B.E. (Civil Engineering) Eighth Semester (C.B.S.)

Irrigation Engineering

P. Pages : 3 **AHK/KW/19/2376**

Time : Three Hours Max. Marks : 80

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.

1. a) Define irrigation and explain its necessity in tropical country in India? What are the advantages & ill effect of irrigation? **6**

b) Following table indicates the data of a off-taking canal. Determine the discharge at the head of this canal by assuming 20% Losses as conveyance Losses. **7**

Sr No.	Crop	Base Period (days)	Water requirement of crop (cm)	Area irrigated (ha)
1	Sugar cane	300	400	1200
2	Overlap sugar cane is hot weather	100	150	400
3	Hot weather crop	120	150	500
4	Kharif Crop	120	55	900
5	Rabi crop	120	70	1000

OR

2. a) After how many days will you supply water to soil in order to ensure efficient irrigation of the given crop, if. **7**

i) Field capacity of soil = 28%

ii) Permanent wilting point = 15%

iii) Dry density of soil = $16 \, kN/m^3$

iv) Effective depth of root zone = 80cm

v) Daily consumptive use of water for the given crop = 12mm.

b) Explain in brief the following **any two.** **6**

a) Drip irrigation with advantages & disadvantages.

b) Sprinkler irrigation with advantages & disadvantages

c) Storage irrigation

3. a) Explain reservoir storage zones & water Level with a neat sketch. **6**

b) The following table tives the mean monthly runoff of a river. Draw a mass curve & find the capacity of reservoir for the combined demand for irrigation, power generation reclamation etc. is 5 million cu.m/min. **7**

Month	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Runoff Mm^3	3	5	8	13	16	18	12	8	5	2	2.2	2.5

OR

4. a) Explain the criterion for site selection for a reservoir? **6**

b) Distinguish between gravity dam and earthen dam. **7**

5. a) Explain in brief forces acting on gravity dam. **7**

b) A gravity dam is 10m high. It has top width of 1m & base width 9m. The upstream face is vertical. The water is stored upto the top of the dam. The specific weight of concrete is $25\,kN/m^3$. Test the stability of this dam section against overturning. **7**

OR

6. a) What are the methods of seepage control in an earthen dam? Explain with the help of neat sketches. **7**

b) A homogeneous earth dam has a section as follow: - **7**

1) Top width = 6m
2) U/S slope = 2.5H:1V
3) D/S Slope = 2 H:1V
4) Height of dam = 21m
5) Free board = 2.5m
6) Filter Length = 20m

The horizontal filter is provided on the down-stream side. Draw the base parabola and the phreatic line. Also calculate the seepage per meter Length of the dam if coefficient of permeability is 8.2×10^{-4} cm/sec.

7. a) Explain design criteria of ogee spillway? **6**

b) Distinguish between a Chute Spillway and a side channel spillway under what circumstances are they used? **7**

OR

8. a) Explain with a neat sketch **any two.** **6**

a) Divide wall
b) Silt Excluder
c) Fish ladder

b) Discuss development utility & limitation of "Khosla's Theory". **7**

9. a) Explain in brief: **7**

a) Canal lining

b) Kennedy's critical velocity ratio

b) A canal has bed width 6m and depth 1.20m, discharge 4.60 Cumecs & slope 1 in 5000 → manning's N = 0.0225 and CVR = 0.95. Check whether the Chosen section satisfies Kennedy's theory. **7**

OR

10. a) Explain Lacey's regime Theory? **7**

b) Design a channel section using Lacey's theory for discharge 15 cumecs, mean diameter of silt particle = 3.0mm & side slop ½ :1. Also find the longitudinal slope. **7**

11. Write a short note on **any three.** **13**

i) Aqueducts & Siphon aqueducts.

ii) Head Regulator

iii) Design of tile drain.

iv) Canal escapes

OR

12. a) Distinguish between- **6**

i) Syphon & Super passage   ii) Level crossing & inlet

b) What is waterlogging? Write causes, effects and remedial measures of waterlogging? **7**

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B.E. (Civil Engineering) Eighth Semester (C.B.S.)

