

CBCS SCHEME

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15CV61

Sixth Semester B.E. Degree Examination, June/July 2018 Construction Management and Entrepreneurship

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define Construction management. Explain the objectives of construction management. (08 Marks)
b. What are the functions of management? Explain any two of them. (08 Marks)

OR

- 2 a. What is construction planning? List the objectives of construction planning. (06 Marks)
b. Explain Bar chart or Gantt chart. Write its limitations. (04 Marks)
c. Draw the network for the project based on the following data of events:
Find Early start time, Early finish time, Late finish time, and determine the least number of days required to complete the work. Draw the critical path.

Event	Duration (Days)	Preceders
A	2	-
B	4	-
C	1	A
D	6	B
E	7	C, D

(06 Marks)

Module-2

- 3 a. Explain the importance of resource management in the construction of a project. (08 Marks)
b. Explain (i) Minimum wages act 1948 (ii) Labour production rate of productivity. (08 Marks)

OR

- 4 a. Explain the advantages of utilization of construction equipments in construction field. List the various classifications of equipments. (08 Marks)
b. Describe material management and objectives of material management. (08 Marks)

Module-3

- 5 a. Define quality. Describe quality control and quality assurance. (08 Marks)
b. Explain the importance of safety in construction. Explain the safety measures during (i) Excavation (ii) Drilling and blasting (08 Marks)

OR

- 6 a. Describe the safety insurance. Explain constructors all risk insurance. (08 Marks)
b. Differentiate between morals and values. (04 Marks)
c. List the professional rights. (04 Marks)

Module-4

- 7 a. What is economics? List the goals of economics. (08 Marks)
b. Differentiate between Microeconomics and Macroeconomics. (08 Marks)

OR

- 8 a. Explain : (i) Time value of money (ii) Simple interest (iii) Compound interest. (10 Marks)
b. Mr. X is planning to build his own house. He plans to deposit Rs. 40,000/- every year for next 10 years in a bank. The bank gives 12% interest rate compound annually. Find the maturity value of his account after 10 year. (06 Marks)

Module-5

- 9 a. Explain in brief the role of entrepreneurship in economic development. (08 Marks)
b. What do you mean by small-scale industry? List the characteristics of small scale industries. (08 Marks)

OR

- 10 a. What is business plan? Explain the importance of business plan. (08 Marks)
b. Explain in detail the contents of a good project report. (08 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2018 Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Use of IS:800-2007, SP(6)-I or Steel table is permitted.*

Module-1

- 1 a. What are the advantages and disadvantages of steel structures? (08 Marks)
- b. What are rolled steel sections? Mention any six shapes used as structural elements with sketches. (08 Marks)

OR

- 2 a. Identify plastic hinge distance 'X' is 0.414l from the simple support of a propped cantilever beam supporting a UDL of w kN/m over the entire span. (08 Marks)
- b. Analyse the continuous beam ABC subjected to working loads shown in Fig.Q2(b) and determine the maximum plastic moment. Take load factor of 1.85. (08 Marks)

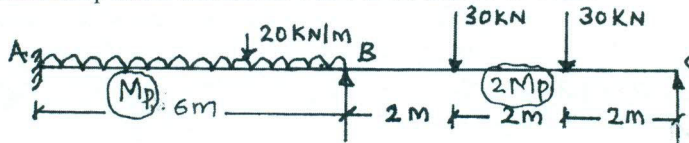


Fig.Q2(b)

Module-2

- 3 a. What are HSFG bolts? What are the advantages of HSFG bolts? (06 Marks)
- b. Design a bolted connection for a lap joint of plate thickness 10 mm and 12 mm to carry a factored load of 150 kN. Use M_{16} and 4.6 grade bolt. Assume the bolts as fully threaded. (10 Marks)

OR

- 4 a. What are the advantages and disadvantages of welded connections? (08 Marks)
- b. 18 mm thick plate is joined to a 16 mm thick plate by 200 mm (Effective) butt weld. Determine the strength of joint if, (i) A double V-butt weld is used (ii) A single V-butt weld is used. Take $f_u = 410 \text{ N/mm}^2$ and $\gamma_{mw} = 1.25$. (08 Marks)

Module-3

- 5 a. Explain Laced and Battened columns with sketches. (06 Marks)
- b. Determine the design strength of a column section ISHB 350@67 kg/m. The column is 3m height with one end fixed and other end hinged. Take $f_y = 250 \text{ N/mm}^2$. (10 Marks)

OR

- 6 Design a compression member using double channel section (2ISLC300@33.1 kg/m) face to face to carry a factored load of 1600 kN. The length of the column is 5 m with one end fixed and one end hinged. Assume M_{18} bolts and $f_{cd} = 200 \text{ N/mm}^2$. Also design single lacing system. (16 Marks)

Module-4

- 7 a. What is lug angle? Explain briefly with sketch. (04 Marks)
b. A single unequal angle ISA 100×75×6 mm is connected to 10 mm thick gusset plate with six 16 mm ϕ bolts to transfer tension. Determine design tensile strength if longer legs are connected to gusset. Assume pitch and edge distance of 40 mm each. (12 Marks)

OR

- 8 a. Briefly explain types of column bases. (04 Marks)
b. Design a slab base for a column ISHB 300@58.8 kg/m subjected to a service load of 1500 kN. The grade of concrete for pedestal is M₂₀ and SBC of soil is 180 kN/m². Design slab base and concrete base with welded connection. (12 Marks)

Module-5

- 9 A floor of hall measuring 9m × 21m is of 150 mm thick R.C. slab supported on steel beams [I section] spaced at 3.5 m c/c. The finishing load of floor is 1.5 kN/m² and live load is 3 kN/m². Design the steel beam and apply the necessary checks. Assume self weight of beam = 1 kN/m and thickness of wall = 0.3 m. (16 Marks)

OR

- 10 Simply supported beam ISMB 350@52.4 kg/m is used over a span of 5 m. The beam carries an Udl live load of 20 kN/m and dead load 15 kN/m. The beam is laterally supported throughout check the safety of the beam. (16 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2018 Highway Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain the various characteristics of road transport. (08 Marks)
- b. What are the significant recommendations of Jayakar committee report? Explain how it is implemented in the road development of a country. (08 Marks)

