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APR-MAY 2022

B. E. (Eighth Semester) Examination, 2020

(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN-IV

Time Allowed : Four hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory and attempt any **one** part from rest two part (b) and (c) in each question. Assume suitable data wherever necessary is 456-2000 is permitted in exam hall. The figure in the right hand margin indicate marks.

Unit-I

1. (a) Underwhat circumstances trapezoidal footing is provided.   2

(b) Design a combined rectangular footing for two columns A and B, carrying loads of 500 and 700 kN respectively. Column A is 300 mm × 300 mm in size and column B is 400 mm × 400 mm in size. The center to center spacing of the columns is 3·4 meters. The safe bearing capacity of soil may be taken 150 kN/mm^2. Use M-20 concrete and F$_2$ 415 steel. 14

(c) Design a strap footing for two columns A and B spaced 5 meter center to center column A 300 mm × 300 mm in size carries a load of 600 kN and is on the property line. Column B, 400 mm × 400 mm in size, carries a load of 900 kN. The bearing capacity of soil is 120 kN/m^2. Use M20 mix and Fe 415 steel reinforcement. 14

Unit-II

2. (a) Name different types of retaining walls. 2

(b) Design a T-shaped cantilever retaining wall to retain earth embankment 3 m high above ground level. The unit weight of earth is 18 kN/m^3 and its angle of repose is 30°. The embankment is horizontal at its top. The safe bearing capacity of soil may be

taken as 100 kN/m^2 and the coefficient of friction between soil and concrete as 0·5. Use M20 mix and F$_2$ 415 bars. 14

(c) Describe design principles of counter fort retaining wall with neat sketches and by giving formulae to be used. 14

Unit-III

3. (a) What do you mean by intze tank? 2

(b) Design a circular water tank with flexible base for capacity to 400000 liters. The depth at tank is to be 4 m including a free board of 200 mm. Use M-20 concrete and Fe-415 steel. Redesign the tank assuming that the joint between the wall and base is rigid. 14

(c) Design an intze tank, tank part only upto bottom dome of 900000 liters capacity. Use M-20 concrete and Fe-415 steel. 14

Unit-IV

4. (a) Enlist the load acting on the bridges. 2

(b) Design a solid slab bridge for class A loading for following data :

(i) Clear span = 5·0 m

(ii) Clear width of roadway = 7·5 m

(iii) Thickness of wearing coat = 7·5 cm

Use M-20 mix and Fe-415 steel. 14

(c) Design a T-beam bridge for the following data :

Clear width of roadway = 7 m

Span center to center of bridge = 16 m

Live load one lane of class AA or two lanes of class A loading.

Average thickness of wearing coat = 8 cm

Use M20 concrete for deck slab and beam. Take unit weight of concrete 24 kN/m³. 14

Unit-V

5. (a) What do you mean by pre-tensioning and post-tensioning? 2

(b) What are the classification and type of prestressing? Explain in brief. 14

(c) A simply supported prestressed concrete beam of rectangular cross-section 400 mm × 600 mm is loaded with a total uniformly distributed load of 256 kN over a span of 6 m. Sketch the distribution of stress at mid-span and end section if the prestressing force is 1920 kN and the tension is :

(i) Concentric

(ii) Ecentric

Located at 200 mm above the bottom figure. 14

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APR-MAY

B. E. (Eighth Semester) Examination, 2020 2022

(New Scheme)

(Civil Engg. Branch)

WATER RESOURCES ENGINEERING-II

Time Allowed : Four hours

Maximum Marks : 80

Minimum Pass Marks : 28

*Note : Part (a) of each question is compulsory.
Attempt question worth 16 marks from each
question.*

1. (a) Define high and low gravity dam.   2

   (b) Explain the various modes of failure of a gravity
       dam.   7

   (c) Write a short note on types of dams.   7

(d) Explain the functions and effects of opening in gravity dam.　　　　7

2. (a) Define hydraulic jump.　　　　2

(b) Design a section for the overflow portion of a concrete dam having downstream face sloping at slope of 0·5 H : 1 V. The other data available are :　14

Design discharge for spillway = 10000 cumec

Height of the spillway crest = RL 210·0 m

Average river bed level = 110 m

Spillway length = 8 span of clear width of 12 m each

Thickness of pier = 3 m

(c) Explain with neat sketch U.S.B.R. stiling basins for different ranges of Froude numbers.　14

3. (a) Define Weir and Barrage.　　　　2

(b) Draw a layout of diversion head works and describe the different component of it.　　　　7