Elective-II : Pavement Analysis & Design

P. Pages : 5 **AHK/KW/19/2379**

Time : Three Hours Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
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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. Relevant IRC codes are permitted.

1. a) Clearly distinguished between flexible and rigid pavements. **7**

b) Calculate ESWL **6**
- i) Wheel configuration = Dual in tandem
- ii) Gear load = 42500 kg
- iii) Tyre pressure = $11 kg / cm^2$
- iv) Clear spacing of duals = 225 mm
- v) Clear spacing of tandems = 375 mm
- vi) Pavement thickness = 1200 mm

OR

2. a) With neat sketches enumerate the functions & importance of each component layer both in flexible & Rigid pavement. **7**

b) Calculate total fatigue from given traffic data with 15 years life and 2 years construction period with growth rate of 7%. **6**

Axle load (kg)	1150	2050	4000	6150	8100	10150	12100
Avg. daily traffic (ADT)	1310	85	110	150	160	85	60

3. a) Explain plate load test for evaluating modulus of subgrade reaction. **7**

b) Estimate the group index of subgrade soil from following data and discuss it rating as subgrade. **6**
- i) Passing 425 micron = 75%
- ii) Passing 75 micron = 60%
- iii) Liquid limit = 51%
- iv) Plastic limit = 28%

OR

4. a) Explain the BR test in pavement system. **7**

b) Calculate the cone bearing value from following data of North Dakota Cone test. Half angle of cone is 7.45'. **6**

Load (kg)	4.5	9.0	18.0	36.0
Penetration (mm)	22.3	35.1	53.4	72.5

5. a) Design a flexible pavement for 02 lane highway for the following data. **7**

i) Present traffic = 575 CVD
ii) Design life = 20 yrs
iii) Delay = 2 yrs.
iv) Growth rate = 5.5%
v) VDF = 2.2
vi) CBR of subgrade = 5%
vii) Minimum surfacing = 75mm

b) A plate load test conducted with 30 cm dia. steel plate on subgrade and also on 20 cm thick base recorded a pressure of $1.4\,kg/cm^2$ and $4.5\,kg/cm^2$ respectively for 5 mm. Using the same material design a flexible pavement for a wheel load of 5200 kg at $5.5\,kg/cm^2$ tyre pressure if allowable deformation is 5 mm. Assume $\mu s = 0.4$. **7**

OR

6. Design a flexible pavement if permissible deflection is 0.5 cm by Triaxial method. Data given **14**

i) Wheel load = 6200 kg
ii) Tyre pressure = $6.6 \dfrac{kg}{cm^2}$
iii) Annual rainfall = 92 cm
iv) $E_{subgrade} = 80\,kg/cm^2; E_{subbase} = 415\,kg/cm^2, E_{base} = 1950\,kg/cm^2$
v) Bituminous surfacing = $4400\,kg/cm^2$
vi) Rainfall coeff. = 0.9
vii) Traffic coefficient = 816
viii) Traffic volume = 3770 CVD.

7. a) Explain types and functions of various joints in rigid pavement. **6**

b) For the rigid pavement, find the spacing of expansion joint and contraction joint and also design a longitudinal Tie – bar joint for following data : **7**

i) Permissible shrinkage stress in CC = $0.85\,kg/cm^2$
ii) Width of expansion joint = 25 mm
iii) Seasonal temperature variation = 45ºC.
iv) Permissible tensile stress in Tie – bar = $2000\,kg/cm^2$
v) Bond stress in steel = $25\,kg/cm^2$
vi) Lane width = 3m.

