management information system in an organization.	**7**
9.	a)	Write a note on major divisions of Maharashtra Regional Town Planning Act.	**7**
	b)	What are the disclosures to be made by the promoter of a real estate sector as per Maharashtra. Housing Regulation and Development Act 2012?	**7**
		OR	
10.	a)	Write down provisions of Maharashtra Water Resources Regulatory Authority Act 2005.	**7**
	b)	Write a note on Gunthewari development Act 2001.	**7**
11.	a)	Write a note on enactment of forest conservation act 1980.	**6**
	b)	Explain the functions of central and state boards as per water pollution (prevention and control) Act 1974.	**7**
		OR	
12.		Give detailed information about laws related to transfer of Immovable Property Act.	**13**

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B.E. (Civil Engineering) Seventh Semester (C.B.S.) Summer 2023

Transportation Engineering-II

P. Pages : 2
Time : Three Hours

MSP/KS/23/2284
Max. Marks : 80

Notes :
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11. Use of non programmable calculator is permitted.

1. a) What do you understand by "permanent Way"? Discuss the requirements of ideal permanent way. **7**

b) A locomotive on M.G. Track has a three pairs of driving wheels each carrying 17.27 tonne. What maximum load can it draw on a level track with a curvature of 2^{o} at a speed of 48.3 kmph. What speed can be attained by a train, carrying the same load on an up-gradient of line 1 in 250? **6**

OR

2. a) Using sleeper density of N+7, find out the number of sleepers required for constructing railway track 1.2km long (MG). **6**

b) Define gauge of railway track. What are the factors which affects the selection of gauge? **7**

3. a) A 4^{o} curve branches in B.G. layout of railway yard, if the speed on branch line is restricted to 30 kmph, calculate the max speed that can be permitted on the main line, Assume cant deficiency = 75mm. **6**

b) What are the objectives of providing ballast in the permanent way. Also discuss the various types of ballast. **7**

OR

4. a) Derive the relationship of super elevation with gauge, speed and radius of curve. **7**

b) On a B.G. 3 degree curve, "The equilibrium cant" is provided for a speed of 70 kmph. **6**
   a) Calculate the value of equilibrium cant.
   b) Allowing a maximum cant deficiency, what would be the maximum permissible speed on the tracks?

5. a) Draw a neat diagram of left hand turnout and show its various component parts. **7**

b) Determine all the necessary elements required to set out a 1 in 16 turnout taking off from straight B.G. track with its curve starting from toe of switch and passes from TNC, heel divergence, d = 11.4 cm. **7**

OR

6. Write a short notes on **any three.** **14**

a) Throw of switch
b) Warner signals
c) Semaphore signals
d) Interlocking
e) Marshaling yard

7. a) Explain the three controls of an aircraft. **6**

b) Explain the procedure of runway orientation. **7**

OR

8. a) Write a short notes on "Wind Rose". **6**

b) Calculate the actual length of runway from the following data: **7**
Airport elevation – R. L. 100
Airport reference temperature – 28ºC
Basic length of runway – 600m
Highest point along the length – R. L. 98.2
Lowest point along the length – R. L. 95.2

9. a) Write short notes on : **7**
1. Approach lighting
2. Runway marking

b) What are the different parking systems for an aircraft? Discuss any one in detail. **6**

OR

10. a) Explain in brief with neat sketch the "I. L. S" system. **7**

b) What is ATC? What En-route aids are provided through A. T. C. **6**

11. Write notes on **14**
i) Tunnel lining
ii) Drainage in Tunnels
iii) Lighting in Tunnels
iv) Economics of tunneling

OR

12. a) What are the ways in which the ventilation can be provided in the tunnel? Explain. **7**

b) Write in detail tunnel surveying. **7**

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