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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH.] MAY-JUNE 2015

Paper Code: ETCE 206 ***Subject: Hydraulics & Hydraulic Machines***

Time : 3 Hours ***Maximum Marks :75***

Note: Attempt five questions including Q.no.1 which is compulsory. Select one question from each unit.

Q1 (a) What are the factors that can change a laminar flow into a turbulent flow? **(5x5=25)**

(b) Explain the Magnus effect with neat diagram.

(c) What is the slip of a reciprocating pump? Why is it negative sometimes?

(d) What are the important aspects of total energy line and hydraulic gradient line?

(e) Define -

(i) Unit Speed

(ii) Jet Ratio

(iii) Manometric efficiency

(iv) Hydraulic efficiency

(iv) NPSH

UNIT-I

Q2 (a) Derive an expression for mean velocity for laminar flow through a pipe. **(6)**

(b) Two parallel plates are placed horizontally with 10mm gap between them. The oil in the gap has a dynamic viscosity 200 centi-poise and density 900Kg/m^3. If the pressure gradient is 1K Pa per meter length of the plate, when the top plate is pulled at 1m/s, find the velocity distribution, the discharge and the shears stress on the top and the bottom plates. **(6.5)**

OR

Q3 (a) Using Von Karman's Momentum integral equation for a laminar flat plate boundary layer $\frac{\tau}{\rho U^2} = \frac{d\theta}{dx}$, derive an expression for δ, τ_0, C'_D and C_D for $\frac{u}{U_\infty} = \frac{u}{U} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}$. **(7.5)**

(b) Define physically and mathematically the concept of displacement, momentum and energy thickness of boundary layer. Place them in order of their magnitudes. **(5)**

UNIT-II

Q4 (a) Explain major and minor losses in a pipe flow. **(4.5)**

(b) A 200mm diameter, 3km long straight pipe runs between two reservoirs of surface elevations 140m and 70m. A 1.5km long, 250mm diameter pipe is laid parallel to the 200mm diameter pipe from its mid point to the lower reservoir. Neglecting all minor losses and assuming a friction factor of 0.02 for both pipes, find the increase in discharge caused by addition of 250mm diameter pipe. **(8)**

OR

Q5 (a) Explain – **(4)**

(i) HGL (ii) TEL.

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(b) The difference in water surface levels in two tank connected by three pipes in series of lengths 300m, 170m and 210m and of diameters 300mm, 200mm and 400mm respectively is 12m. Calculate the rate of flow of water if coefficient of friction are 0.005, 0.0052 and 0.0048 respectively considering: **(8.5)**
(i) minor losses (ii) neglecting minor losses

UNIT-III

Q6 (a) Draw and explain the inlet and outlet velocity diagram of Pelton turbine. **(6.5)**
(b) Explain (i) Hydraulic efficiency (ii) Volumetric efficiency
(iii) Mechanical efficiency (iv) Overall efficiency **(6)**

OR

Q7 (a) A double overhung 1.6m diameter Pelton turbine installation is to develop 3200kW at 410 rpm under a head of 300m. If the overall efficiency is 0.89. Find: (i) Diameter of the nozzle (ii) Speed ratio (iii) Specific speed. **(8)**
(b) What is a draft tube? Why is it used in a reaction turbine? **(4.5)**

UNIT-IV

Q8 (a) Explain the construction and working of a centrifugal pump with the help of a neat sketch. **(6)**
(b) A centrifugal pump is delivering $0.21 m^3/s$ of water against a head of 19m, the speed of rotation of impeller is 600rpm. The diameters at outer and inner periphery of the impeller are 600mm and 300mm respectively. The area of flow is constant at $0.085 m^2$ from inlet to outlet of impeller. If the vanes of the impeller are curved backwards at an angle of 35^0 to the tangent at exit. Find- **(6.5)**
(i) Manometric efficiency
(ii) Inlet vane angle
(iii) Loss of head at inlet to the impeller when discharge is reduced by 30%.

OR

Q9 (a) Differentiate between centrifugal pump and reciprocating pump. **(4)**
(b) In a single acting reciprocating pump, the suction and delivery heads are 4.8m and 1.2m. the pump runs at 90rpm and its piston diameter is 100mm and stroke 150mm. The actual quantity of water lifted is 102 lit/min. Determine: **(8.5)**
(i) The slip
(ii) The coefficient of discharge
(iii) Theoretical power required to drive the pump.
(iv) Force required to work the piston during the suction stroke.
(v) Force required to work the piston during the delivery stroke.