OR

8. Design 2 lane pavement for traffic volume of 860 CVD. And other data as follows : **13**

i) n = 20 yrs
ii) r = 7%
iii) p = 4600 kg
iv) p = $5.8\,kg/cm^2$
v) M30 concrete
vi) $R = 42\,kg/cm^2$
vii) $K_S = 8.2\,kg/cm^2/cm$
viii) Temp. gradient = 0.46ºC/m
ix) Panel dimension = $(3.5 \times 6)\,m$

9. a) Write short note on **6**
i) Present serviceability index
ii) Repetition of load

b) Design of a bituminous overlay for a pavement section 3 km long the Benkelman Beam test is conducted at a rate of one test for 250 m length over a two section. The following values of deflection are recorded 1.38, 1.52, 1.67, 1.31, 1.7, 1.92, 1.68, 1.2, 1.84, 1.93, 1.46, 1.55 mm. The test temperature of pavement is 26ºC. Present traffic volume is 750 CVD. Assume growth rate of 9.5% per year for service life of 10 years with delay of 1 year. **7**

OR

10. a) Explain the rut depth & its treatment. **6**

b) A plate load test with 30 cm dia. plate is conducted on subgrade gives following data. **7**

Deformation (mm)	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
Load on plate (kg)	200	480	730	1005	1240	1475	1720	1975

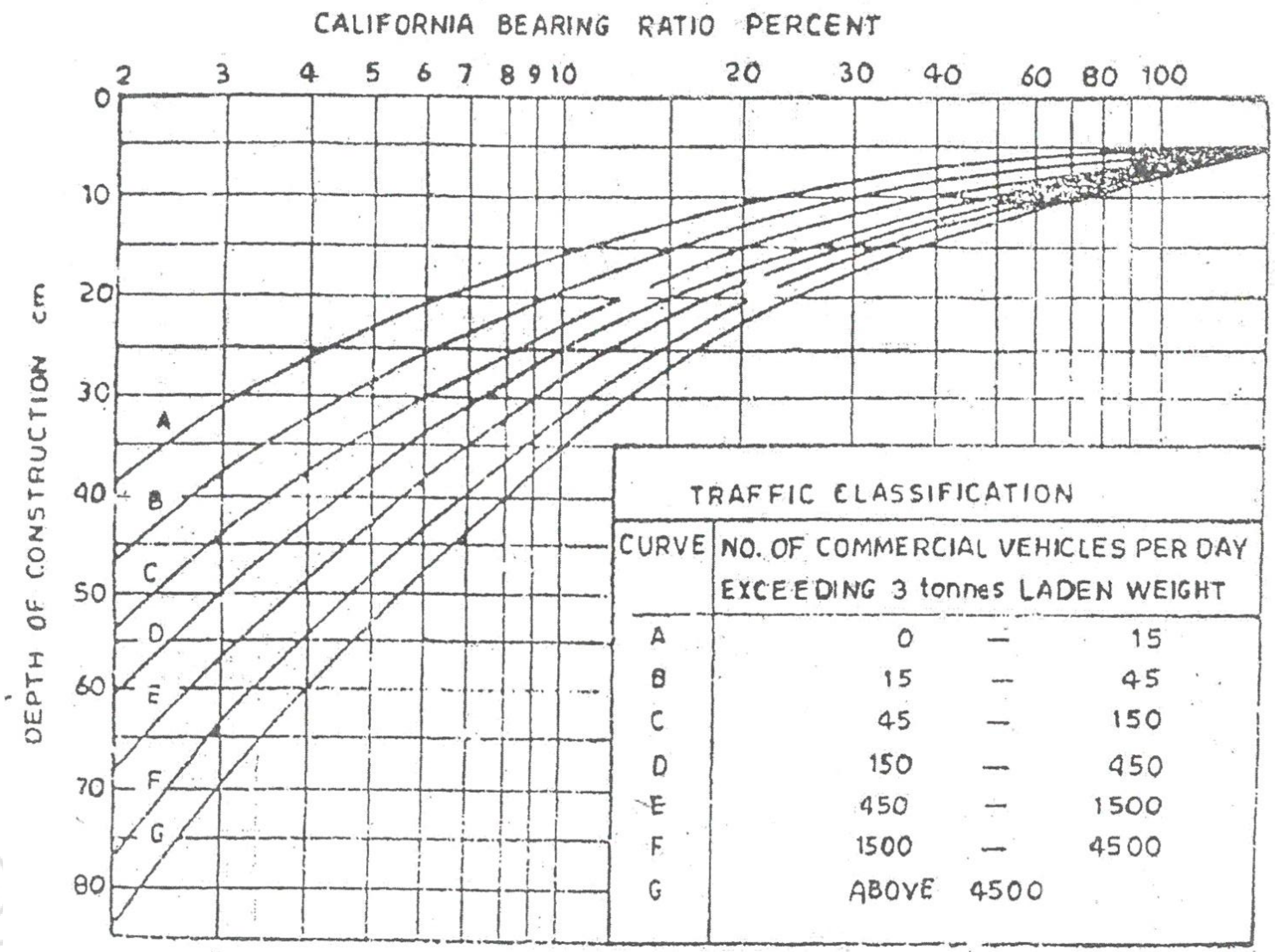
Estimate modulus of subgrade reaction.

