Question Bank

THIRD SEMESTER (2019)

MA201 LINEAR ALGEBRA &COMPLEX ANALYSIS

Module I			
Sl. No	Questions	Marks	KTU
1.	Show that $u = y^3 - 3x^2y$ is harmonic and hence find its harmonic conjugate.	8	DEC 2016
2.	Define an analytic function and prove that an analytic function of constant modulus is constant.	8	DEC 2016
3.	Check whether the following functions are analytic or not. Justify your answer i) $f(z) = z + \bar{z}$ ii) $f(z) = \|z\|^2$	4+4	MARCH2017
4.	Show that $f(z) = sinz$ is analytic for all z. Find $f'(z)$	7	MARCH2017
5.	Show that $v = 3x^2y - y^3$ is harmonic and find the corresponding analytic function	8	MARCH2017
6.	. Let $f(z) = u(x,y) + i\, v(x,y)$ be defined and continuous in some neighbourhood of a point z = x+ iy and differentiable at z itself.Then prove that the first order partial derivatives of u and v exist and satisfy Cauchy- Reimann equations	7	ARIL 2018
7.	Prove that $u = sinxcoshy$ is harmonic.Hence find its harmonic conjugate.	8	ARIL 2018
8.	Check whether the function f(z) = $\frac{Re\,(z^2)}{\|z\|^2}$ if z ≠ 0 = 0 if z = 0 is continuous at z=0	7	ARIL 2018
9.	Let f (z) = u+iv is analytic ,prove that u = constant,v=constant are families of curves cutting orthogonally.	7	JULY2017
10	Prove that the function u(x, y) = $x^3 - 3xy^2 - 5y$ is harmonic everywhere . Also find the harmonic conjugate of u.	7	JULY2017
11	Find the points,if any,in complex plane where the function f(z)=$2x^2 + y + i(y^2 - x)$is (i) differentiable(ii) analytic	8	JULY2017
12	Find the analytic function whose imaginary part is v(x,y) = $log(\ x^2 + y^2\ ) + x - 2y$.	7	MAY 2019
Module II			
1.	Find the image of $\left\|z - \frac{1}{2}\right\| \leq \frac{1}{2}$ under the transformation $w = \frac{1}{z}$ .Also find the fixed points of the transformation	7	DEC2016

	$w = \frac{1}{z}$		
2.	Find the linear fractional transformation that maps the points $z_1 = 0, z_2 = 1, z_3 = \infty$ onto $w_1 = -1, w_2 = -i, w_3 = 1$ respectively.	7	DEC2016
3.	Find the image of the lines x = c and y = k where c and k are constants under the transformation w = $sinz$	7	DEC2016
4.	Find the image of $0 < x < 1, \frac{1}{2} < y < 1$ under the mapping w = e^z	7	MARCH2017
5.	Find the linear fractional transformation that carries $z_1 = -2, z_2 = 0$ and $z_3 = 2$onto the points $w_1 = \infty w_2 = \frac{1}{4}$,$w_3 = \frac{3}{8}$ hence find the image of x axis	7	MARCH2017
6.	Find the image of the rectangular region$-\pi \leq x \leq \pi, a \leq y \leq b$ under the mapping $w = sinz$	8	MARCH2017
7.	Find the image of the region $\left\|z - \frac{1}{3}\right\| \leq \frac{1}{3}$under the transformation $w = \frac{1}{z}$	8	APRIL 2018
8.	Find the image of the x axis under the linear fractional transformation $w = \frac{z+1}{2z+4}$	8	APRIL 2018
9.	Under the transformation $w = z2$, find the image of the triangular region bounded by = 1, □ = 1 and□ + □ = 1.	8	MAY 2019
10.	Find the bilinear transformation that maps the points −1,□,−1 onto □,0,−□.	8	MAY 2019
11.	Find the image of the half plane Re(z)≥ *2*,under the map w=iz	8	JULY 2017
12.	Under the transformation□ = 1/ □ , find the image of |□ − 2□| = 2.	8	MAY 2019
	Module III		
1	Evaluate $\int_{□}$ □□(□) □□ where is the straight line from 0 to 1+2i	7	DEC2016
2	Show that $\int_0^{\infty} \frac{1}{1+□^4}$ □□ =$\frac{□}{2\sqrt{2}}$	8	DEC2016
3	Integrate $\frac{□^2}{□^2-1}$ counter clockwise around the circle |□_1_□|=$\frac{□}{2}$	7	DEC2016
4	Evaluate $\int_{□}$ |□| dz i)where c is the line segment joining i and –i ii) where c is the unit circle in the left of the half plane	3+4	MARCH2017
5	Verify Cauchy's integral theorem for z^2 taken over the	8	MARCH2017