OR

- 2 a. Briefly explain about planning surveys for a highway project. (08 Marks)
- b. The area of a district is 13400 sq km and there are 12 towns as per 1981 census. Determine the length of different categories of roads to be provided in the district by the year 2001. Assume over all density of road length is 82 km per 100 sq km area. (08 Marks)

Module-2

- 3 a. Explain with sketches the various factors controlling the alignment of a road. (08 Marks)
- b. What are the objectives of preliminary survey for highway alignment? Enumerate the details to be collected and the various steps to be followed in the conventional method. (08 Marks)

OR

- 4 a. Derive an expression for finding the extra widening required on horizontal curve. (08 Marks)
- b. The speeds of overtaking and over taken vehicles are 70 kmph and 40 kmph respectively on a two way traffic road. The average acceleration during overtaking may be assumed as 0.99 m/sec². Calculate safe overtaking sight distance and show the details of overtaking zone with sketch. (08 Marks)

Module-3

- 5 a. What are the desirable properties of sub grade soil? Enumerate the identification and classification tests of soils. (08 Marks)
- b. Design a flexible pavement for a two lane undivided carriage way using the following data: Design CBR value of subgrade 5.0% initial traffic on completion of construction is 300 C.V/day. Average growth rate is 6.0% per year. Design life is 10 years VDF value is 2.5. Lane distribution factor is 0.75. (08 Marks)

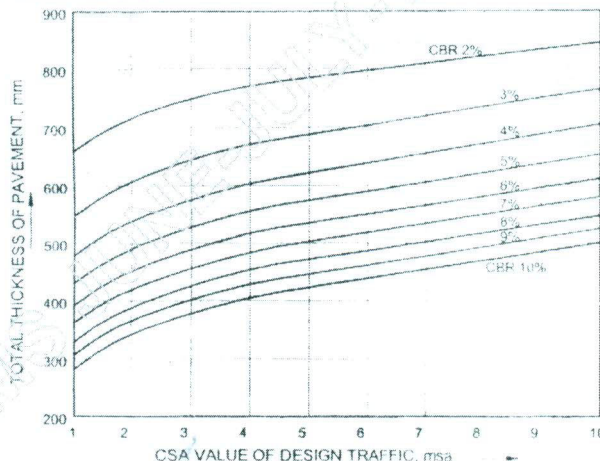


Fig.5(b) CBR design chart for determination of total pavement thickness for traffic with CSA of 1.0 to 10 msa.

OR

- 6 a. What are the desirable properties of road aggregates? What tests are conducted for judging the desirable properties? Mention the significance of each test. (08 Marks)
- b. A plate load test was conducted on a soaked sub grade during monsoon using a plate diameter of 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of sub grade reaction for the standard plate. (08 Marks)

Mean settlement values, mm	0.0	0.24	0.52	0.76	1.02	1.23	1.53	1.76
Load values kg	0.0	460	900	1180	1360	1480	1590	1640

Module-4

- 7 a. What are the desirable properties of Bituminous mixes? Discuss briefly. (08 Marks)
- b. What are the essential requirements of soil properties suitable for the construction of highway sub grade? Explain the method of construction of highway sub grade. (08 Marks)

OR

- 8 a. Explain the method of construction of water Bound Macadam base. (08 Marks)
- b. What are the functions of granular material sub base? Explain the construction method of granular sub base. (08 Marks)

Module-5

- 9 a. Discuss the importance of highway drainage. (08 Marks)
- b. The maximum quantity of water expected in longitudinal drains on clayey soil is $0.9 \text{ m}^3/\text{sec}$. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2 m/sec and Manning's roughness coefficient is 0.02. (08 Marks)

OR

- 10 a. Discuss the various components of quantifiable and non-quantifiable benefits to the road users due to highway development project. (08 Marks)
- b. Calculate the annual cost of a stretch of highway from the following particulars:

Item	Total cost lakhs	Estimated life years	Rate of interest
Land	35.0	100	6%
Earthwork	40.0	40	8%
Bridges, culverts, drainage	50.0	60	8%
Pavement	100.0	15	10%
Traffic signs and road appurtenance	15.0	5	10%

The average cost of maintenance of the road is Rs.1.5 lakhs per year. (08 Marks)

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15CV64

Sixth Semester B.E. Degree Examination, June/July 2018 Water Supply and Treatment Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Enumerate points to be considered for water supply scheme. (08 Marks)
b. What is fire demand? Compute fire demand for a city having population 1,40,000 by various formula. (08 Marks)

OR

- 2 a. What is peaking factor? Explain the factor governing design period. (08 Marks)
b. The population of 5 decades from 1970 to 2010 are given in the table. Find the population after one, two and three decades beyond the last known decade by : i) geometric increase method ii) incremental increase method.

Year	1970	1980	1990	2000	2010
Population	25000	28000	34000	42000	47000

(08 Marks)

Module-2

- 3 a. What is the purpose of analysis of water point out significant of each unit in water treatment? (08 Marks)
b. What is sampling? Explain the steps involved in collection of river water sample. (08 Marks)

OR

- 4 a. Enumerate the necessity of microbiological examination of water. Explain membrane filter technique for bacteriological examination of water. (08 Marks)
b. Write the permissible limits and effects of following water quality parameter according (IS10500 – 1991) i) Turbidity ii) p^H iii) Chloride iv) Lead. (08 Marks)

Module-3

- 5 a. Briefly explain mechanism of filtration. (08 Marks)
b. A rectangular settling tank without mechanical equipment is to treat 1.8 million liters per day of raw water. The sedimentation period is to be 4 hours, the velocity of flow 8cm/min and the depth of water and sediment 4.2m. If an allowance of 1.2m for sediments is made. Design the dimension of the tank. (08 Marks)

OR

- 6 a. Briefly explain design elements of a rectangular sedimentation tank. (08 Marks)
b. What are the characteristics of good coagulant? (04 Marks)
c. Explain the causes for Fouling of membrane and how it can be controlled. (04 Marks)

Module-4

- 7 a. What is permanent hardness? With the help of chemical formula explain zeolite process of removing hardness. (08 Marks)
- b. Discuss the importance of nano filtration and explain different forms of chlorination. (08 Marks)

OR

- 8 a. Discuss the characteristics of ideal disinfectants and explain the mechanism of disinfection. (08 Marks)
- b. Explain reverse osmosis principle with the help of neat sketch. (04 Marks)
- c. Enumerate importance of defluoridation. Mention the methods of defluoridation. (04 Marks)

Module-5

- 9 a. Briefly explain economical diameter of raising main. (04 Marks)
- b. Mention the points to be considered for selection of a site for intake structure. (04 Marks)
- c. A city has a population of 1,50,000 water is to be supplied at the rate of 160 liters per head per day. If the static lift of the pump is 40 meters. Calculate the B.H.P of motor. The raising main is 300m long and its diameter is 50cm. Assume that motor efficiency is 85%. Pump efficiency is 60% $f = 0.04$ and peak hour demand is 1.5 times of average demand. (08 Marks)

OR

10 Briefly explain the following :

- a. Sluice valve
- b. Reflux valve
- c. Post fire hydrant
- d. Air valve.