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2015

Paper Code: ETCE-208 **Subject: Advanced Surveying**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 Answer the following: **(5x5=25)**

(a) Write short note on true error, residual error and most probable error.
(b) Briefly explain tide and its characteristics.
(c) How do you determine the scale of an aerial photograph? What do you understand the term datum scale and average scale?
(d) Write short notes on sidereal time, standard time.
(e) Describe the procedure of setting out a building.

Q2 (a) In a trignometrical measurement of the difference in level of two stations P and Q, 10480 m apart, the following data were obtained.
(i) Instrument at P, angle of elevation of Q = 0 "15"
(ii) Instrument at Q, angle of depression of P = 3 "33"
(iii) Height of instrument at P = 1.42 m.
(iv) Height of instrument at Q = 1.45 m.
(v) Height of signal at P = 3.95 m.
(vi) Height of signal at Q = 3.92 m.
Find the difference in level between P and Q and the curvature and reflection correction. **(8)**

(b) How you determine the most probable value? Explain with suitable example. **(4.5)**

Q3 Explain the following with suitable examples:

(a) Law of error (4)
(b) Law of weight (4)
(c) Method of least square (4.5)

Q4 (a) Briefly explain the procedure of setting out of centre line of a dam. **(6)**
(b) Briefly explain hydrographic surveying. **(6.5)**

Q5 Explain the survey methods involved for Highway alignment, with suitable example. **(12.5)**

Q6 (a) A vertical photograph was taken at an altitude of 1200 meters above the mean sea level. Determine the scale of photograph for terrain lying at elevation of 80 meters and 300 meters if the focal length of the camera is 15 cm. **(6.5)**

(b) Explain parallax in aerial stereoscopic views with neat sketch. **(6)**

Q7 (a) An object of elevation of 400 m above mean sea-level. The distance from the principal point to the image of that point on the photograph is s 4.86 cm. If the datum scale is 1/12000 and focal length of the camera is 24 cm, determine the relief displacement of the point. **(6)**

(b) The scale of an areal photograph is 1 cm = 100 m. The photograph size is 20 cm x 20 cm. Determine the number of photographs required to cover an area of 10 km x 10 km, if the longitudinal lap is 60% and side lap is 30%. **(6.5)**

Q8 (a) What are 'Parallax' and 'refraction' and how do they affect the measurement of vertical angle in astronomical work? **(8)**

(b) Find the LST at place in longitude 85^0 20'E at 6^h 30^m P.M. GST at GMN being 6^h 32^m 12^s. **(4.5)**

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE-2015

Paper Code: ETCE 202 **Subject: Water Engineering**

Time : 3 Hours **Maximum Marks :75**

Note: Attempt any five questions including Q.No. 1 which is compulsory. Select one question from each unit.

Q1. (a) What are the effects of variations of demand on the design capacities of different components of a water supply scheme? **(5)**

(b) A water sample is alkaline to both phelophthalein as well as methyl orange. 100mL of water sample on titration with N/50 HCl required 6.8mL of acid up to phenolphthalein end point. When a few drops of methyl orange are added to the same solution and titration further continued, the yellow colour of the solution just turned red after addition of another 12.6mL of acid solution. Elucidate the type and extent of alkalinity present in water sample. **(5)**

(c) What is the method adopted for detecting the presence of coliform bacteria? What do you mean by MPN? **(5)**

(d) Write a note on backwashing of rapid gravity filters. **(5)**

(e) Distinguish between Centrifugal and Reciprocating pumps. What are the components of a sewage pumping station? **(5)**

Unit-I

Q2. (a) Determine the future population of a satellite town by Geometric increase method for the year 2011, given the following data: **(6)**

Year	Population in thousand
1951	93
1961	111
1971	132
1981	171
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2011	?

(b) How can dissolved chloride content be estimated? **(6.5)**

Q3. (a) What are the types of solids present in a water sample? How can we estimate the content of solids? **(6.5)**

(b) 700 m3/day of water is to be obtained from a proposed infiltration gallery, which is placed at 7m depth from sub-surface water table. The coefficient of permeability of soil aquifer is 100m/day. Find the length of the gallery if the drawdown in the gallery on pumping is not to exceed 4m. The radius of influence may be assumed to be 100m. **(6)**

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Unit-II

Q4. (a) Explain the Streeter Phelps model for Dissolved oxygen. **(6.5)**

(b) What is the effect of temperature and mixing intensity on Oxygen transfer? **(6)**

Q5. (a) Estimate the quantity and quality of waste stream and the total quantity of water that must be processed, from a reverse osmosis facility that is to produce $500 m^3/d$ of water to be used for industrial cooling operations. Assume that both the recovery and rejection rates are equal to 90% and the concentration of feed stream is $400 g/m^3$. **(8)**