	boundary of the rectangle with vertices -1,1,1+i,1-I in the counter clockwise sense.		
6	Evaluate $\int_{\square} \square\square(\square^2)\,\square\square$ where c is the triangle with vertices 0,1,i counter clockwise.	7	APRIL 2018
7	Use Cauchy's Integral Formula, evaluate $\int_{\square} \frac{\square^2}{\square^3-\square^2-\square+1}\,\square\square$ where c is taken counter clockwise around the circle: i)$\lvert\square+1\rvert=\frac{3}{2}$ ii)$\lvert\square-1-\square\rvert=\frac{\square}{2}$	8	APRIL 2018
8	Find the Taylor series and Laurent series of $\square(\square)=\frac{-2\square+3}{\square^2-3\square+2}$ with centre 0 in i)$\lvert\square\rvert<1$ ii$1<\lvert\square\rvert<2$	8	APRIL 2018
9	Find the Laurent series expansion of $\square(\square)=\frac{1}{1-\square^2}$ which is convergent in i)$\lvert\square-1\rvert<2$ ii)$\lvert\square-1\rvert>2$	8	MARCH2017
10	If $(\square)=\frac{1}{\square^2}$, find the Taylor series that converges in $\lvert\square-\square\rvert<\square$ and the Laurent series that converges in $\lvert\square-\square\rvert>\square$	8	DEC 2016
11	Using Cauchy's integral formula, evaluate $\int_{\square} \frac{\square^{\square}}{(\square^2+4)(\square-1)^2}$dzwhere $\square$ is the circle $\lvert\square-1\rvert=2$	7	MAY2019
12	Evaluate $\int_0^{2+\square} (\bar{\square})^{2}dz$ along (i) the real axis to 2 and then vertically to $2+\square$. ii) the line $2\square=\square$.	8	MAY2019
Module IV			
1	Define three types of isolated singularities with an example for each	7	DEC2016
2	Determine the nature and type of singularities of i)$\frac{\square^{-\square^2}}{\square^2}$ ii)$\frac{1}{\square}$	7	MARCH 2017
3	Use Residue theorem to evaluate $\int_{\square} \frac{30\square^2-23\square+5}{(2\square-1)^2(3\square-1)}\,\square\square$ where c is$\lvert\square\rvert=1$	7	MARCH 2017
4	Evaluate $\int_0^{\infty} \frac{1}{(1+\square^2)^2}\,\square\square$ using residue theorem	8	MARCH 2017
5	Determine and classify the singular points for the following functions i)$\square(\square)=\frac{\square\square\square\square}{(\square-\square)^2}$ ii) $g(z)=(\square+\square)^2\square^{\frac{1}{\square+\square}}$	7	APRIL 2018

6	Evaluate $\int_{-\infty}^{\infty} \frac{1}{(1+\square^2)^3}$ □□	8	APRIL 2018
7	Evaluate $\int_{\square} \frac{\square\square\square\square}{\square^2-1}$ □□ counter clockwise around c :$\|\square\| = \frac{3}{2}$ using Cauchy's Residue theorem	7	APRIL 2018
8	Using contour integration evaluate $\int_{-\infty}^{\infty} \frac{\square^2-\square+2}{\square^4+10\square^2+9}$ □□	7	JULY 2017
9	Evaluate ∫ □□□□□□ where □ is the circle $\|\square\| = 1$	7	MAY2019
10	Evaluate∫ 1/(5−3□i□□)□□	8	MAY2019
11	Find all singular points and residues of the functions (a)f (□) = (□−□□nz)/□^{2} (□) f(z) =tanz	8	MAY2019
12	Evaluate $\int_{-\infty}^{\infty} \frac{\square^2}{(\square^2+1)(\square^{2+4})}$ □x	8	MAY2019
Module V			
1	Solve by Gauss elimination method: $X_1 - x_2 + x_3 = 0$ $-x_1+x_2 - x_3 = 0$ $10x_2 + 25x_3 = 90$ $20x_1+10x_2 = 80$	5	MARCH2017
2	Find the rank of matrix $\begin{bmatrix} 0 & 1 & 0 \\ -1 & 0 & -4 \\ 0 & 4 & 0 \end{bmatrix}$ .Also find a basis for row space and column space	5	DEC 2016
3	Solve using Gauss elimination method: y+z-2w =0 2x-3y-3z+6w =2 4x+y+z-2w =4	6	MARCH2017
4	Reduce to echelon form and hence find the rank of the matrix $\begin{bmatrix} 3 & 0 & 2 & 2 \\ -6 & 42 & 24 & 54 \\ 21 & -21 & 0 & -15 \end{bmatrix}$	6	MARCH2017
5	Find the basis for the null space of $\begin{bmatrix} 2 & -2 & 0 \\ 0 & 4 & 8 \\ 2 & 0 & 4 \end{bmatrix}$	8	MARCH2017
6	Are the vectors (3,-1,4) (6,7,5) and (9,6,9) are linearly dependent or independent .Justifyyour answer.	5	MARCH2017
7	.Are all vectors (x,y,z) in R^3 with y -x+ z =0 form a vector space over the field of real numbers? Justify your answer.	5	MARCH2017
8	Solve using gauss elimination method: 3x+3y+2z=1,x+2y=4,10y+3z=-2,2x-3y-z=5	8	APRIL2018
9	Prove that the vectors (1,1,2),(1,2,5),(5,3,4) are linearly dependent	6	APRIL2018
10	Prove that the set of vectors V={(v_1,v_2,v3) □ℝ: -v_1+v_2+4v_3=0} a vector space over the field ℝ. Also find the dimension and the basis	6	APRIL2018