(c) What is Bligh's creep theory? How does Khosla's theory differ from Bligh's creep theory?　7

(d) Explain the effect of construction of Weir on the river regime.　　　　7

4. (a) What are the purposes of regulation work?　　　　2

(b) Design a 1·5 m Sarda type fall for a canal having discharge of 12 cumec with following data :　14

Bed level upstream　　　　–　103·0 m

Side slopes of channel　　–　1 : 1 m

Bed level downstream　　　–　101·5 m

Full supply level upstream　–　104·5 m

Bed with u/s and d/s　　　–　1.0 m

Soil　　　　　　　　　　–　Good loam

Assume Bligh's coefficient　–　6.

(c) Describe the necessity and functioning of a distributory head regulator and canal regulator in a canal project. Also discuss the procedure that you will adopt for designing these regulation work.　14

5. (a) Define cross-drainage works.　　　　2

(b) Design a syphon aqueduct with the following data :　14

For canal :

    Discharge   – 56 cumecs

    Bed width   – 32 m

    F.S. depth   – 1·98 m

    R.L. of bed   – 267·00 m

For drainage :

    High flood discharge – 425 cumecs

    HFL   – 268·20 m

General bed level of low water

    Cross section   – 265·50 m

    Section   – 265·50 m

    General ground level – 267·20 m

(c) Write a short notes on :   14

    (i) Aqueduct

    (ii) Super passage

    (iii) Level crossing

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APR-MAY 2022

B. E. (Eighth Semester) Examination, ~~2020~~

(New Course)

(Civil Engg. Branch)

STRUCTURAL ANALYSIS-III

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) of each question is compulsory. Attempt questions worth 16 marks from each unit.*

Unit-I

1. (a) State the methods used for the analysis of a building frame for horizontal and vertical loads.   2

   (b) Figure show a substitute frame for a multistoreyed building. The frames are spaced at 4 m c/c. Take the

[2]

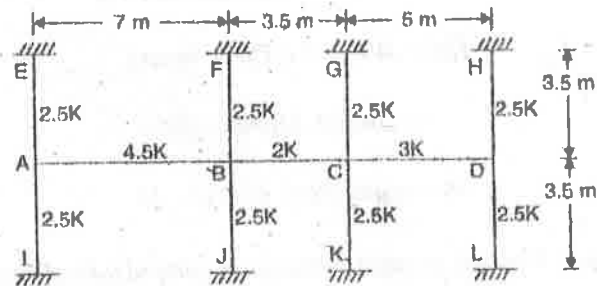live load as 4 kN/m², dead load as 3 kN/m², 3·25 kN/m² and 2·75 kN/m² for the panels AB, BC and CD respectively. The self weight of the beam may be taken as under:

Beams of 7 m span : 5 kN/m

Beams of 5 m span : 3·5 kN/m

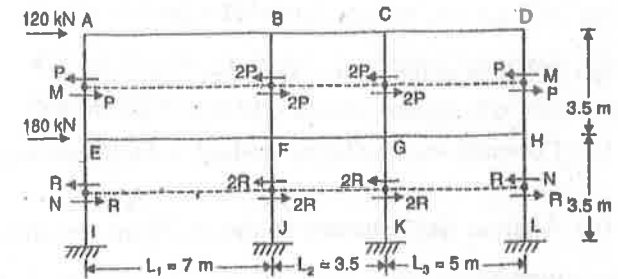Beams of 3·5 m span : 2·5 kN/m

The relative stiffness of the members are marked on the figure itself.   14

Calculate Maximum positive B.M. at the centre of span AB and maximum negative B.M. at the centre of span BC.

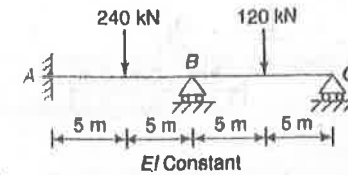(c) Analyse the building frame, subjected to horizontal forces, as shown in figure. Use portal method.   14
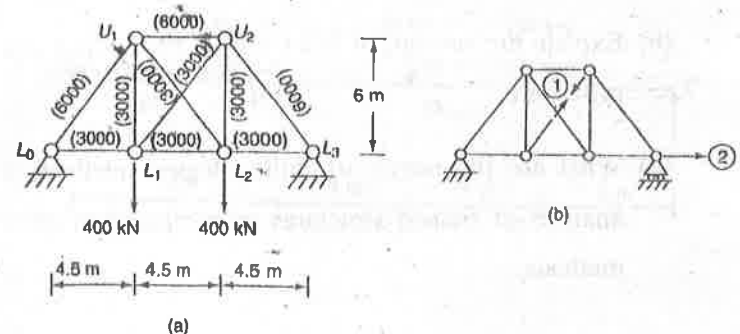
[3]