(b) Distinguish between Slow and Rapid sand filters. **(4.5)**

Unit-III

Q6. (a) What is meant by Short circuiting of a sedimentation tank? How to overcome this phenomenon? **(6.5)**

(b) What are the benefits of using aeration in a treatment plant? Write a note on Cascade aerators. **(6)**

Q7. (a) What are the economic considerations to be kept in mind while designing water works system? **(6)**

(b) State some merits and demerits of coagulation process in sewage treatment. **(6.5)**

Unit-IV

Q8. (a) Draw a neat labeled diagram of the brake point chlorination curve. What are the guidelines for addition of chlorine to drinking water? **(6)**

(b) What are membrane bioreactors? What are the advantages of BMRs over activated sludge process? **(6.5)**

Q9. (a) Which type of distribution network is used in Chandigarh? What are the various advantages and disadvantages of such distribution network? **(6)**

(b) Explain the principle used in EPANET software for analysis of water distribution networks. **(6.5)**

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE-2015

Paper Code: ETCE 212 ***Subject: Design of Concrete structure (Batch: 2013 onwards)***

Time : 3 Hours ***Maximum Marks :75***

Note: Attempt any five questions including Q.No. 1 which is compulsory. Assume any missing data suitably. Use of IS456-2000 code is allowed.

Q1. Answer the following: **(5x5=25)**

(a) Write short note on Shrinkage, temperature and creep effect of concrete.

(b) Explain the major difference between limit and working stress method.

(c) A rectangular beam is 300 mm wide and has 550mm effective depth. Determine the area of tension reinforcement required in the section for it to be a balance section. M20 concrete and Fe 250 steel are used.

(d) What are the advantages of R.C.C. column with helical reinforcement?

(e) i) What are the criteria to calculate minimum eccentricity in column?
ii) List out the type of footing used in concrete structure indicating specific application.

Q2. (a) Briefly describe role of water cement ratio in concrete. **(4.5)**

(b) Design a beam for shear reinforcement having a cross section of bXd=250x500 reinforced with 4 no's of 20mm diameter bar. The factored shear force= 130 kN. Use M20 and Fe 415 steel. **(8)**

Q3. Determine the ultimate moment carrying capacity of the T beam. Given: bf=800mm, df=150mm, bw=300mm, d=420mm, Ast=5 Nos. of 20mm dia bars on tension side. Assume Fe 415 steel and M20 concrete. Also compute the maximum stresses in steel and concrete if it is subjected to a design moment of 100 kNm. **(12.5)**

Q4. Design a roof slab for a room of size 7.5X3.5m, simply supported on 200 mm thick masonry walls to support a live load of 4 KN/m². Adopt M20 concrete and Fe 415 steel. **(12.5)**

Q5. Design a simply supported rectangular RC beam, having a span 5.5m, subjected to a uniformly distributed load of 3.8KN/m. Compute the required reinforcement, assuming the breadth of beam as 230mm and effective cover for compression and tension reinforcement as 50mm. Assume the beam is supported by load bearing masonry of thickness 230mm. Use M20 concrete and Fe415 steel. **(12.5)**

Q6. Design an isolated footing for a column 300mm X 500mm reinforced with 6, 25mm dia bars with Fe 415 steel and M25 concrete, subject to a factored axial load Pu=100kN and a factored uniaxial moment Mux=120kNm (with respect to the major axis) at the column base. Assume that moment is reversible. The safe bearing capacity of soil may be taken as 300kN/m² at a depth of 1.25m. Assume M20 concrete and Fe415 steel for fotting. **(12.5)**

Q7. Design a circular column with helical reinforcement subjected to working load of 1500 kN. Diamater of the column is 450mm. The column has unsupported length of 3.5m and is effectively held in position at both ends but not restrained against rotation. use M25 concrete and Fe415 steel. **(12.5)**

Q8 Write comprehensive notes on the following:

a) Steps involved in concrete mix design. **(3)**

b) Behaviour of load bearing masonary wall. **(3)**

c) Limit states of Serviceability. **(3)**

d) Design of combined footings. **(3.5)**

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH.] MAY-JUNE 2015

Paper Code: ETCE 204 **Subject: Structural Analysis**

Time : 3 Hours **Maximum Marks :75**

Note: Attempt five questions including Q.no.1 which is compulsory. Assume any missing data suitably.