11	Find the values of □ and □ for which the system of linear equations □ + 2□ + 3□ = 6, + 3□ + 5□ = 9,2□ + 5□ + □□ = □ has (i) no solution (ii) a unique solution (iii) infinitely many solutions	7	MAY2019
12	Solve the system of equations by Gauss Elimination Method: 3□ + 3□ + 2□ = 1, □ + 2□ = 4,10□ + 3□ = −2, 2□ − 3□ − □ = 5	8	MAY2019
	Module VI		
1	Diagonalize the matrix A= $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$	10	DEC 2016
2	If 2 is an eigen value of $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ without using its characteristic equation ,find other eigen values .Also find the eigen values of A^3 ,A^T ,A^{-1} ,5A, A-3I and Adj A	7	JULY2017
3	What kind of conic section or pair of straight line is given by the quadratic form $3x^2+22xy+3y^2=0$ express $(x,y)^T$ in terms of new coordinates.	6	DEC 2016
4	Find out what type of conic section the quadratic form $Q=17x^2-30xy+17y^2=128$ represents and transform it to the principal axis	10	DEC 2016
5	Dioganalize the matrix A= $\begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$ hence find A^4	8	MARCH2017
6	Determine whether the matrix is orthogonal $\begin{bmatrix} 1 & 0 & -0 \\ 1 & 1/\sqrt{2} & -1/\sqrt{2} \\ 0 & 1/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$	5	DEC 2016
7	Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$	10	MARCH2017
8	What kind of conic section is given by the quadratic form $7□_1^2+6□_1□_2+7□_2^2=200$.Also find its equation	6	APRIL2018
9	Find the basis of null space of A= $\begin{bmatrix} 2 & -2 & 0 \\ 0 & 4 & 8 \\ 2 & 0 & 4 \end{bmatrix}$	6	MARCH2107
10	Reduce to echelon form and hence find the rank of the matrix A= $\begin{bmatrix} 3 & 0 & 2 \\ -6 & 42 & 24 \\ 21 & -21 & 0 \end{bmatrix}$	7	MARCH2107
11	Diagonalize the matrix $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 3 & -1 \\ 1 & -1 & 3 \end{bmatrix}$	12	APRIL 2018

12	Diagonalize the matrix $\begin{bmatrix} -1 & 2 & -2 \\ 2 & 4 & 1 \\ 2 & 1 & 4 \end{bmatrix}$	8	MODEL QUESTION

Mechanics of Solids (S3 CE)

MODULE 1

1. (a)State Hooke's Law *(AU , JAN 2015)*
   (b)What is complimentary shear stress (AU, JAN 2015)
   © What is elastic limit and elasticity (AU , JUNE 2015)

2. A steel bar of 30 mm square in section is subjected to an axial compressive load of 80 kN . Find the percentage change in volume if the bar is 400 mm long . What are the equal stresses that must be applied to the sides of the bar if the volumetric chane to be zero ? Youngs modulus is 200 Gpa and poisson's ratio is 0.3
   (AU, JAN 2015)
3. (a)Draw typical stress strain curve for high tensile steel and cast iron?
   (AU , JAN 2015)
   (b) What is elastic limit and elasticity (AU , JUNE 2015)
   © What is tangential stress and longitudinal Stress ? (AU, JUNE 2015)
4. (a)Write about different types of beams and different loadings? (AU, JUNE 2015)
   (b)Explain elastic limit, Hook's law, Poisson's ratio. ***(KU; Dec. 2015)***
5. (a)Define volumetric strain ***(KU; Apr. 2015)***
   (b)Explain: ***(KU; Jan. 2015)***
   (a) Constitutive relation
   (b) Principle of superposition
6. (a) Draw and explain stress strain Diagram for mild steel. ***(KTU; Jan. 2017)***
   (b)Derive the expression for elongation of a tapering circular section subjected to axial load .

   (KTU; Jan. 2017)

MODULE II

1. Define Thermal stress and derive an expression for the stress developed in a bar restrained at both the ends subjected to an increase in temperature.

   (KU; Nov. 2014)

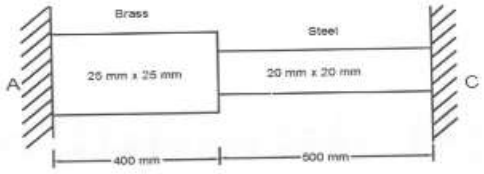
2. A straight bar 450mm long is 40mm in diameter for the first 250mm length and 20mm diameter for the remaining length. If the bar is subjected to an axial pull of 15kN. Find the maximum and minimum stresses produced in it and the total extension

of the bar. Take E= 2x 10^5 N/mm^2.

(KTU; Jan. 2017)

3. A bar made of brass and steel as shown in figure is held between two rigid supports A and C. Find the stress in each material if the temperature rises by 40^0C. Take E_b = 1x10^5 N/mm^2, α_b = 19x$10^{-6}/^0$C, E_s = 2x10^5 N/mm^2, α_s = 12x$10^{-6}/^0$C.

(KTU; Jan. 2017)



4. A cylindrical bar is 20mm diameter and 800mm long. During a tensile test it is found that the longitudinal strain is 4 times the lateral strain. Calculate the modulus of rigidity and bulk modulus, if its elastic modulus is 1x10^5 N/mm^2. Find the change in volume, when the bar is subjected to hydrostatic pressure of 100N/mm^2.***(MG; Nov 2014)***

5. A steel rod 5cm diameter and 6m long is connected to two grips and the rod is maintained at a temperature of 100^0C. Determine the stress and pull exerted when the temperature falls to 20^0C if :
    1. The ends do not yield and
    2. The ends yield by 0.15 cm.

    Take E = 2x10^5 N/mm^2 and α = 12x10^{-6} $/^0$ C. (***AU; June 2013)***

6. A metallic bar 250mmx80mmx30mm is subjected to a force of 20kN (tensile), 30kN (tensile) and 15kN (tensile) along the x, y and z directions respectively. Determine the change in the volume of the block. Take E = 2x10^5 N/mm^2 and Poisson's ratio = 0.25. (***AU, Nov 2013)***
7. (a) A copper rod of 25mm in diameter is encased in a steel tube of 30mm internal diameter and 35 mm external diameter. The ends are rigidly attached. The composite bar is 500mm long and is subjected to an axial pull of 30kN. Find the stress induced

in the rod and the tube. Take for steel as $2x10^5$ N/mm^2 and e for copper as $1x10^5$N/mm^2. ***(KTU; Jan. 2017)***

(b)Rails of a railway line are laid so that there is no stress in the rails at 10^0C. Calculate the stress in the rails at 60^0 C if there is an expansion allowance of 10mm per rails. ***(KTU; Jan. 2017)***

MODULE III

1. Draw SFD and BMD for the overhanging beam shown in figure. Locate the points of contraflexure. Also determine the maximum bending moment.