(16 Marks)

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15CV653

Sixth Semester B.E. Degree Examination, June/July 2018 Alternative Building Materials

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain the concept of energy embodied in building materials. (08 Marks)
b. Explain the role of construction industry in global warming. (08 Marks)

OR

- 2 a. List out the various environmental friendly and cost effective building technologies. Explain any one in brief. (08 Marks)
b. What are the advantages of LEED? List out the five main credit categories in LEED rating system. (08 Marks)

Module-2

- 3 a. Write a note on : (i) Fal-G blocks (ii) Laterite blocks. (08 Marks)
b. List and explain the properties of Good mortar. (08 Marks)

OR

- 4 a. Explain the method of manufacturing stabilized mud blocks. (08 Marks)
b. A brick masonry prism is made up of 6 bricks joined by mortar of thickness 2 cms. The brick is 8 cm is thickness. The prism is subjected to a uniform vertical stress of 5 MPa. The brick has a modulus of 800 MPa and the mortar has a modulus of 9000 MPa. Determine the horizontal lateral stress in brick and mortar. Assume the Poisson's ratio of brick and mortar = 0.1 (08 Marks)

Module-3

- 5 a. Write the properties and uses of lime Pozzolana cement. (08 Marks)
b. List out the different methods employed in manufacturing of FRP and explain any one in brief. (08 Marks)

OR

- 6 a. List out the different agro and industrial wastes. Explain their use as a building material. (08 Marks)
b. Explain the applications of FRP composites. (08 Marks)

Module-4

- 7 a. List out the advantages and disadvantages of Mivan Construction Techniques. (08 Marks)
b. Explain the process of constructing masonry domes and vaults. (08 Marks)

OR

- 8 a. What are the materials used in ferro cement? Explain its construction methods in brief. (08 Marks)
b. What are the primary functions of a roof? Explain briefly the various roofing alternatives. (08 Marks)

Module-5

- 9 a. What are the advantages and disadvantages of manufacturing concrete from RMC plants?
(08 Marks)
- b. What is the meaning of precast elements? What are the advantages of precast concrete?
(08 Marks)

OR

- 10 a. Write a note on :
(i) Types of concrete mixer
(ii) Cost concept in building. (08 Marks)
- b. What are the equipments used for producing stabilized blocks? Explain them in brief.
(08 Marks)

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15CV654

Sixth Semester B.E. Degree Examination, June/July 2018 Ground Improvement Techniques

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Classify the ground improvement techniques and discuss their suitability. (08 Marks)
b. If in a project unsuitable soil conditions encountered, what are the possible alternate solutions of ground modification? (08 Marks)

OR

- 2 a. Explain the effects of compaction on compressibility and permeability properties of soil. (08 Marks)
b. With a sketch, explain dynamic compaction. (08 Marks)

Module-2

- 3 a. Briefly explain different methods of dewatering techniques. (08 Marks)
b. Explain Electro – Osmosis dewatering and stabilization technique. What is the purpose of replacing electrodes during Electro – Osmosis dewatering? (08 Marks)

OR

- 4 a. With a neat sketch, explain preloading technique with vertical drains of ground improvement techniques. (08 Marks)
b. Why drainage of slope is necessary? Give reasons. (08 Marks)

Module-3

- 5 a. Discuss short term and long term soil – lime reaction, when lime is used as stabilizer and what are the engineering benefits of lime stabilization? (08 Marks)
b. Describe Cement stabilization. What are the engineering properties of cement additives to soil as stabilizer? (08 Marks)

OR

- 6 a. Explain how fly ash is beneficial in combination with other materials for effective stabilization. (08 Marks)
b. Write short notes on : i) Chlorides stabilization ii) Bitumen stabilization. (08 Marks)

Module-4

- 7 a. Explain Blasting method of stabilization. Bring out the advantages of this method. (08 Marks)
b. What are Stone columns? Explain the process of installation. (08 Marks)

OR

- 8 a. Give the classification of grouting methods for soils. Describe it in brief. (08 Marks)
b. What are the applications of grouting? Explain them briefly. (08 Marks)

Module-5

- 9 a. List the properties of geosynthetics. Explain any two. (08 Marks)
b. Explain the four most basic applications of geosynthetics. (08 Marks)

OR

- 10 Write short notes on the following : (16 Marks)
a. Soil nailing b. Gabions and Mattresses c. Soil reinforcement d. Micro piles.

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15CV662

Sixth Semester B.E. Degree Examination, June/July 2018 Environmental Protection and Management

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define Environmental Management. Discuss different system approach to corporate Environment Management. (08 Marks)
b. Explain Business strategy drivers and barriers. (08 Marks)

OR

- 2 a. Discuss the significance of Environmental stewardship in detail. (08 Marks)
b. Explain different types of Environment management principles. (08 Marks)

Module-2

- 3 a. Discuss the Environmental quality objectives. (08 Marks)
b. Explain the rationale of Environmental standards. (08 Marks)

OR

- 4 a. Define Concentration and Mass standards, Effluent standards and Stream standards. (06 Marks)
b. Distinguish between Pollution, Prevention and Pollution control. (06 Marks)
c. Define Benchmarking. Explain the three distinctive types of benchmarking. (04 Marks)

Module-3

- 5 a. Explain the Core element of EMS, with a schematic diagram. (10 Marks)
b. List any six benefits of EMS. (06 Marks)

OR

- 6 a. Discuss the benefits and barriers of EMS as per ISO 14001. (05 Marks)
b. Write any four principles and structure of ISO 14000 series. (05 Marks)
c. Write a short note on Documentation and Operational control. (06 Marks)