Unit-II

2. (a) What is flexibility? Mention the properties of flexibility. 2

(b) Analyse the given beam by flexibility method.   14

(c) Analyse the pin jointed frame by flexibility method. Figures in brackets are cross sectional areas of the members in mm².   14
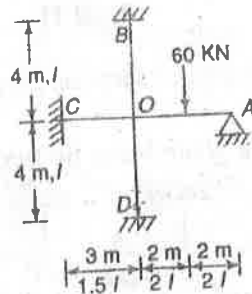

(a)

(b)

Unit-III

3. (a) What is equation for stiffness method?   2

(b) Compare the flexibility method and stiffness method.   14

(c) Analyse the structure shown in figure by stiffness method.   14

B

60 KN

4 m, I

C   O   A

4 m, I

D

3 m   2 m   2 m
1.5 I   2 I   2 I

Unit-IV

4. (a) Explain C° - Continuity, C^1 - Continuity and C^2 - Contiunity in Finite Element Method.   2

(b) Explain the concept of FEM briefly and outline and procedure.   7

(c) What are the merits of finite element method of analysis of framed structures as compared to other methods.   7

(d) Assemble equations of equilibrium for the spring ystem shown in figure by direct approach. Show that minimization of potential energy also yields same result.   7

F_1 F_2 F_3

k_1 1 k_2 2 k_3 3

u_1 u_2 u_3
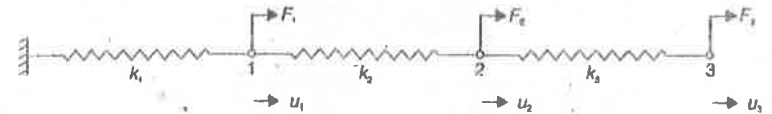
Unit-V

5. (a) Explain fully plastic moment of the section.   2

(b) Find out shape factor for rectangular, circular and hollow circular section.   14

(c) A continuous beam ABC is loaded as shown in figure. Determine the required M_p if the load factor is 3·2.   14

3 kN/m   60 kN   90 kN

A   D   E   C

M_p B $2M_p$

12 m   8 m   8 m   8 m
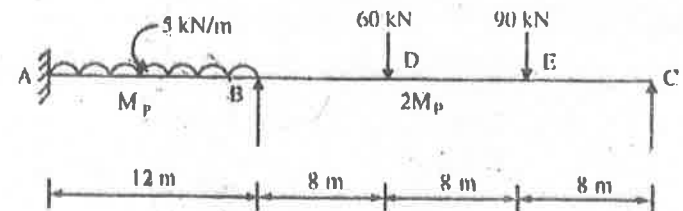
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B. E. (Eighth Semester) Examination, April-May 2022

(New Scheme)

(Civil Engg. Branch)

ADVANCED ENVIRONMENTAL ENGINEERING

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) from each question is compulsory. Attempt any two parts from part (b), (c) and (d) of each question.

Unit-I

1. (a) What are various environmental constituents?   2

(b) What are various pollutions control methods?   7

(c) Describe in detail about various international agencies for environmental management.   7

(d) What are the various implications of pollution on environmental health?   7

Unit-II

2. (a) Define Lapse Rate.   2

(b) Write short note on :   7

(i) Negative Lapse Rate

(ii) Plume Behavior

(c) What are various sources and impacts of nitrogen and sulphur oxides on environment?   7

(d) What are the various affects of air pollution on human beings and plants.   7

Unit-III

3. (a) Define oxidation pond?   2

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(b) Explain in detail about streeter - phelps water quality model.   7

(c) Explain in detail about self purification of natural streams.   7

(d) Explain in detail about construction and operation of trickling filters.   7

Unit-IV

4. (a) Define air quality standards.   2

(b) Explain stack monitoring system of air pollution control.   7

(c) What is the importance of mathematical modelling in air pollution control?   7

(d) Discuss in detail about Gaussian Plume Model.   7

Unit-V

5. (a) Define green house effect?   2

(b) What are different ways to control radioactive waste management?   7

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(c) Write short notes on : 7

