Hall Ticket Number :										

R-11 / R-13

Code: 1G633

II B.Tech. I Semester Supplementary Examinations May 2017

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **Five** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Enumerate any two Physical properties of fluid. 4M
   b) Differentiate
      i. Ideal and Real fluid
      ii. Newtonian and Non-Newtonian fluids 4M
   c) The capillary rise in a tube should not exceed 0.2mm. Determine the size of the tube required for the purpose T=0.0725N/m. Contact angle=90° with respect two horizontal. 6M
2. a) A tank with vertical sides is square, in plan with sides 3.5m long. It contains oil of specific gravity 0.91 to a depth of 1.5m floating on 3.25 meters depth of water. Calculate the pressure on the side of the tank and also determine the height of the center of pressure above the base of the tank. 7M
   b) A rectangular plate 2.5 m wide and 1.5m deep is immersed in water keeping the plate vertically such that its top edge is 3.5m below the water surface. Calculate the center of pressure and the total force acting on one side of the plate. 7M
3. a) Define Stream line , Path line ,streak lines ,Stream tube 4M
   b) Differentiate
      i. Steady and unsteady flow
      ii. Uniform and non-uniform flow
      iii. Laminar and turbulent flow
      iv. Rotational and irrotational flow. 4M
   c) Derive one dimensional continuity equation. 6M
4. a) Derive with the help of neat sketch, Euler's equation of motion for a steady flow along a stream line. 10M
   b) Enumerate Assumptions and Limitations of Bernoulli's equation. 4M
5. a) Derive the Darcy Weisbach equation for the head loss due to friction in a pipe. 8M
   b) A pipe 20cm diameter is 25m long and the velocity of water in the pipe is 8.2m/sec. What loss of head would be saved if the central 7.5m length of the pipe is replaced by a 300 mm diameter pipe, the change in section being sudden? f=0.04. 6M
6. a) Compensation water is to be discharged by two circular orifices under a constant head of 1.25 meter, measured the centre of the orifices. What diameter would be required to give a discharge of 25.5 x 106 liters per day? Assume Cd=0.6 for each orifice. 7M
   b) A Rectangular channel 6m wide carries a flow of 1.5 m^3/s. A rectangular sharp crested weir is to be installed near the end of the channel to create a depth of 1m upstream of the weir. Calculate the necessary height. Assume Cd=0.62. 7M
7. a) With the help of neat sketch explain the Reynolds experiment and discuss the classification of flow through a pipe based on Reynolds number. 7M
   b) An oil with a dynamic viscosity 0.05 N-S/m^2 and specific gravity 0.94 flows through a smooth pipe 10m long and 30mm diameter. If the pressure drop across the length is 5 N/cm^2 (gauge), show that the flow is laminar. 7M
8. a) Define the terms dimensional analysis and modal analysis. 4M
   b) Write a note on Rayleigh's method and Buckingham's pi theorem 10M

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Hall Ticket Number :										

R-11 / R-13

Code: 1GC31

II B.Tech. I Semester Supplementary Examinations May 2017

Mathematics – II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer any **Five** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Prove that a square matrix A am dots transpose A^T have the same Eigen values 4M

   b) Using Cayley-Hamilton theorem to find A^{-1} for $A=\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ 10M

2. Expand the function f(x) = x sinx as a Fourier series in [-π, π] 14M

3. a) Form the partial Difference Equation by the eliminating the arbitrary function from z= f(x^2 + y^2 + z^2) 7M

   b) Solve the Method of separation of variables $y^3 \frac{\partial z}{\partial x} + x^2 \frac{\partial z}{\partial y} = 0$ 7M

4. a) Find a root of the equation $x^3 – 4x – 9 = 0$ using Bisection method in four stages 7M

   b) The values of a function f(x) are given below for certain values of x

x	0	1	3	4
f(x)	5	6	50	105

   Find the value of f(2), using Lagrange's Interpolation formula 7M

5. a) Find the first two derivatives at x=1.0 from the following data

x	1.0	1.2	1.4	1.6	1.8	2.0
y	0	0.128	0.544	1.296	2.432	4.0

   7M

   b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's ¼ rule 7M

6. Find y at x=0.1, 0.2 and 0.3 using Taylor's series method given that $\frac{dy}{dx} = x^2 y - 1,\ y(0) = 1$ 14M

7. Prove that the function f(z) defined by $f(z) = \begin{cases} \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2} & ,(z \neq 0) \\ 0 & ,(z = 0) \end{cases}$ is continuous and the Cauchy – Riemann equations are satisfied at the origin but *f'(0)* does not exist 14M

8. a) Evaluate $\int_c \frac{z^3 - \sin 3z}{\left(z - \frac{®}{2}\right)^3} dz$ with C: |z|=2 using Cauchy's Integral formula. 7M

   b) Find the Laurent series expansion of the function $f(z) = \frac{z^2 - 6z - 1}{(z-1)(z-3)(z+2)}$ in the region 3 < |z+2|<5. 7M

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Hall Ticket Number :										

Code: 1G631

R-11 / R-13

II B.Tech. I Semester Supplementary Examinations May 2017

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any ***five*** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Draw and explain stress-strain diagram for a ductile material. 7M

   b) Determine by taking the weight of the bar into account, the displacement of the free end of the bar shown in Figure.1, if its cross section is A and modulus of elasticity is E, and the specific weight of the material is γ.