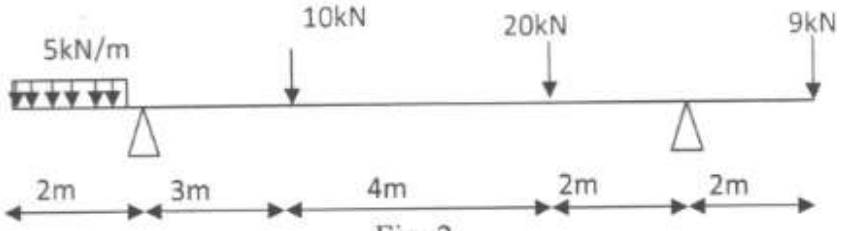


Fig. 2

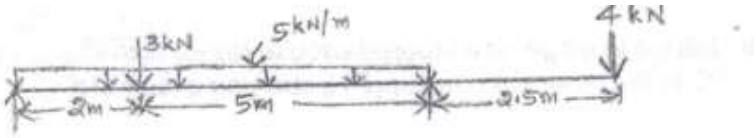
(KTU; Jan. 2017)

2. **a)** Derive the relation between intensity of loading, shear force and bending moment at a section of uniformly loaded beam

   b) A simply supported beam of length 4m carries a uniformly distributed load of 3kN/m over the central 2m length and two point loads 2kN and 3kN at distances 0.5m and 3.5m from the left support. Draw SFD and BMD. Locate the point of maximum bending moment and find out the maximum bending moment.

3. Draw the shear force and bending moment diagrams for a simply supported beam with equal overhang on either side carrying uniformly distributed load 'w' per unit run over the whole length. Span length is 'l' and overhanging length is 'a'. Consider the three cases of $l > 2a$

4. Determine the values of shear force and bending moment and draw the diagrams for the beam loaded as shown.



5. (a) Draw the SFD and BMD diagram of a cantilever beam subjected to a central concentrated load ***(KTU; Jan. 2017)***
   (b)Draw the BMD and SFD for a simply supported beam with udl over the entire span ***(KTU; Jan. 2017)***

MODULE IV

1.In theory of pure bending, plane cross sections are assumed to remain plain even after bending. What are the consequences of this assumption?

2.Derive the expression for for shear stresses for an I beam and plot the variation of stresses across the section. ***(KU; Dec. 2015)***

3.At the critical section of a I beam, the value of vertical shear force is 40kN and the sectional dimensions are :- Flange width- 200mm, Flange thickness- 30mm, web thickness- 40mm and total depth- 300mm. Draw the shear stress distribution across the depth of the section.

(KTU Jan.2017)

4.Calculate the maximum bending stress in a cantilever beam of span 2m subjected to a UDL of 1kN/m over full length. Cross section of the beam is 100x150mm.

(KU; Jan.2015)

5.A circular cast iron column of diameter 250mm carries a vertical load of 600kN at a distance of 35mm from the axis. Find the extreme values of stresses induced in the section . ***(KU;Dec.2015)***

6.Derive the expression for shear stress in a beam section stating the assumptions made

(KTU; Jan. 2017)

MODULE V

1. Derive Euler's buckling load for slender columns with ends hinged

(KTU;Jan.2017)

2. A 1.5m long column has a circular cross section of 5cm diameter. One of the ends of the column is fixed in direction and position and other end is free. Taking factor of safety as 3, calculate the safe load using Rankin's formula, take yield stress as 560 N/mm2 and α = 1/1600 for pinned ends

(KTU;Jan.2017)

3.Determine the buckling load for a strut of T-section,the flange width being 150mm, overall depth 100mm and both flange and web 13mm thick. The strut is 3m long and is hinged at both ends. Take E=200GPa

(KU;Apr.2015)

4. Calculate the safe compressive load on a hollow cast iron column whose one end is rigidly fixed and other end is hinged. The external diameter is 200mm and internal diameter 150mm and 8m length. Use Euler's formula with a factor of safety of 3 and $E=2x10^5 N/mm^2$.

(KU;Dec.2015)

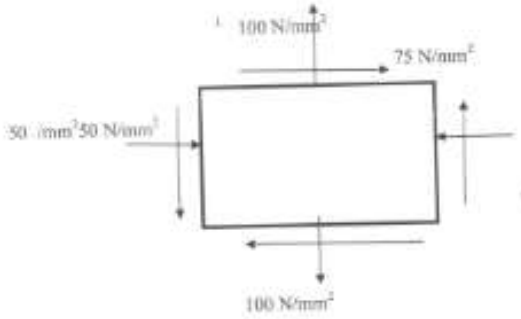
5. (a)List the assumptions made in the Euler's buckling theory. ***(KU; Dec.2015)***

(b) What is the limitation of Euler's theory? ***(KU; Sep. 2014)***

7.Determine the principal stresses and principal planes in an element subjected to stresses as shown. Also calculate

1. Maximum shear stress and its plane
2. Stress conditions in the plane shown ***(KU; Nov.2014)***

8.State of stress at a point in a material is $100N/mm^2$ (tensile) upon a horizontal plane and 50N/mm2 (compressive) upon a vertical plane. These planes also carry a shear stress of $75N/mm^2$ as shown in fig. Determine principal stresses, maximum shear stress, plane of maximum shear stress and the resultant stress on the plane of maximum shear stress.