11. Check the adequacy of rigid pavement from IRC criteria. **14**
i) Slab thickness = 150 mm
ii) $E_{concrete} = 3\times10^5\ kg/cm^2$
iii) $\mu = 0.15$
iv) Thermal expansion coefficient $= 10\times10^{-6}$ per $^\circ C$
v) M.O.R. of concrete = $48\,kg/cm^2$
vi) Thermal gradient across c.c. slab = $0.5^\circ C/cm$
vii) K of subgrade soil = $6.5\,kg/cm^2/cm$
viii) $c_x = 0.82$, $c_y = 0.45$
ix) Wheel load = 3000 kg
x) Tyre pressure = $4.5\,kg/cm^2$

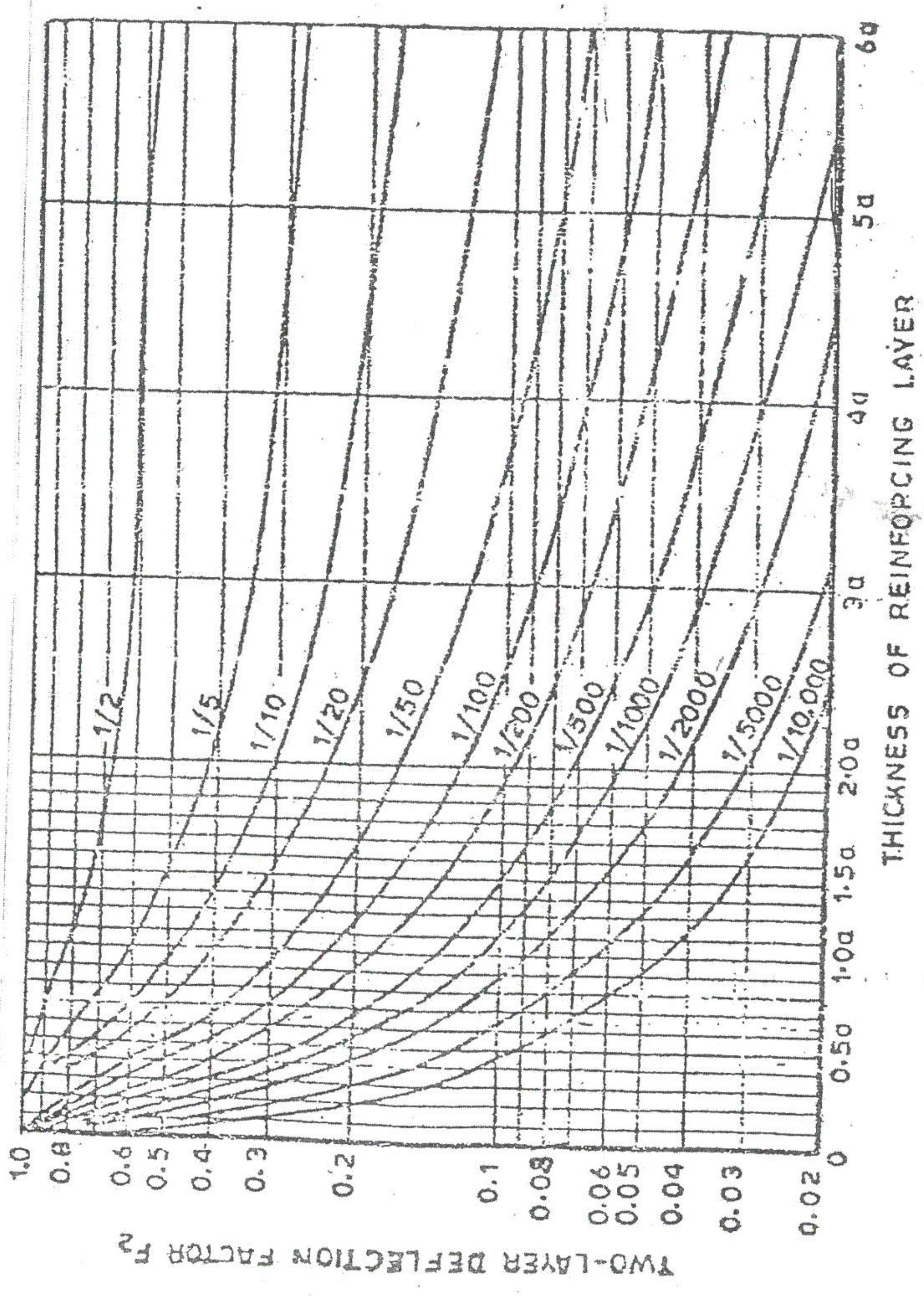
OR

12. a) Write short note on **any two.** **7**
i) Benkelman Beam deflection test
ii) Repair, maintenance & rehabilitation of pavement
iii) Profilometers

b) Design a dowel bar system for the following data **7**
i) Pavement thickness = 200 mm.
ii) Radius of relative stiffness = 55 cm
iii) Width of relative expansion joint gap = 20 mm
iv) Permissible shear stress in dowel bar $(F_S) = 1000\,kg/cm^2$
v) Permissible flexural stress in dowel bar $(F_f) = 1400\,kg/cm^2$
vi) Bearing stress in concrete $= 100\,kg/cm^2$
vii) Wheel load = 4000 kg.



C.B.R. Design Chart
(Recommended by IRC)



Relationship of F_2 and h in a Two-Layer System (Burmister's Method)

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B.E. (Civil Engineering) Eighth Semester (C.B.S.)

Elective-III : Water & Waste Water Treatment

P. Pages : 3 **AHK/KW/19/2392**

Time : Three Hours Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