(i) Global warming

(ii) Ozone depletion

(d) Define eutrophication of lakes and what are the various different methods of measurement and detection of it? 7

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APR-MAY 2022

B. E. (Eighth Semester) Examination, ~~2020~~

(New Scheme)

(Civil Engg. Branch)

ENVIRONMENTAL POLLUTION and MANAGEMENT

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) of each unit is compulsory and carry 2 marks. Attempt any two parts from (b), (c) and (d) from each unit which carries 7 marks each.*

Unit-I

1. (a) What is the importance of Environmental Legislation? 2

(b) Write the steps required for the management of Environment. 7

(c) What do you mean by environmental standards? Write in brief about the procedure, how are environmental standards are formed? 7

(d) Discuss the nature and scope of environmental problems in detail. 7

Unit-II

2. (a) What is ecology of population? 2

(b) Explain the world population growth and its effects of overcrowding on ecology. 7

(c) Write short notes on : $3\frac{1}{2} \times 2$

(i) Population density

(ii) Environment & human health

(d) How is the world's population distributed between rural and urban area? 7

Unit-III

3. (a) Define Research Methodology. 2

(b) Give classification of waste collection system. Explain the system it in detail. 7

(c) How can you help to solve the solid waste problem? 7

(d) Discuss the fate of pollutants in soil. 7

Unit-IV

4. (a) Define hazardous substances. 2

(b) Explain the health impacts of hazardous waste dump on human health. 7

(c) What do you mean by environmental audit? Give the outline of the procedure adopted to conduct the environmental audit. 7

(d) Write short notes on : 7

(i) Incineration

(ii) Composting

Unit-V

5. (a) What do you mean by environmental inventory? 2

(b) Explain the different strategies sustainable development in India.   7

(c) Explain the procedure to conduct the environmental impact assessment of a fertilizer industry in details.   7

(d) Describe the basic steps for prediction and assessment for water environment.   7

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APR-MAY 2022

B. E. (Eighth Semester) Examination, ~~2020~~

(New Scheme)

(Civil Engg. Branch)

AIR POLLUTION & CONTROL MEASURES

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) is compulsory*
in each question. Attempt any two parts from
(b), (c) and (d) ~~part~~ of each question.

Unit-I

1. (a) Choose from the following pollutants, the primary
    air pollutant is :   2

    (i) Ozone

    (ii) Formaldehyde

(iii) Carbon Monoxide

(iv) Peroxy acetyl nitrate

(b) Give brief classification of air pollution sources. Write a note on problem of air pollution in our country's capital 'Delhi' in winter season in recent years. What are the remedial measures suggested by authority? 7

(c) Write the names of sampling methods adopted for particulate pollutants. Describe any two methods in detail. 7

(d) Write short note on any **two** of the following : $2×3½=7$

   (i) Devices used for gaseous sampling

   (ii) Selection of sampling locations

   (iii) Difficulties in sampling

Unit-II

2. (a) Respiratory suspended particulate matter concentration includes all particles in air mass of size up to : 2

   (i) 2·5 μm

   (ii) 10 μm

(iii) 20 μm

(iv) no limit specified

(b) What do you understand by 'Temprature Inversion'? Explain any four types of plume behaviour of stack emission with neat sketch. 7

(c) Write an explainatory note on Gaussian plume model including assumptions made, formulae used to determine concentration of pollutants and limitations for application. 7

(d) Write short note on any **two** of the following :

   (i) Wind rose and it's significance

   (ii) Design criteria of stack height

   (iii) Meterological parameters governing air pollution 7

Unit-III

3. (a) Synthetic Silicate or Zeolite molecular sieves may be used as absorbant in pollution control devices for : 2

   (i) NO_2

   (ii) SO_2

   (iii) SO_2 and NO_2

   (iv) None of the above

(b) Explain effect of SO_x on human health, animal health, plants and economy. 7

(c) Explain the control techniques adopted for minimization of NO_x emission from furnances in industries and exhaust emission of vehicles. Mention some new technologies being tested and developed. 7

(d) Write short note on any **two** of the following : $2\times3\frac{1}{2}=7$

(i) Electrostatic Precipitator

(ii) Bag House Filter

(iii) Scrubbes or Wet collectors

Unit-IV

4. (a) Which of the following pollutant has affinity to haemoglobin, causing health problem of unconsciousness, nerve damage and heart attack with long duration exposure : 2