Q1 Answer **any five** from following: **(5x5=25)**

(a) What is middle third rule?
(b) What are wire wound cylinders and why they are needed?
(c) Differentiate between internal and external static indeterminacy.
(d) Define castigliano's first and second theorems.
(e) Differentiate between truss and frame.
(f) What is carry over factor? Differentiate between distribution factor and Rotation factor.
(g) Prove that S.I. for plane frame is 3m+r-3j where m is no of members, r is no of reaction components and j is No. of joints.
(h) What is effective length of a column? Write down effective length for fix-fix, fix-hinged & fix-free column ends.

Q2. Show that for column with initial curvature:- **(12.5)**

Final deflection= constant X initial deflection

Or $$\delta = \left(\frac{P_{EULER}}{P_{EULER} - P} \right) X \ \delta'$$

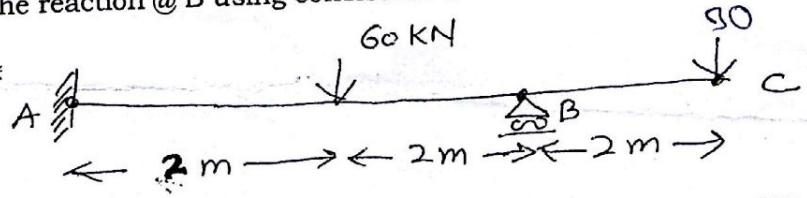
Where δ is initial curvature.

Q3. Show that for cylindrical shell with hemispherical ends; the governing thickness for safety of shell is thickness of cylindrical portion i.e. thickness of hemispherical portion is redundant in safety calculations. **(12.5)**

Q4. A simply supported beam has a span of 15m. Uniformly distributed load of 40 KN/m and 5m long crosses the girder from left to right. Find maximum shear force (positive and Negative) and bending moment at a section 6m from left end. (12.5)

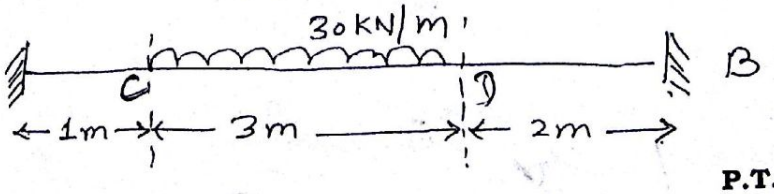
Q5. Determine the reaction @ B using consistent deformation method only. **(12.5)**

Figure



Q6. Analyse following beam for BMD & SFD. **(12.5)**

Figure



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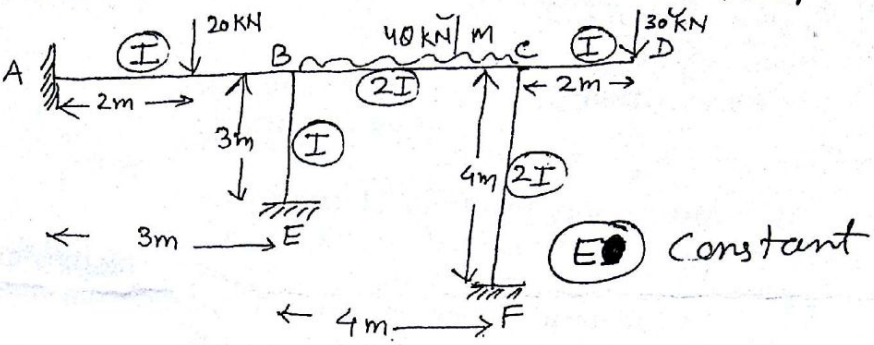
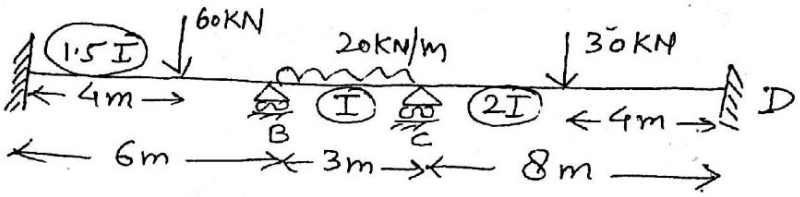
Q7. Analyse the frame using slope deflection method assuming No Sway. **(12.5)**