Module-4

- 7 a. Explain types of Environmental audits. (10 Marks)
b. What are the roles and responsibilities of the auditors? (06 Marks)

OR

- 8 a. Explain in detail the Waste audits. (08 Marks)
b. Discuss how pollution prevention is integrated into compliance audits. (08 Marks)

Module-5

- 9 a. Explain application of EMS and pollution prevention in sugar and textile industry. (08 Marks)
b. Explain application of EMS and pollution prevention in paper and pulp and tanning industry. (08 Marks)

OR

- 10 a. Explain disposal procedures of hazardous wastes. (10 Marks)
b. Write a note on application of EMS in dairy Industry. (06 Marks)

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CBCS SCHEME

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15CV61

Sixth Semester B.E. Degree Examination, Aug./Sept.2020 Construction Management and Entrepreneurship

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Graph(Plain) is permitted.

Module-1

- Define Management and list out management functions or process. (08 Marks)
 - Identify the stakeholder's in a construction project and explain the role of contractor. (08 Marks)

OR

- Explain the concept of work Breakdown structure with an example. (06 Marks)
 - Define "Activity" and "Event" as application to construction project. (02 Marks)
 - Using CPM method, determine "Critical activities" and "Critical path" for the Network given under Fig.Q2(c). What is project duration? (08 Marks)

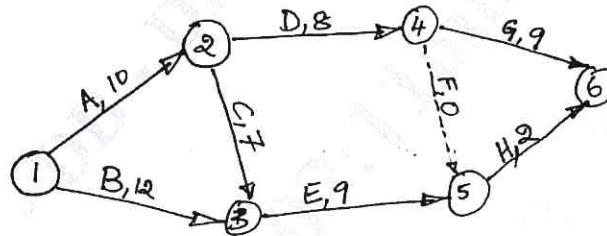


Fig.Q2(c)

Module-2

- Explain the main provisions of the Minimum Wages Act, 1948 (as amended recently). (06 Marks)
 - Define worker's productivity standard and list out typical factors affecting the workers production efficiency. (04 Marks)
 - A typical RCC building of G+2 floors have 900 MT of Reinforcement work for each floor. The work to be completed in 24 days with 8 hrs/day of working. A labour gang or team consisting of 1 HSKL + 2 skilled + 4 unskilled have productivity of 1.75 MT/hr worker team productivity will decrease by 7.5% for first floor work and further 7.5% @ second floor slab work. Estimate (i) Total number of worker gangs or teams required to complete the job. (ii) Number of man power, man days and man hours (iii) Unit rate for labour work if highly skilled gets Rs. 750/day, skilled gets Rs.600/day and unskilled Rs.500/day. (06 Marks)

OR

- List out factors behind the selection of construction equipments to perform an assigned task or project. (04 Marks)
 - List out various inventory control techniques for material management? What is A-B-C analysis? (04 Marks)

- c. An excavator with a bucket capacity of 1.22 cum and rated horse power of 180 HP is used for excavation of soil. Following information is available.
- Capital cost Rs.75 lakhs,
 - Technical life 5 years
 - Charged to the project : 2.5% per month of capital cost
 - Total hours employed per month = 300 Hrs
 - Prime mover = Diesel, Load factor = 0.85, Crank case capacity = 32 lit, Time between oil charge = 120 Hrs
 - Correction factor = 0.7, load factor = 0.85, Bucket swing factor = 1.00, Bucket fill factor = 0.90.
 - Operation and maintenance man power cost = Rs. 175/hr
 - Time cycle for one operation = 45 sec with 55 min per hour working.
 - Routine maintenance and major repair cost = 120% of depreciation or ownership cost.
 - Diesel rate Rs.70/lit ; Lube rate Rs. 200/kg.
- Estimate : (i) Hourly production rate is cum/hr
(ii) Cost of ownership and operation in Rs/hr
(iii) Unit rate of equipment operation in Rs/cum. (08 Marks)

Module-3

- 5 a. Explain : (i) Total Quality management (TQM)
(ii) Cost of Quality
(iii) Quality Control (QC) (12 Marks)
- b. What is the importance of “Tool Box Talks” and “Good House Keeping” in construction safety management? (04 Marks)

OR

- 6 a. Define Values, Moral's and Ethics. List out seven ethical principles applicable to construction industry. (06 Marks)
- b. Describe the safety measures to be adopted while doing open excavation of earth and rock to avoid accidents. (06 Marks)
- c. List out Broad Principles of Quality Management System's as outlines under ISO 9000. (04 Marks)

Module-4

- 7 a. Discuss briefly “Concept of Engineering economic study and its principles”. (06 Marks)
- b. What is the present equivalent money value of Rs.50,000/-, 5 Years from now. The rate of interest is 14% compounded quarterly. (04 Marks)
- c. A concrete mixer has following cash flow detail :
(i) Initial purchase price = Rs. 7,50,000/- (ii) Annual operating and maintenance cost of Rs.45,000/- (iii) Salvage value = Rs.2,10,000/- (iv) Useful life = 10 years. (v) 1 number of operator is employed and the cost of Rs. 30/- per hour. (vi) The mixer production rate is 0.1 cum per 1 hour. (vii) The revenue or cost generated by selling 1 cum of concrete is Rs.1000/- (viii) Interest rate on capital purchase = 11% per annum. Determine the quantity of concrete in m³ or cum in a year to be produced so that the Revenue generated will be Break even with the expenditure. (06 Marks)

OR

- 8 a. What is the total capitalized cost of a building which have (i) Construction cost Rs.1,00,000/- immediate (ii) Rs.10,000/- expenses each year for the first 4 years. (iii) Annual year end maintenance cost of Rs.5000/- plus the expenditure of Rs. 25000/- @ the end of each 10 years period for replacement purpose? (iv) Interest rate = 8% p.a. (04 Marks)

- b. Cash flow for two projects A and B are given below with minimum attractive rate of return of 10%. Choose the best alternative using “Annual worth” method of analysis.