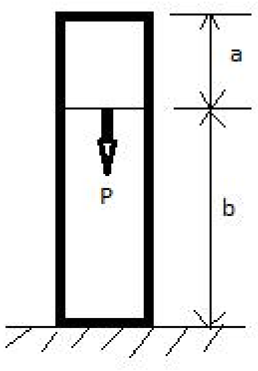

Figure.1 7M

2. a) Derive the relation between shear force, bending moment and rate of loading at a section of a beam. 5M

   b) Draw SFD and BMD for an overhanging beam subjected to UDL throughout its length *l*. The beam is having overhangs of length *a* on both sides. 9M

3. a) Derive expressions for section modulus of solid and hollow rectangular sections. 4M

   b) Derive the flexure formula: M/I =f/y = E/R stating the assumptions. 10M

4. a) Show that $\tau_{max} = 1.5\ \tau_{avg}$ for a rectangular section of a beam. 5M

   b) A 7.5 cm x 5 cm rolled steel joist is freely supported over an effective span of 3 metres. The flanges are 0.5 cm thick while the web is 3.7 mm thick. Calculate the UDL the joist can carry if the maximum shear stress is limited to 40 N / mm^2. 9M

5. a) Derive the differential equation for the deflected curve of a beam 7M

   b) Derive maximum slope and deflections of a cantilever subjected to a point load at free end. 7M

6. a) State the Mohr's moment area theorems. 4M

   b) Find by moment-area method, the expressions for maximum slope and deflection of a simply supported beam subjected to UDL throughout its length. 10M

7. a) At a point in a strained material the vertical shear stress is 15 MPa and the horizontal tensile stress is 25 MPa. Using Mohr's circle method, find the principal stresses and the direction of principal planes. 7M

   b) At a given point in a machine element, the stress system shown in Figure.2 is acting. Determine the stresses at this point on a plane having a slope of 3 vertical to 4 horizontal.

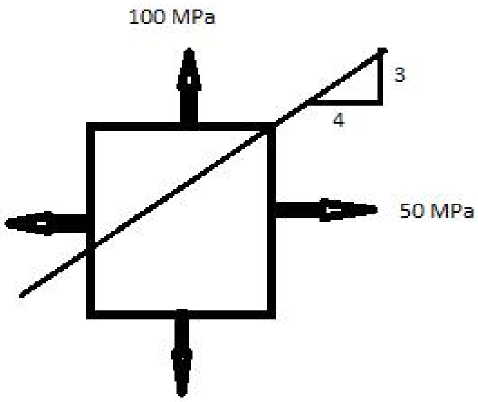

Figure.2 7M

8. a) Explain one theory of failure applied to each of brittle material and ductile material. 6M

   b) The load on a bolt consists of an axial pull of 8 kN together with a transverse shear of 3 kN. Estimate the diameter of the bolt required according to

      (i) Rankine's theory, and (ii) Guest's theory.

   Elastic limit in simple tension = 270 N / mm^2, factor of safety = 3, and 1/m = 0.3. 8M

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Hall Ticket Number :										

R-14

Code: 4G631

II B.Tech. I Semester Supplementary Examinations May 2017

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Define modulus of resilience. 2M

b) A steel tie rod 20 mm diameter is encased in a copper tube of external diameter of 36 mm and internal diameter of 24 mm with the help of washers and nuts. The nut on the tie rod is tightened and the assembly is subjected to a tensile load of 20 kN. The temperature of the assembly is now raised to 800C. Determine the resultant stresses in the rod and the tube.

Take Es=210 GPa, Ec = 100 GPa, $\alpha s=11 \times 10^{-6}$ / ^{0}C and $\alpha c =18 \times 10^{-6}$ / ^{0}C . 12M

OR

2. a) What are temperature stresses? Derive a expression for temperature stress. 5M

b) A 20 mm square bar deformed by 0.11 mm in a gauge length of 100 mm under an axial tensile force of 50 kN. If the Poisson's ratio of the material is 0.3, compute the stress induced in the bar and the three elastic moduli. Also calculate the volume change. 9M

UNIT–II

3. a) When do you observe an abrupt change in SFD and BMD? Explain each of these cases 4M

b) What are points of contra flexure? Locate the same in case of a doubly over hanging beam of overhanging spans of 2 m each, with a central span of 8 m, subjected to a UDL of 4 kN/m over the entire beam in addition to a central point load of 20 kN. Also draw the shear force and bending moment diagrams. 10M