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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. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1. a) Which points should be kept in mind while selecting a site for water treatment plant ? **6**

b) Draw flow sheet of conventional water treatment plant and explain the function of each unit in brief. **7**

OR

2. a) Write short note on gas transfer in aeration process. **6**

b) Design the cascade aerator for the flow of 15 MLD. **7**

3. a) Design a flash mixer for the flow of 10 MLD. **7**

b) State various types of coagulants used in water treatment and explain any one in detail. **6**

OR

4. Design a Clariflocculator for the design flow of 500 m^3/hr. Assume suitable data. **13**

5. Design a Rapid sand filter for 15 MLD along with underdrainage system design for sand bed, gravel and trough. **13**

OR

6. a) State the difference between slow sand filter and rapid sand filter. **6**

b) Result of chlorine demand test on raw water is given below : **7**

Sample No.	Chlorine Dosage (mg/l)	Residual chlorine after 10 min contact (mg/l)
1	0.2	0.18
2	0.4	0.34
3	0.6	0.48
4	0.8	0.46
5	0.9	0.27
6	1.0	0.18
7	1.2	0.38
8	1.4	0.58
9	1.6	0.78

Sketch chlorine demand curve. Determine the break point dosage and chlorine demand. Also chlorine demand at dose of 1.20 mg/l ?