9.Select a suitable diameter of solid shaft of circular section to transmit 112.5kW of power at 200r.p.m, if the allowable shear stress is $75N/mm^2$ and the allowable twist is 1^0 in length of 3m. Take G as$0.82 x10^5 N/mm^2$

(KTU; Jan. 2017)

MODULE VI

1. Explain double integration method to find the deflection of a cantilever beam with a point load at the free end ***(KTU;Jan.2017)***
2. A beam of length 6m is simply supported at its ends and carries two point loads of 48kNand 40kN at a distance of 1m and 3m respectively from the left support. Find the

deflection under each load and the maximum deflection by Macaulay's method. Given E= $2x10^5$ N/mm^2 and I= $85x10^6$ mm^4.

(KTU;Jan.2017)

3. Calculate slope at supports and deflection at mid span. Take flexural rigidity as$3x10^4 kN\text{-}m^2$. ***(KU;Jan.2015)***
4. (a) What are the assumptions in Eulers coloumn theory ***(KTU; Jan. 2017)***

   (b)Write the equation for Eulers Crippling load for columns with both ends hinged , both ends fixed, one end fixed and other end hinged, one end fixed and other free

   (KTU; Jan. 2017)

   (c)A hollow alloy tube of 5m long with diameter 40mm and 25mm was found to extend 6.4mm under the tensile load of60kN. Find the buckling load for the tube when used as a strut with both ends pinned

   (KTU; Jan. 2017)

CE203: FLUID MECHANICS I

MODULE 1

1a. A triangular plate of 1m base and 1.5 m altitude is immersed in water. The plane of the plate is inclined at 30°with free water surface and the base is parallel to and at a depth of 2m from water surface. Find the total pressure on the plate and the position of centre of pressure. **10 marks KTU2017**

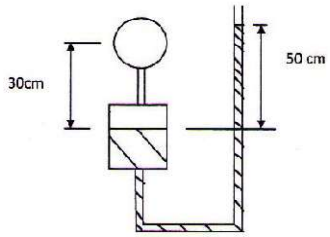
b. What is metacentre of a floating body? How would you estimate the metacentric height experimentally**?** **10 marks KU 2012**

1. a. Show that a cylindrical buoy 1.25m diameter and 3.25m high weighing 11127 N will not float vertically in sea water weighing $10055N/m^3$. Find the tension necessary. In a vertical chain attached to the centre of the base of the buoy that will just keep the cylinder vertical. **10 marks KTU Jan 2017**

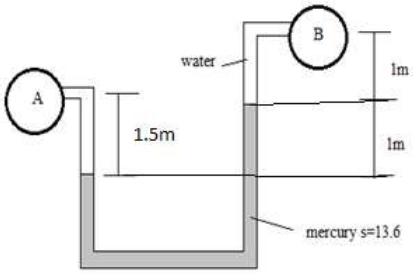
b.A circular plate of 2.5m in diameter is submerged in an oil of Sp. Gr. 0.8. The maximum and minimum depth of the plate are 2m and 1m from the free surface. Calculate the hydrostatic force on one face of the plate and the depth of the centre of pressure. **10 marks CUSAT 2009**

2. A wooden block of 1m side cube of relative density 0.7 floats in water. Determine the volume of concrete of relative density 2.5 that needs to be placed on it so that the block is just immersed in water. **20 marks KTU July 2017**

3. A single column vertical manometer with a reservoir to is connected to a pipe containing oil of specific gravity 0.9. The area of reservoir is 100 times the area of the manometric tube. The reservoir contains mercury of specific gravity 13.6. The level of mercury in the reservoir is at a depth 30cm below the centre of pipe. If the difference of mercury levels in the reservoir and the right limb is 50cm, calculate the pressure in the pipe. **20 marks KTU July 2017**



4. a.Determine the pressure difference between A and B for the setup shown in figure? **12 marks (KU)**



b. State and prove Pascal's law**.** **8 marks CUSAT 2008**

5. a. The top of an inverted U-tube manometer is filled with oil of specific gravity 0.98 and the reminder of the tube with water of specific gravity 1.12. Find the pressure difference between two p s at the same level at the base of the legs when the difference of water level is 70mm. **10 marks KU Oct 2017**

b. An annular plate 3m external diameter and 1.5 m internal diameter is immersed in water with it's greatest and least depths below the water surface as 3.6m and 1.2m respectively. Determine the total pressure and the position of the centre of pressure on one face of the plate. **10 marks KU Oct 2017**

6. a.A metallic ring was first submerged in water and weighed against a mass of 10 gm. When the ring was submerged in oil of Sp. Gr 0.8 the balancing weight had the mass of 13 gm. Calculate the true density of material**.** **10 marks CUSAT 2008**

b. A hollow circular plate of 2m external diameter and 1m internal diameter is immersed vertically in water such that centre of plate is 4m deep from the water surface. Find the depth of centre of pressure and total pressure.**10 marks MG 2014**

MODULE 2

1. The velocity vector in an incompressible flow is given by $V=(6xt+yz^2)i+(3t+xy^2)j+(xy-2xyz-6tz)k$

   (i) Verify whether continuity equation is satisfied **5 marks**

   (ii) Determine the acceleration and velocity at a point A (1,1,1) at t=1 **10 marks**

   (iii) Differentiate between simple manometer and differential manometer

   5 marks KTU2017

2. a.Show that stream lines and equipotential lines are orthogonal

   10 marks CUSAT2008

   b.CompareLagrangian and Euler methods of describing fluid motion?