OR

4. a) Draw shear force diagram and bending moment diagram for a cantilever beam of 3 m span carrying a concentrated moment 10 kN-m at the free end. 7M

b) Draw SFD and BMD for a simply supported beam of span 4 m and carrying a point load of 20 kN at 1m from left hand support in addition to a udl of 5 kN/m throughout the span. 7M

UNIT–III

5. a) Draw the shear stress distribution diagrams across circular, rectangular and H sections. 4M

b) A T-section is used as a cantilever of span 1.5 m. A point load of 2.0 kN is acting at the free end of the cantilever in addition to a udl of 3 kN/m from the free end to a distance of 1.0 m. The flange is 100 x 20 mm and web is 10 x 150 mm deep. Calculate the maximum tensile and compressive stresses in the section. 10M

OR

6 a) Write the flexure formula and discuss its applications 4M

b) A simply supported beam of T- section with flange of size 120mm x 20 mm thick and a web of size 180 mm x 20 mm carries a uniformly distributed load on an effective span of 4 m. If the allowable stress in bending and shear are 12 N/ mm^2 and 5 N/ mm^2 respectively, what is the safe value of the udl that can be placed on the beam including self-weight? 10M

UNIT–IV

7. a) Prove, from the fundamentals, that the deflection at the free end of a cantilever of span 'L' carrying a load of 'W' at a distance 'a' from the fixed end and flexural rigidity 'EI' is $W a^3 / 3 EI + (W a^2 / 2 EI) (L-a)$. 7M

   b) Find the maximum deflection of the simply supported beam of span 8 m, when it carries a udl of 40 kN/m for a length of 4m. The udl starts from 1m from the left hand support. Take E=200 GPa and $I = 4.3 \times 10^8$ mm^4. 7M

OR

8. a) Write Mohr's theorems and explain 4M

   b) A simply supported beam of span 10 m is loaded by a point load at 8 m from the left hand support. The moment of inertia of the beam is '4I' for the left 8 m and 'I' for the remaining 2 meters length. Determine the slope at the supports and the deflection at the mid-span. Take 'I'= 8×10^{-5} m^4 and E = 200 GPa. 10M

UNIT–V

9. a) Derive an expression for elastic strain energy in bending. 6M

   b) A simply supported beam of span 3 m is carrying point loads of 9 kN and 18 kN at 1 m and 2 m respectively from the left hand support. Determine the strain energy stored in the beam due to bending. 8M

OR

10. a) Describe the construction steps of Mohr's Circle. 4M

    b) Explain the various theories of failure. 10M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G632

II B.Tech. I Semester Supplementary Examinations May 2017

Surveying

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **Five** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) Explain with an example, principle of 'work from whole to part'. 4M
   b) A distance of 2000m was measured by a 30m chain. Later it was detected that the chain was 0.1m too long. Another 500m was measured and it was detected that the chain was 0.15m too long. If the chain was correct initially, determine the exact length that was measured. 5M
   c) With the help of a neat sketch explain the principle and use of optical square in surveying. 5M
2. a) Define orientation and explain the methods for orientation of plane table. 6M
   b) Explain with neat sketch intersection method of plotting of plane table survey. 4M
   c) Differentiate whole circle and quadrant bearing in compass survey. 4M
3. a) Define the following terms.
   (i) Parallax (ii) Bench Mark (iii) Line of sight
   (iv) Elevation (v) Change point (vi) Face left observation 6M
   b) Find the height of a Tee beam above the floor level. The RL of the floor is 100.855m and the staff reading on the floor is 2.055m. The reading on a staff held inverted against the underside of the beam is 3.565m. 3M
   c) Illustrate with sketches characteristics of contours. 5M
4. a) List the methods for determination of Latitude. Explain any one in detail. 7M
   b) Enumerate different methods of determination of volume of earthwork. Describe their merits & demerits. 7M
5. a) Explain temporary adjustments in theodolite. 7M
   b) Explain the method of measuring horizontal angle by repetition with table for recording readings. 7M
6. a) Enumerate determination of constants K and C of a tacheometer. 7M
   b) The stadia readings with horizontal sight on a vertical staff held 40m away from a tacheometer were 1.354 & 1.880. The focal length of the object glass was 25cm. the distance between the object glass and trunnion axis of the tacheometer was 15cm. calculate the stadia interval? 7M
7. a) Two straights AI and BI meet at a chainage of 3450m. A right handed simple circular curve of 250m radius joins them. The deflection angle between two straights is 50^0. Tabulate the necessary data to layout a curve by Rankine's method of deflection angles. Take the chord interval as 20m. 7M
   b) With the help of neat sketch explain procedure to set out a simple circular curve by offsets from long chord method. 7M
8. a) Explain different sources of errors in GIS. 4M
   b) Illustrate basic principles of electronic distance measurement. 5M
   c) Enumerate Instrumental errors in EDM. 5M

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