End of year	0	1	2	3	4
Project A	-50,000/-	5,000/-	17,500/-	30,000/-	42,500
Project B	-50,000/-	40,000/-	15,000/-	15,000/-	15,000

(08 Marks)

- c. A contractor has been awarded to do a job which requires procurement of an equipment. Two brands ‘A’ and ‘B’ are available to perform the job. Brand ‘A’ requires an investment of Rs. 4,50,000/- while brand ‘B’ requires an investment of Rs. 7,25,000/-. The annual savings generated by the Brands are :

Brand	I year Rs.	II year Rs.	III year Rs.
A	2,25,000/-	2,25,000/-	2,25,000/-
B	3,00,000/-	3,00,000/-	3,00,000/-

Which Brand of equipment should the controller choose? Assume rate of interest p.a = 8%.

(04 Marks)

Module-5

- 9 a. Define Entrepreneur? Explain the functions of an Entrepreneur. (08 Marks)
 b. Define Micro, Small and Medium enterprises. List and explain the characteristics of ‘MSME’. (08 Marks)

OR

- 10 a. What is “DPR”? Discuss the guidelines for the preparation of model project report for starting a new venture. (08 Marks)
 b. What are the various ways of entry into International Business? (08 Marks)

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15CV62

Sixth Semester B.E. Degree Examination, Aug./Sept.2020 Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS-800-2007, SP(6)-1 or steel table is permitted.*

Module-1

- 1 a. What are the advantages and disadvantages of steel structures? (08 Marks)
- b. Explain limit state of strength and limit state of serviceability. (08 Marks)

OR

- 2 a. State upper bound, lower bound and uniqueness theorems. (06 Marks)
- b. A propped cantilever ABCD is loaded as shown in Fig.Q.2(b). Find the collapse load if the beam is of uniform cross section. (10 Marks)

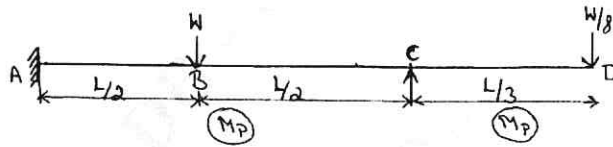


Fig.Q.2(b)

Module-2

- 3 a. Explain the phenomenon of load transfer in high strength friction grip bolts. (06 Marks)
- b. A double cover butt joint is used to connect two flats 200 ISF 10 with 8mm cover plates. The two plates are connected by 9 bolts in chain bolting at a pitch of 60mm and edge distance of 40mm. The bolts are arranged in 3 rows with 3 bolts in each row as shown in the Fig.Q.3(b). Determine the strength and efficiency of the joint. The diameter of the bolts used is 20mm. Assume grade of bolt as 4.6. (Assume both thread and shank to interfere the shear plane). (10 Marks)

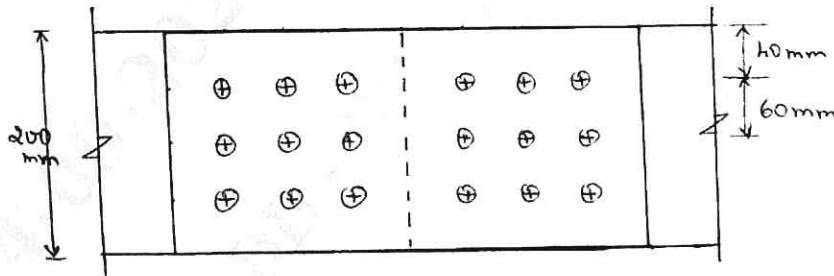


Fig.Q.3(b)

OR

- 4 a. Write the advantages of welded connections over bolted connections. (06 Marks)
- b. A tie member consisting of an ISA 80 × 50 × 8mm (Fe 410 grade steel) is welded to a 12mm thick gusset plate at site. Considering the size of weld as 6mm, find the length of weld required to transmit load equal to design strength of the member. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Determine the design strength of ISHB300@ 0.588kN/m, used as stanchion. Effective length of stanchion is 3.0m. (04 Marks)
- b. Design a compression member of a roof truss to carry an axial load of 150kN. Design the member using a single unequal angle and the corresponding connections to a gusset plate using 20mm diameter bolts of grade 4.6 grade, connecting the longer legs to the gusset plate of 8mm thick. Take effective length of the member as 2.5m. (12 Marks)

OR

- 6 The axial load on a steel column is 2000kN. The column of length 5m is effectively held in position at both ends and restrained in direction at the end. Design a suitable built-up column made of 2 I-sections spaced apart, adopting a single lacing system. Consider permissible stress (f_{cd}) = 180N/mm². (16 Marks)

Module-4

- 7 a. Explain: i) Lug angles ii) Shear Lag. (06 Marks)
- b. Determine the design tensile strength of the plate 200 × 10mm with bolts as shown in Fig.Q.7(b). The yield and ultimate strengths of steel are 250MPa and 410MPa respectively. The diameter of bolt used is 20mm. (10 Marks)

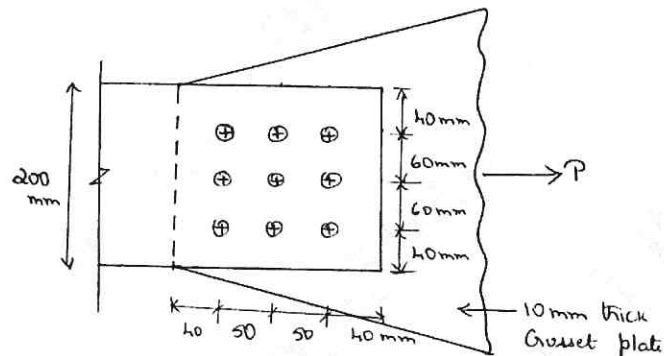


Fig.Q.7(b)

OR

- 8 a. With the help of neat sketches, explain the different types of column bases. (06 Marks)
- b. Design a suitable slab base for a column carrying an axial load of 800kN. The section of the column is built up by ISHB250 @ 54.7 kg/m and 2 plates 300mm × 10mm one on each flange of the joint section. The bearing capacity of the soil is 250 kN/m². Consider grade of concrete as M20, thickness of weld as 8mm and bearing strength of concrete as 9N/mm². (10 Marks)

Module-5

- 9 a. Explain the factors affecting the lateral stability of beams. (08 Marks)
- b. Calculate the moment and shear capacity of a laterally restrained beam ISLB350 @ 0.486kN/m. (08 Marks)

OR

- 10 a. Write a note on the ways to connect a beam and a column. (04 Marks)
- b. Check the adequacy of a laterally restrained cantilever beam ISMB 550@ 1.037 kN/m to withstand a moment of 562.5 kN-m and shear force of 225kN, performing all checks necessary for design of a beam. (12 Marks)

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CBCS SCHEME

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15CV63

Sixth Semester B.E. Degree Examination, Aug./Sept.2020 Highway Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are the important recommendations of Jayakar Committee? How were these helpful in road developments in India? (08 Marks)
- b. Four new road links A, B, C and D are to be constructed during a 5 year plan period. Suggest the order of priority for phasing the road construction programme based on maximum utility approach. Assume utility units of 0.5, 1.0 and 2 for the population ranges and 1 per 1000 tonnes, 500 tonnes and 100 tonnes of agricultural, raw material and industrial products respectively.