   10 marks CUSAT2008

3. a.What are the different mathematical conditions for irrational flow

   10marks CUSAT2008

   b.Explain the terms circulation and vorticity . **10 marks**

4. a.Differentiate between the Eulerian and Lagrangian methods of representing fluid flow

   10 marks KTU Jan 2017

   b.Derive the continuity equation for three dimensional flow in Cartesian co-ordinates

   10 marks CUSAT 2009

5. a.Distinguish between velocity potential function and stream function?

   10 marks

   b.Differentiate between laminar and turbulent flow **10 marks CALICUT 2010**

6. a). The velocity components in a two dimensional flow is given by

$u = \frac{y^3}{3} + 2x - x^2 y$ and $v = xy^2 - 2y - \frac{x^3}{3}$

i) Show that it is a possible case of flow? **3 marks KU2008**

ii) Prove that the flow is irrigational? **10 marks KU2008**

iii)Stream function is given by $\Psi = x^2 + y^2$.Determine the velocity and direction of flow at (2, 2) **7 marks KU2008**

MODULE 3

1 a.What are the practical applications of Bernoulli's equation? **10 marks**

b.Explain Bernoulli's equation with its assumptions.

10 marks MG2014

2 a.Explain the use of a pitot tube. **5 marks CUSAT 2009**

b.State and explain about Euler's Equation**.** **7 marks MG2010**

c.What are the advantages of venturimeter over orifice meter. Explain with a neat sketch. **8 marks MG2010**

3 a.A horizontal venturimeter with inlet and outlet diameter 30cm and 15cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and throat is 20cm of mercury. Determine the rte of flow. Take C_d=0.98 **12marks MG2010**

b.Explain the applications of momentum equation. **8 marks CUSAT2009**

4 a.Define energy correction factor and momentum correction factor.

7 marks KTU2017

b.Aventurimeter is used for measurement of discharge of water in horizontal pipe line. If the ratio of upstream pipe diameter to that of throat is 2:1, upstream diameter is 300mm, the difference in pressure between the throats and upstream is equal to 3m

head of water and loss of head through meter is one-eighth of the throat velocity head, calculate the discharge in the pipe**.** **15 marks CALICUT2014**

5 a.An orifice meter with dia 10mm is inserted in a pipe of 20mm dia. The pressure gauges fitted upstream and downstream of the orificemeter gives reading of 19.62N/cm^2 and 9.81N/cm^2 respectively. Co-efficient of discharge for the meter is given as 0.6 ,find the discharge of water through pipe. **10 marks CALICUT2014**

b. Water under pressure of $4x10^{-3}62N/m^2$ is flowing through a pipe at the rate of $0.25m^3/s$. if the pipe is bent such that the internal angle between the two limbs of the bend is 135°, find the magnitude and direction of the resultant force on the bend.

10 marks KTU2017

6 A pipe of diameter 400mm conveying $0.2m^3/s$ of water has a right-angle bend in horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of the bend are 35N/cm^2 and 30N/cm^2. **20 marks**

MODULE 4

1. a.What do you understand by end contraction of weir? Write down the equation for calculating discharge over a rectangular weir with two end contraction?

10 marks KU2012

b.What is cipoletti weir? Write down the discharge equation for cipoletti weir?

10 marks

2. a.Write a short note about hydraulic coefficients.

10 marks

b.Write relation between coefficient of discharge, coefficient of contraction and coefficient of velocity**?** **10 marks**

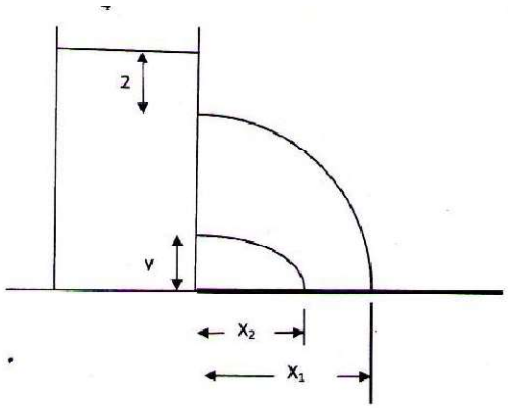
3. A hemispherical tank of diameter 4m contains water up to a height of 1.5m.An orifice of diameter 50mm is provided at the bottom. Find (i) Time required to fall down the level from 1.5m to 1m.(ii) Time required to completely empty the tank**?**

20 marks

4. A cylindrical tank of radius R and length L laid with its axis horizontal contains water. An orifice of area 'a' and coefficient of discharge Cd is provided at the bottom of the tank. Find the time required to lower the water level in the tank from an elevation of H1 to H2 measured with respect to the centre of orifice?

20 marks

5. a.An orifice meter with orifice dia 10mm is inserted in a pipe of 20mm dia. The pressure gauges fitted upstream and downstream of the orificemeter gives readings of 19.62N/cm^2 and 9.81N/cm^2 respectively. Co-efficient of discharge for the meter is given as 0.6, find the discharge of water throgh pipe**.** **10 marks KTU2017**



b. A rectangular orifice of width 1m and height 60cm is fitted on to a large water tank. Calculate the discharge when the height of water over the bottom edge of orifice is 5m, C_d=0.6 **10 marks CUSAT2009**

MODULE 5

1a.Derive Hagen Poiseuille's formula for laminar flow through a circular pipe?

10 marks KTU2017

b. Derive Darcy-Weisbach equation for major loss in pipes **10 marks**

1. A piping system consiss of three pipes arranged in series; the lengths of the pipes are 1200m,750m and 600m and diameters 750mm,600mm and 450mm respectively.