(i) Fluoride

(ii) Lead

(iii) Hydrocarbon

(iv) Carbon monoxide

(b) Explain various mechanisms of deterioration in polluted atmosphere. 7

(c) What is difference between acute and chronic effect of pollutants? Write symptoms of chronic pollution. 7

(d) Write short note on any **two** of the following : $2\times3\frac{1}{2}=7$

(i) Effect of pollutants an art treasures of India

(ii) Bhopal gas tragedy

(iii) Special diseases caused by air pollution

Unit-V

5. (a) According to central pollution control board, the minimum stack height needed in major industries like cement, steel or thermal plant is : 2

(i) 20 m

(ii) 30 m

(iii) 40 m

(iv) None of the above

(b) Define air quality standard and air pollution quality index? Write National ambient air quality standards adopted for India. 7

(c) Write the powers and functions of Central Pollution Control Board according to Air Pollution Act, 1981. 7

(d) Write short notes on : (any two)   2×3½=7

    (i) Green house effect

    (ii) Ozone Layer depletion

    (iii) Altered precipitation and Urban heat Island effect

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APR-MAY 2022

B. E. (Eighth Semester) Examination, ~~2020~~

(New Scheme)

(Civil Engg. Branch)

COMPUTER APPLICATIONS in CIVIL ENGINEERING

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) from each question is compulsory. Attempt any two parts from parts (b), (c) and (d) of each question.

Unit-I

1. (a) Write the expression for Reynold's No. in C++?   2

   (b) Write a program to compute discharge in a Trapezoidal open channel, if depth of flow is known.   7

(c) Write a program to compute to compute Froude No. for the section and define flow is critical or subcritical supercritical? 7

(d) Write a program to compute friction factor in case of Laminar flow and Turbulent flow? 7

Unit-II

2. (a) Write a program to compute the sum of any three given angles. 2

(b) Write a program to convert W.C.B. to Reduced Bearing. 7

(c) Write a program to compute RL of various points using Rise and Fall method. 7

(d) Write a program to compute the estimate time of completion of any network. 7

Unit-III

3. (a) Write an expression for computing porosity. 2

(b) Write a program to determine the one dimensional pre consolidated settlement under compacted fill. 7

(c) Write a program to determine ultimate bearing capacity of soil for given water table condition. 7

(d) Write a program to determine horizontal and vertical hydraulic conductivities for flow through anisotropic soil. 7

Unit-IV

4. (a) Draw the flow chart for computing maximum deflection in a simply supported beam carrying a point load at the mid span. 2

(b) Write a program to compute bending moment, shear force and deflection at every quarter point in a simply supported beam carrying UDL? 7

(c) Write a program to calculate maximum deflection in a cantilever carrying UDL throughout the span. 7

(d) Write a program to calculate shear force at every tenth point load in a simply supported beam carrying UDL throughout the span. 7

Unit-V

5. (a) Draw the flow chart for moment of resistance of a balanced section?   2

    (b) Write a program to compute the area of steel in an under reinforced section by limit state method, if the factored moment at a section is given.   7

    (c) Write a program to calculate effective area of single angle tension member connected by one leg to gusset plate?   7

    (d) Write a program to compute permissible stress in bending compression for a laterally supported beam of given section.   7

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APR-MAY2022

B. E. (Eighth Semester) Examination, 2020

(New Scheme)

(Civil Engg. Branch)

OPEN CHANNEL FLOW

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

*Note : Attempt any **three** parts of each question. Part (a) is compulsory. Assume suitable data wherever necessary.*

Unit-I

1. (a) Classify the following open channel flow situation : 2

   (i) Flow from a sluice gate

(ii) A river flow during flood

(iii) Sudden opening of sluice gate

(iv) Flow over a spillway

(b) The velocity distribution along a vertical in a channel can be expressed as $v/v_{max} = (y/y_0)^{1/n}$ where $y_0 =$ depth of flow, $v =$ velocity at any height y above the bed and $n = a$ constant, find the values α and β. 7

(c) Show that the second hydraulic exponent N could be calculated approximately as :

$$N = \frac{2y}{3}\left[5\frac{T}{A} - \frac{2}{P}\frac{dP}{dy}\right]$$ 7

(d) Find out expressions for area, wetteded perimeter, width hydraulic radius and top width for most economical trapezoidal (half regular hexagon). 7