Road Link	Length km	No. of Villages served with population range			Productivity served, in tonnes		
		< 1000	1001 – 2000	> 2000	Agricultural	Raw Material	Industrial Products
A	25	20	15	25	8000	4000	1000
B	35	30	20	40	6000	1000	1600
C	40	50	20	60	4500	2000	3200
D	30	15	12	30	4000	6000	500

(08 Marks)

OR

- 2 a. With a neat sketch, explain the concept of star and grid patterns. (08 Marks)
- b. Determine the length of different categories of roads in a state in India by the year 2001 using the third road development plan formule and the given data:
Total area of the state = 4,30,000 sq.km
Total number of towns as per 1991 census = 550
Overall road density aimed at = 75km/100km². (08 Marks)

Module-2

- 3 a. Explain various steps to be followed in a new highway project. (08 Marks)
- b. Calculate the minimum sight distance required to avoid a head-on collision of two cars approaching from the opposite directions at 90 and 60kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.7 and brake efficiency of 50 percent, in either case. (08 Marks)

OR

- 4 a. What is superelevation? Explain the steps for practical design of superelevation. (08 Marks)
- b. An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A summit curve is to be designed for a speed of 80kmph so as to have an overtaking sight distance of 470m. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain briefly, how CBR value of given soil is determined. (08 Marks)
 b. Explain with a neat sketch, how the plate load test is conducted to determine the modulus of sub grade reaction of soil and for making correction for small plate size. (08 Marks)

OR

- 6 a. Explain the meaning of ESWL. How is it determined for a dual wheel assembly and what are its applications? (08 Marks)
 b. Calculate the warping stress at interior, edge and corner region in a 25cm thick concrete pavement with transverse joint at 11m interval and longitudinal joints at 3.6m interval. The modulus of subgrade reaction is 6.9kg/cm^3 . Assume temperature difference for day conditions to be 0.6°C per cm of slab thickness. Assume radius of loaded area as 15cm $C_x = 1.03$ and $C_y = 0.55$, $E = 3 \times 10^5\text{kg/cm}^2$, $\mu = 0.15$, $e = 10 \times 10^{-6}$ per $^\circ\text{C}$. (08 Marks)

Module-4

- 7 a. Explain the construction steps for Bituminous concrete surface course. (08 Marks)
 b. What do you understand by Wet-Mix Macadam? What are its advantages and disadvantages over Water Bound Macadam? (08 Marks)

OR

- 8 a. List the desirable properties and explain the specifications of material for WBM pavement. (08 Marks)
 b. Enumerate the construction steps for cement concrete pavements. (08 Marks)

Module-5

- 9 a. Explain with sketches how the subsurface drainage system is provided to lower the water table and control the seepage flow. (08 Marks)
 b. The maximum quantity of water expected in one of the open longitudinal drains on clayey soil is $0.9\text{m}^3/\text{sec}$. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is $1.2\text{m}/\text{sec}$ and Mannings roughness coefficient is 0.02. (08 Marks)

OR

- 10 a. Explain the various road user benefits of highway improvements. (08 Marks)
 b. Calculate the annual cost of a stretch of highway from the following particulars:

Item	Total cost Rs. In lakhs	Estimated life, years	Rate of interest %
Land	12.0	100	6
Earth Work	9.0	40	8
Bridge culverts	7.5	60	8
Pavement	14.0	15	10

The average cost of maintenance of the Road is Rs.1.5 lakhs per year.

(08 Marks)

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15CV64

Sixth Semester B.E. Degree Examination, Aug./Sept.2020 Water Supply and Treatment Engineering

Time: 3 hrs.

Max. Marks: 80

**Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Draw neat sketches wherever necessary.**

Module-1

- 1 a. Discuss the need for a protected water supply. (06 Marks)
b. List the various types of water demand and explain any four only. (10 Marks)

OR

- 2 a. Explain the term "Design Period" and factors affecting the same. (06 Marks)
b. The census record of a town shown population of 50000, 110000 and 160000 for the years 1971, 1991, 2011 respectively. Estimate
i) Saturation population and
ii) Expected population in 2031. Use Logistic curve method. (06 Marks)
c. Explain the term variations in demand of water. (04 Marks)

Module-2

- 3 a. Draw a neat treatment flow chart for a river source drawn from a balancing reservoir and explain the significance of each unit operation or process. (10 Marks)
b. Explain the term surface and sub – surface sources. (06 Marks)

OR

- 4 a. Explain the grab sampling and composite sampling techniques for water. (04 Marks)
b. Discuss the terms Palatability and Wholesomeness of water. (04 Marks)
c. Give the permissible limits (as per IS 10500 : 1991) and ill effects caused if exceeded (for any eight parameters only) in water used for drinking purpose. (08 Marks)

Module-3

- 5 a. Explain the term plain sedimentation and sedimentation aided with coagulation. (08 Marks)
b. A settling tank with a continuous flow regime is 3m deep and 60m long. Determine the velocity of water to be maintained for effective removal of particles for the following data :
Diameter of particle = 0.025mm ; Sp. gr. Of particles = 2.65 ;
Kinematic viscosity of water at 25°C = 0.01 cm²/sec. (08 Marks)

OR

- 6 a. Explain the theory of Filtration. (04 Marks)
b. Discuss the types of filters used and their classification. (06 Marks)
c. Design a rapid sand filter unit for 4 MLD water supply.
Assume 4% filtered water for washing every day.
Rate of filtration = 5000 litres/hr/m².
Length of filter bed = 1.5 × width.
30 minutes are lost every day for washing filter. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Give the comparison between Lime soda process and Zeolite process of softening water. (10 Marks)
 b. Explain briefly with a neat sketch, the principle showing Reverse Osmosis. (06 Marks)