Transform the system to an equivalent 450mm diameter pipe and determine an equivalent diameter for the pipe 2550m long**.** **20 marksKTU2017**

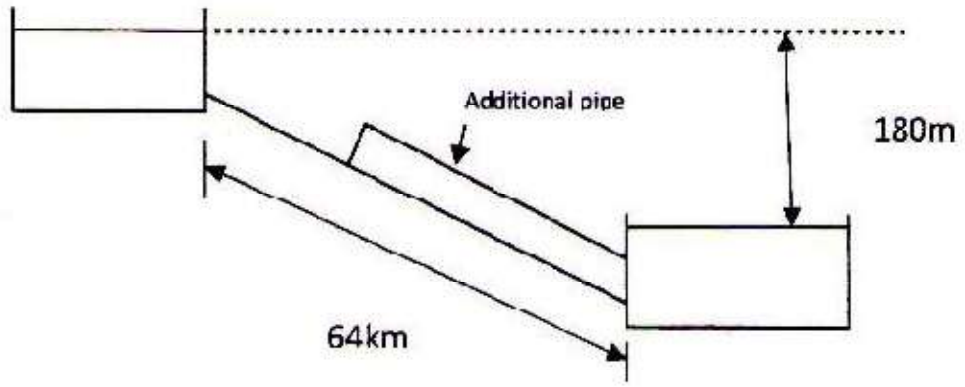
2. a.List out the various major and minor losses takesplace in a pipeline? Explain in detail.

10 marks MG2010

bFind the loss of head when a pipe diameter 200mm is suddenly enlarged to a dia of 400mm. the rate of flow of water through the pipe is 250 litres/second.

10 marks MG2010

3. a.Two reservoirs with a difference in water levels of 180m are connected by a 64km long pipe of 600mm diameter and Darcy's friction factor f=0.015. Determine the discharge through the pipe. Inorder to increase this discharge by 50% another additional pipe of the same diameter is laid from the pipe and connected to the reservoir. Determine the length of the additional pipe. **10 marks KTU2017**



b.Derive continuity equation for one dimensional steady incompressible flow? 10 marks

4. a.A pipe of diameter 300mm branches into 2 pipes having diameters 100mm and 125mm respectively. The average velocity in 300mm pipe is 4m/s. Determine the velocity of flow through the branch pipes if the flow rate through 100mm pipe is 1/3rd of flow rate through the main pipe**?** **15 marks**

b.Describe the concept of an equivalent pipe **5 marks**

MODULE 6

1. a.Explain boundary layer separation. How it can be controlled? **10 marks**

   b.A smooth flat plate 2m wide and 2.5m long is towed in an oil of relative density 0.8, with a velocity of 1.5 m/s lengthwise. Find the boundary layer thickness and shear stress at the centre and tailing edge of the plate. Also find the power required for towing the plate? Kinematic viscosity of oil=$10^{-4}m^2/s$. **10 marks**

2. Find the displacement thickness and momentum thickness for the velocity distribution in the boundary layer given by $\frac{u}{U} = \frac{y}{\delta}$ where u is the velocity at a distance y from the plate and u=U at y= δ where $\delta = boundary\ layer\ thickness$. **20 marks**

3. Water is delivered by a 15cm pipe at the rate of 60 l/s. Calculate the pressure difference between two points 300mm apart on the same horizontal line? Take f= 0.0055 in the equation $h_f = \frac{4flv^2}{2gd}$ **20 marks**

4. a.The velocity distribution in the boundary layer is given by $u/U = 2(y/\delta)-(y/\delta)^{2,}$,$\delta$ being boundary layer thickness. Find the displacement thickness, momentum thickness and energy thickness. **10 marks KTU2017**

   b.What is the difference between friction drag and pressure drag. **10 marks KTU2017**

5. Calculate the friction drag on a plate 0.15m wide and 0.45m long placed longitudinally in a stream of oil flowing with a stream velocity of 6m/s. also find the thickness of the boundary layer and shear stress at the trailing edge. Specific gravity of oil is 0.925 and its kinematic viscosity is $0.9x10^{-4}\ m^2/s$. **20 marks KTU2017**

6. a.Define Hydraulic Gradient Line and Total Energy Line. **7 marks KTU2017**

   bFind the displacement thickness and the momentum thickness for the velocity distribution in the boundary layer given by $u/U = 2(y/\delta)-(y/\delta)^2$. **10 marks AU2015**

7. a.Find the thickness of the boundary layer at the end of the plate and the drag force on one side of the plate 1m long and 0.8m wide when placed in water flowing with a velocity 150mm/sec. calculate the coefficient of drag also. Take kinematic viscosity of water is $0.01Ns/m^2$. **10 marks CALICUT2010**

   b.Explain in detail with a neat sketch the description of "Boundary Layer".

BUSINESS ECONOMICS

Module 1

1	a. What are basic or central economic problems?	(5)
	b. How will you use PPC to explain opportunity cost?	(5)
2	Explain the Marginal utility theory with the help of a figure?	(10)
3	What is meant by economic problem? What are the causes of emergence of an economic problem?	(10)
4	What is diminishing marginal utility ? Explain the law with the help of an empirical example.	(10)
5	Explain 1 Marginal utility 2 Total utility 3 Micro economics 4 Utility 5 Opportunity cost	(10)
6	A country producing wheat and cloth in a neutral proportion, a sudden change in the technology will lead high production in both of the product. Explain with the help of PPC ?	(10)
7	a. Examine the meaning and scope of Business Economics?	(6)
	b. Explain the factors affecting Utility?	(4)
8	a. Explain the shift in PPC with the help of figure?	(6)
	b. What are the difference between marginal utility and total utility?	(4)
9	a. What is business economics?	(5)
	b. How does a business economics helps a manager in decision making?	(5)
10	a. Define a production possibility curve? Mark full employment and Under utilization of resources in a PPC.	(5)

b. Cigarette may be harmful but it may posses utility. Do you agree? Give reasons .