7. a) Explain physical and chemical characteristics of waste water. **6**

b) During BOD test conducted on a 5% dilution of waste the following observations were taken. **8**

i) Do of aerated water used for dilution = 3.6 mg/l

ii) Do of original sample = 0.8 mg/l

iii) Do of diluted sample after 5 day incubation = 0.7 mg/l

Calculate :
a) 5 day BOD and b) Ultimate BOD
Assume deoxygenation constant at test temperature as 0.12.

OR

8. a) Draw a flowsheet of conventional wastewater treatment plant and explain the function of each unit. **7**

b) Write a short note on sewage farming and sewage sickness. **7**

9. a) What is 'oxygen sag curve' in stream pollution ? Explain with neat sketch. **7**

b) Design a grit chamber for a flow of 0.5 m^3/s. Assume the peak flow rate to be 3 times the average flow. **7**

OR

10. a) Design a circular sewage sedimentation tank for the design discharge of 15 MLD. **7**

b) Design a suitable screen unit for the design flow of 12 MLD. **7**

11. a) What is activated sludge process ? With the help of neat sketch explain its working. **5**

b) Design the activated sludge treatment unit with the following data, for a town having a population of 70,000 - **8**

i) Average sewage flow - 2 wt/cap/day

ii) BOD of raw sewage = 200 mg/l

iii) Suspended solids in raw sewage = 3000 mg/l

iv) BOD removed in primary treatment = 40%

v) Overall BOD removal desired = 90%

OR

12. a) Explain the working of trickling filter with neat sketch. **6**

b) Write note on **any two.** **7**

i) Sludge Drying Beds

ii) Sludge Digester

iii) Aerated lagoons

iv) Stabilization Pond

v) MLSS & MLVSS

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B.E. (Civil Engineering) Eighth Semester (C.B.S.)

Construction Economics & Finance

P. Pages : 2

Time : Three Hours

AHK/KW/19/2394

Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
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1. a) Explain the importance of construction industry for economic development of the country. **7**

b) What is value of money? Illustrate your answer with suitable example. **6**

OR

2. a) Explain why construction industry is called a key industry of India. **6**

b) A company is trying to diversify its business in a new product line. The life of the project is 10 years with no salvage value at the end of its life. The initial outlay of the project is Rs. 25,00,000/- The annual net profit is Rs. 4,00,000. Find the rate of return for new project. **7**

3. a) What are the factors of production? **6**

b) Explain the features of turn key projects. **7**

OR

4. a) Explain monopoly and different types of monopoly. **6**

b) Explain oligopoly. State its features and types. **7**

5. a) What is inflation? State its types. **7**

b) What is recession? State its impact on economy. **7**

OR

6. a) What is monopolistic competition? State its features. **7**

b) What is stagflation? State its features. **7**

7. a) Explain the various sources of financing the construction business. **7**

b) What is foreign Direct investment? What are its various types? **6**

OR

8. a) What do you understand by project cash flow? Illustrate your answer with suitable example. **7**

b) What is affordable housing finance scheme launched by Govt of India? **6**

9. a) What is Balance sheet? Give brief proforma of balance sheet. **7**

b) Calculate current ratio and acid test ratio from the following data. **6**

Current assets	Rs. 12,00,000.
Current liabilities	Rs. 6,00,000.
Inventories	Rs. 3,50,000.

OR

10. a) Calculate Debt-equity ratio from the following. **7**

Particulars	Amount
Equity share capital	Rs. 20,00,000
General Reserve	Rs. 16,00,000
Debentures	Rs. 15,00,000
Current liabilities	Rs. 1,00,000
Prepaid expenses	Rs. 10,000

b) What do you understand By CIBIL? State its importance. **6**

11. a) Explain with suitable example the management of working capital. **7**

b) Explain the various factors affecting working capital requirement. **7**

OR

12. a) From the following calculate operating Ratio. **7**

Particulars	Amount (Rs)
Net sales	8,00,000
Administrative & office Exp.	45,000
Selling expenses	40,000
Cost of Goods sold	4,00,000

b) Explain the concept of capital structure. What is the combination of capital structure would you prefer. **7**

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