Figure



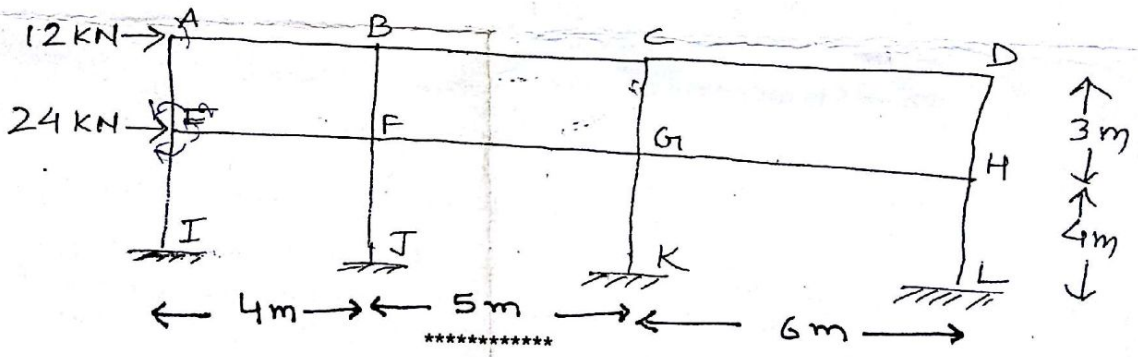
Q8. Analyse continuous beam using Moment distribution method or Kani's method. **(12.5)**

Figure



Q9. Analyse the frame using approximate method's (i.e.)portal or cantilever method. **(12.5)**

Figure



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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2015

Paper Code: ETCE-210 **Subject: Soil Mechanics**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each unit.

Q1 (a) List out the methods used for water content determination. Briefly explain any one method of them. **(5)**

(b) Define flow net. List out properties of flow net. **(5)**

(c) State and discuss different factors influencing compaction of soil in the field. **(5)**

(d) Briefly explain Vane shear test of Soil. **(5)**

(e) Discuss the importance of Atterberg's limit in soil Engineering. **(5)**

Unit-I

Q2 (a) A partially saturated sample from borrow pit has a natural moisture content of 15 percent and bulk unit weight 1.9g/cc. The specific gravity of solid is 2.7. Determine the degree of saturation and void ratio. What will be the unit weight of soil on saturation? **(8.5)**

(b) Define the term Activity and Thixotropy. **(4)**

Q3 (a) What is the use of classification of Soil? Briefly discuss Indian standard Classification system. **(6.5)**

(b) Define the term Plasticity Index, Flow index, and explain their engineering significance. **(6)**

Unit-II

Q4 (a) Describe the pumping out methods for the determination of coefficient of Permeability in field? Discuss their advantages and disadvantage? What are Duptis Assumption. **(8)**

(b) Discuss the basis of construction of Newmarks influence chart. How it is used? **(4.5)**

Q5 (a) A concentrated load of 40 kN acts on the surface of soil. Determine the vertical stress increment at point directly beneath the load up to depth of 10 m and draw a plot. **(3)**

(b) Determine the average coefficient of Permeability in the horizontal and vertical directions for a deposit consisting of three layer of thickness 5m, 1m and 2.5m and having the coefficient of permeability of $3x10^{-2}$ mm/sec, $3x10^{-5}$ mm/sec and $4x10^{-2}$ mm/sec respectively. **(4.5)**

(c) Define quick sand condition in soil, and develop the expression for critical hydraulic gradient. **(5)**

Unit-III

Q6 (a) In a laboratory consolidometer test on a 20 mm thick sample of saturated clay taken from a site, 50 percent consolidation point was reached in 10 min. Estimate the time required for the clay layer of 5m thickness at the site for 50 percent compression, if there is drainage

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only towards top. Assume that the laboratory sample and clay layer at site are both same increase in stress. How much time is required for the clay layer to reach 90 percent consolidation? What is the time required for the clay layer to reach 50 percent consolidation if the layer has double drainage instead of single drainage? **(8.5)**

(b) What are the major difference between Compaction and consolidation? **(4)**

Q7 (a) What is time factor? How it relate to average degree of consolidation. **(4.5)**

(b) Describe Standard proctor test and modified Proctor test. How you decide the type of test to be conducted in the laboratory. **(8)**

Unit-IV

Q8 (a) Determine the shear strength in terms of effective stress on a plane with in a saturated soil mass at a point where the total normal stress is 200 kN/m^2 and pore water pressure is 80 kN/m^2. The effective stress strength parameters for soil are: C' = 16 kN/m^2 and ϕ' = 30^0. **(4.5)**

(b) What is Mohr's circle? Discuss its important characteristics. **(8)**

Q9 (a) A sample of dry sand was subjected to a triaxial test, with a confining pressure of 250 kN/m^2. The angle of shearing resistance is found to be 36^0. At what value of major principal stress, the sample is likely to fail. **(4.5)**

(b) What is unconfined compression test? Sketch apparatus used. What is its advantage over a triaxial test? **(8)**

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