Unit-II

2. (a) Draw variation of y_1, and y_2 in subcritical flow over a hump. 2

(b) A 3·0 m wide rectangular channel carries a flow at 1·25 m depth. At a certain section the width is reduced to 2·5 m and channel bed is raised by 0·20 through a stream line hump (i) estimate the discharge in the channel when the water surface drops by 0·15 m over the hump (ii) what change in the bed elevation at the contracted section would make the water surface have the same elevation upstream and down stream of the contraction. (Energy loss in the contraction can be neglected). 7

(c) Show that in a triangular channel, the Froude number corresponding to alternate depths are given by

$$\frac{F_1}{F_2} = \frac{\left(4 + F_1^2\right)^{5/2}}{\left(4 + F_2^2\right)^{5/2}}$$ 7

(d) Show that at critical flow condition for that specific energy, discharge is maximum. 7

Unit-III

3. (a) Identify the G.V. flow profiles which do not exist; give the reason alos. 2

(b) Sketch the GVF profiles on the up stream and downstream of a sluice gate, introduced in a :

    (i) Steep slope

    (ii) Mild slope

    (iii) Horizontal channel bed   7

(c) Derive the basic differential GVF equation and find out its different ways of presentation.   7

(d) Explain the method of GVF computation by 'Direct Investigation of GVF Equation.' How the distance between two depth y_1 & y_2 can be estimated by this method.   7

Unit-IV

4. (a) The initial depth of a hydraulic jump in a rectangular channel is 0.2 m and the sequent depth ratio is 10. The length of jump is about   2

(b) An overflow spillway has its chest at elevation 125.40 m elevation and a horizontal apron at an elevation of 95.00 m on the down stream side. Find the tailwater elevation required to form a hydraulic jump when the elevation of the energy line is 127.90 m. The C_d for the flow can be assumed as 0.735.

The energy loss for the flow over the spillway face can be neglected.   7

(c) Discuss the case of hydraulic jump in a triangular channel, how the discharge rate can be estimated in the triangular channel if pre jump and post jump depth are known.   7

(d) A wide rectangular channel carries a discharge of 10 m^3/s/m at a depth of 3.0 m. Through operation of a gate at its upstream and the discharge is reduced instantaneously to 4.0 m^3/s. Estimate the height of negative wave and the velocity of flow in the channel downstream of the gate after the event.   7

Unit-V

5. (a) The differential equation of SVF with increasing discharge has one extra term in numerator on the right hand side when compared to the corresponding GVF equation. This term is   2

(b) Explain a method of calculation and location of critical depth based on the concept of equivalent critical depth channel.   7

(c) Show that the following equation is applicable to a control section where critical depth occurs in a frictionless lateral spillway channel :

$$\frac{S_0^2 g \, A_C \, T_C}{4 \beta \, q_*^2} = 1$$

7

(d) Write short notes on : (any **two**) . 7

(i) Flow classification in SVF with increasing discharge

(ii) Profile computation of SVF with increasing discharge (any one method)

(iii) Differential equation of SVF with decreasing discharge

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APR-MAY2022

B. E. (Eighth Semester) Examination, 2020

(New Scheme)

(Civil Engg. Branch)

WATER SHED MANAGEMENT

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory. Solve any two from parts (b), (c) and (d).

Unit-I

1. (a) Explain basic objective of Watershed Management. 2

   (b) Explain in detail about various necessary conditions for plant growth in watershed? 7

(c) Give a brief explanation on how soil plays a vital role in watershed. 7

(d) Explain in detail about watershed hydrology and characteristics related to watershed. 7

Unit-II

2. (a) Define bench terracing. 2

(b) Explain in detail about various land capability and suitability surveys. 7

(c) Explain the following in detail : (any **two**)

(i) Contour bund 3½

(ii) Bench Terracing uses 3½

(iii) Broad beds and furrows 3½

(d) Discuss in detail about land capability classification. 7

Unit-III

3. (a) Define mulching. 2

(b) Explain in detail about various methods of soil conservation in a watershed. 7

(c) Explain in detail about different types of erosion which occurs in a watershed. 7

(d) Write short notes on agronomical measures undertaken for soil and water conservation. 7

Unit-IV

4. (a) Define watershed management planning. 2

(b) Explain in detail about importance of people's participation in preparation of action plan and management activities of watershed. 7

(c) Write short notes on importance of conservation forming in watershed management. 7

(d) Explain how a tool like GIS plays a vital role in watershed management. 7

Unit-V

5. (a) Define hill slope processes. 2

(b) What are bad lands? Write short notes on bad land development. 7

(c) Explain in detail about various classification of hill slope failures. 7

(d) Write short notes on Integrated wasteland development project. (IWDP). 7