OR

- 8 a. Discuss the emphasis on treatment of water for community bathing during a fair. (06 Marks)
 b. Explain briefly available technologies for Defluoridation of water. (06 Marks)
 c. Write a note on waterborne diseases and their prevention. (04 Marks)

Module-5

- 9 a. Define the term intake structures and illustrate with neat sketches river intake. (06 Marks)
 b. Obtain the size of the "Main" and BHP of pump required for following data :
 Population of Town = One Lakh ; Per capita demand = 150 Lpcd ;
 Length of pipe = 1800 m ; RL of sump = 100.00 ;
 RL of service reservoir = 136.00 ; Maximum demand = $1.8 \times$ Average demand
 Working hour of pumps = 12 hours ; Flow velocity, through pipe = 1.5 m/s
 Hazen William's coefficient = $C_{11} = 120$ for material of pipe. (10 Marks)

OR

- 10 a. Explain the different pipe materials used in water supply scheme along with advantages and disadvantages. (08 Marks)
 b. Explain methods of Distribution system. (08 Marks)

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Sixth Semester B.E. Degree Examination, July/August 2021 Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions.

2. Use of IS-800-2007, SP(6) – I or steel table is permitted.

3. Assume missing data suitably.

- 1
 - a. List out any four advantages and four disadvantages of steel structures. (06 Marks)
 - b. What are the different loads and load combinations in the design of steel structures? (06 Marks)
 - c. With a neat sketch, mention the classification of steel sections as per IS 800:2007. (04 Marks)
- 2
 - a. Define: (i) Plastic hinge (ii) Shape factor (06 Marks)
 - b. Determine the maximum plastic moment for the beam shown in Fig.Q2(b). Take load factor as 1.5.

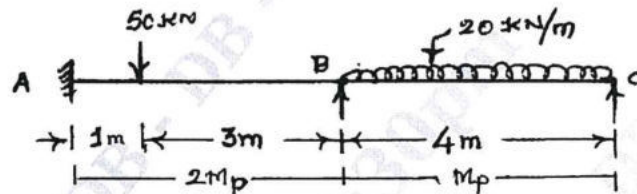


Fig.Q2(b)

(10 Marks)

- 3
 - a. With neat sketches, explain the various modes of failures of bolted connections. (06 Marks)
 - b. Find the efficiency of a butt joint shown in Fig.Q3(b). Black bolts of M20 and grade 4.6 and the plates are made of grade Fe410 [E250] are provided.

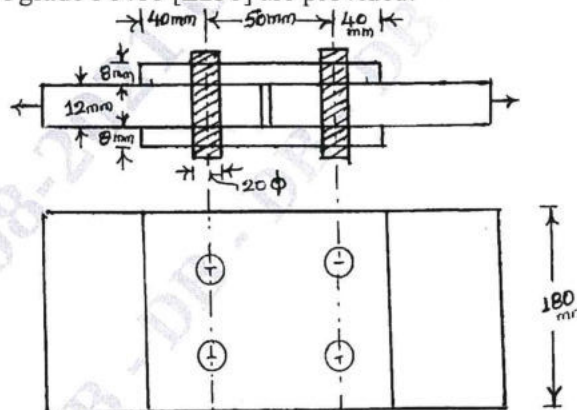


Fig.Q3(b)

(10 Marks)

- 4
 - a. Explain the various types of defects in welded connections with neat sketches. (06 Marks)
 - b. In a truss, a tie member consisting of an angle section ISA 100 × 100 8 mm of Fe 410 grade is subjected to factored tension of 200 kN. It has to be connected to a 12 mm thick gusset plate using fillet welds at tow and back. Determine the weld length required so that centre of gravity of weld lies in the plane of the centre of gravity of the angle. (10 Marks)

- 5 a. Explain the different modes of failure of axially loaded compression members. (06 Marks)
 b. Determine the design load carrying capacity of a single angle (discontinuous) ISA $50 \times 50 \times 5$ mm used as a compression member in a roof truss connected to a 10 mm gusset by two bolts. The centre to centre distance between and connections is 1.5 m. Assume $f_y = 250$ MPa. (10 Marks)
- 6 Calculate the compressive resistance of a compound column consisting of ISHB 300 with one cover plate of 350×20 mm on each flange and having a length of 5m. Assume, that the bottom of the column is fixed and top is rotation fixed, translation free and $f_y = 250$ MPa. Refer Fig.Q6.

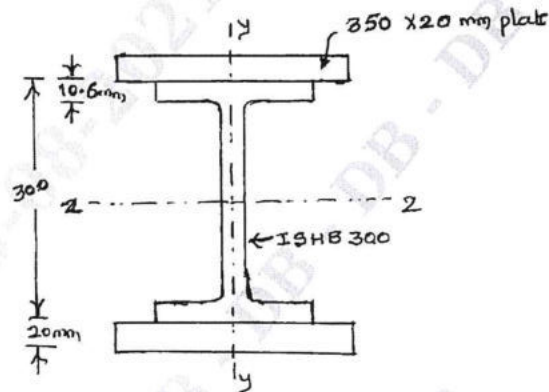


Fig.Q6

(16 Marks)

- 7 a. Explain with the aid of neat sketches, (i) Lug angle (ii) Gusset plate (06 Marks)
 b. Determine the block shear strength of the welded tension member shown in Fig.Q7(b). Steel grade is Fe 410.

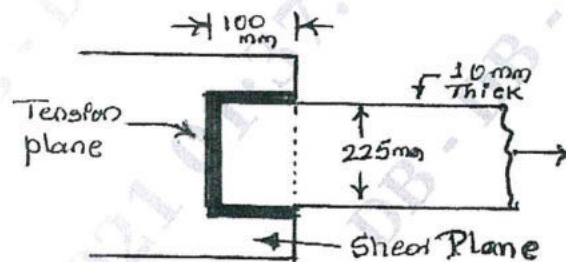


Fig.Q7(b)

(10 Marks)

- 8 Design a gusseted base for a column to carry an axial factored load of 3000 kN. The column is ISHB 400 @ 77.4 kg/m, with two cover plates of 250×20 mm on either side. Use M22 property class 5.6 bolts. Sketch the base showing the detail of bolts. Take grade of concrete M20 and SBC of soil = 180 N/m^2 . (16 Marks)
- 9 a. Mention the various factors affecting lateral stability of beams. (04 Marks)
 b. Design a simply supported beam of span 5m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The uniformly distributed load is made up of 20 kN/m imposed load and 20 kN/m dead load. Section is stiff against bearing. Assume Fe 410 grade steel. (12 Marks)
- 10 a. How do you analyze the design strength of laterally unsupported beams? (08 Marks)
 b. Describe the behaviour of beam-column with neat graph. (08 Marks)

CBCS SCHEME

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15CV63

Sixth Semester B.E. Degree Examination, July/August 2021 Highway Engineering

Time: 3 hrs.

Max. Marks: 80

Note : 1. Answer any FIVE full questions.
2. Use of IRC codes and charts are allowed.

- 1 a. Explain the role of transportation in the development of the country and write the different modes of transport. (06 Marks)
b. What are the important recommendations of Jayakar Committee? (04 Marks)
c. Explain the objectives of the following : (06 Marks)
i) HRB ii) IRC iii) CRF.
- 2 a. List and explain the different planning surveys required for highways. (06 Marks)
b. What are the policies and goals of fourth development plan? (06 Marks)
c. Outline the essential features of the PMGSY. (04 Marks)
- 3 a. What are the main objectives of the Preliminary survey and the steps followed in the Preliminary survey by Conventional methods. (08 Marks)
b. What are the ideal requirements of highway alignment? List and explain briefly. (08 Marks)
- 4 a. Explain the various factors governing the geometric design of a highway. (07 Marks)
b. Explain the objectives of providing : (09 Marks)
i) Camber ii) Super elevation iii) Overtaking zone.
- 5 a. Explain the desirable properties of road aggregates. List and explain any one test conducted in detail on road aggregates to determine the properties. (08 Marks)
b. Differentiate between : i) Bitumen and Tar ii) Cutback and Emulsion. Also list the desirable properties of bitumen and the tests conducted on bitumen. (08 Marks)
- 6 a. Draw a typical flexible pavement c/s indicating the different component layers. Also mention the functions of each layer. (08 Marks)
b. List and explain the various design factors to be considered for flexible pavements. (08 Marks)
- 7 a. Write the specification for materials and step by step construction procedure for Bituminous concrete. (08 Marks)
b. What is WMM? Describe the method of construction of WMM roads. (08 Marks)
- 8 a. Mention the tests, gradation and requirements as per IRC for aggregates used in Pavement Quality Concrete (PQC). (08 Marks)
b. Enumerate the construction steps for WBM road construction. (08 Marks)
- 9 a. Briefly outline the requirement of highway drainage system. (08 Marks)
b. Indicate any two methods of subsurface drainage. Explain with neat sketches. (08 Marks)

- 10 a. Briefly explain the various highway user benefits. (08 Marks)
 b. Calculate the Annual cost of a sketch of highway from the following particulars :

Item	Total cost Rs , in lakhs	Estimated life, years	Rate of interest , %
Land	35.0	100	6
Earth work	40.0	40	8
Bridges, Culverts and drainage	50.0	60	8
Pavement	100.0	15	10
Traffic signs and road appurtenances	15.0	5	10

The average cost of maintenance of the road is Rs 1.5 lakhs per year. (08 Marks)

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Sixth Semester B.E. Degree Examination, July/August 2021 Water Supply and Treatment Engineering

Time: 3 hrs.

Max. Marks: 80

**Note : 1. Answer any FIVE full questions.
2. Missing data may be suitably assumed.**

- 1 a. Explain the need of Planned Water supply scheme in present day. (08 Marks)
- b. What are the different types of Water demand? Explain any two of them. (08 Marks)
- 2 a. Define Per – Capita demand. Explain the factors affecting the same. (08 Marks)
- b. Estimate the domestic water requirements of a town in the year AD 2000 by projecting the population of the town by the Incremental Increase method from following data. It has been decided to provide 200 litres per head per day in 21st Century of this town.

Year	1940	1950	1960	1970	1980
Population	2,50,000	4,80,500	5,50,300	6,38,600	6,95,200

(08 Marks)

- 3 a. What are the various objectives in Water Quality Management? Discuss. (08 Marks)
- b. With typical flow chart, explain the significance of Water treatment unit you would propose for domestic purpose. (08 Marks)
- 4 a. Explain in brief Grab sampling and Composite sampling. (08 Marks)
- b. Explain the health significance of the following drinking water quality parameters along with desirable and permissible limits :
 i) Fluoride ii) Chloride iii) Hardness iv) pH. (08 Marks)
- 5 a. Define Sedimentation. Explain the various factors which influence the Sedimentation Process. (08 Marks)
- b. At a water treatment plant 12 million litres of water is treated daily using Ferrous sulphate and lime. If the dosage of Ferrous sulphate is 10mg/lit, determine the total quantity of Ferrous Sulphate and lime required. (08 Marks)
- 6 a. Explain with neat sketch, the working of a Rapid sand filter. (08 Marks)
- b. Explain in brief the fouling of Ultra and Micro filtration systems. Mention the Fouling Control method. (08 Marks)
- 7 a. Explain Zeolite Process of Water softening writing the chemical reactions involved. (08 Marks)
- b. What are the Conventional Pre treatment techniques required for RO and nano filtration? (08 Marks)
- 8 a. What are the factors which affects the Disinfection process? (06 Marks)
- b. List the various forms in which Chlorine can be applied. (04 Marks)
- c. Chlorine usage in the water treatment of 20,000 cum per day is 8kg/day. The residual after 10 min contact is 0.20 mg/ℓ. Calculate the dosage in milligrams per litres and chlorine demand of water. (06 Marks)
- 9 a. What are Intake Structures? Explain with neat sketch, Reservoir Intake. (08 Marks)
- b. Estimate the size of water main required to carry water from a source 2.15 km away from the town. Yield from the source is 1500 litres/min. Head lost in friction is 50.50m. Assume $f = 0.01$. (08 Marks)
- 10 a. List the various layouts used in water distribution networks. Explain any two. (08 Marks)
- b. Explain i) Valves ii) Fire hydrants. (08 Marks)

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