(5)

Module 2

1 Explain

1. Deman
2. Joint demand
3. Veblan good
4. Opportunity cost
5. Supply (10)

2 a. Degrees of price elasticity? (6)

b. Explain change in demand? (4)

1. Expansion and contraction
2. Increase and decrease in demand

3 a. Law of variable proportion with the help of a figure? (6)

b. What is production? Explain the factors of production? (4)

4 a. Cobb- Dugless production function? (6)

Suppose the production function is given as $Q=2K^{1/2}L^{1/2}$

1. What will be output when K=16 & L=36?
2. what is marginal product of labour?

b . Draw a total cost curve with the help of Tvc & Tfc? (4)

5 a. How is the equilibrium price of a commodity determined? Suppose the number Of buyers of a commodity increases. How does it affects market demand curve And equilibrium price? Draw a diagram and explain. (6)

b. Suppose the finance minister increase the tax on those commodities Where demand is highly elastic. What happens to total tax revenue? Why? (4)

6 a. What is a production function? Distinguish between Fixed proportion and variable proportion. (5)

b. Suppose the production function is given as Q=3L½K½. Find average and marginal product of labour when L=9 and K=4. (5)

7 Show the law of variable proportion with help of a figure? (10)

8 a. Determining the factors affecting demand? (7)

b. Point out the factors affecting supply? (3)

9 a. What are the different types of demand? (6)

b. Explain the Cobb-Duglas produo=ction function and bring out its merits and demerits? (4)

10 Explain the different types of elasticity? (10)

Module 3

1 a. Find out a break even point in a break even analysis with the help is figure ? (5)

b. Suppose the monthly fixed cost of a firm Rs 20000/-, Variable cost 30000/-, sales 60000/- Find out BEP ?(Break Even Point) (5)

2 Explain perfect competition with the price determination? (10)

3 a. what are the basic difference between Monopoly And Monopolistic competition ? (4)

b. What is the marginal importance of BEP (6)

4 Explain

1 Real cost

2 Social cost

3 Replacement cost

4 short run cost

5 Fixed cost

6 opportunity cost (10)

5 a. Complete the following short run cost schedule? (6)

Output	TC	TFC	TVC	MC
0	100	--------	-------	
1	---------	--------	50	-------
2	---------	--------	-------	40

.

b. What are the difficulties of measurement now national income? (4)

6 a. What is a short run shutdown point? (3)

b. Suppose price of a product is less than AC. Will a firm stop Production or continue? Why? (7)

7 a. State the main features of monopoly market? (6)

b. Demand curve facing a firm under perfect competition is perfectly elastic. Why? (4)

8 Explain

1. Marginal revenue
2. Margin of safety
3. Variable cost
4. Total revenue (10)

9 a.What is meant by stock and flow? (5)

b. Explain break even analysis with digram? (5)

10 Pricing under oligopoly market requires some assumptions about the behavior of rival firms. Several models have been put forward for this purpose. Discuss the two prominent models explaining the behavior of rival firms in an oligopoly market? (10)

Module- 4

1 a. What is repo rate? How does RBI use it as a measure to control inflation? (4)

b. National income of a country is given as 2850. If the annual depreciation

Is 300, net factor income from abroad is 50, and net indirect tax is 100, Estimate GDPmp? (6)

2 Explain

1 Intermediate goods

2 Gross Domestic product

3 Net National Product

4 private income.

5 personal disposable income. (10)

3 a. What are the difference between product method and income method of national income measurement (6)

b. Explain final expenditure method (4)

4 a. Fisher equation? (3)

b. Types of inflation? (3)

c. What is demand pull inflation & explain the causes? (4)

5 What are the main measures to control inflation? (10)

6 a. Trade cycle? (6)

b. How would you define money? (4)

7 What is deflation and Explain the causes of deflation? (10)

8 a. State the Cambridge version of quantity theory of money? (7)

b. Major causes of inflation in a country? (3)

9 How is national income estimated? Bring out the difficulties involved in National income estimation in under developed countries? (10)

10 What is the risk join with Bitcoins? State your points. (10)

Module 5

1 a. What are the main process of capital budgeting? (5)

b. Explain the types of investment projects?

(5)

2 a. Initial investment Rs - 2500/-, cost of capital- 10% find out NPV on the Following cash flows given below? (10)

Year	Cash
1	900
2	800
3	700
4	600
5	500

3 a . Limitations of NPV mathod?

(3)

b. Merits of IRR method?

(3)

c. What is pay back method? Write down two merits and demerits Of payback method? (4)

4 a. What are the basic sources of Risk ? (6)

b. What do you mean by decision taking under uncertainty?

5. Explain the types of forecasting? (minimum 5 types) (10)

6 a . what is cost benefit analysis? Point out the limitations? (5)

b. What is IRR and its limitations? (5)

7 a. Suppose the initial investment in a project is estimated as 25000 and the cost of capital is 10%. Estimate the NPV of the future cash flows after tax given below and state weather the project will be accepted or not.

(6)

Year	1	2	3	4	5
Cash flow	9000	8000	7000	6000	5000

b. What do you mean by a risky situation in business, How is decision taken under risk? (4)

8 a. From the following data choose the best project based on payback period?

(6)

Capital cost - Project A =15000, Project -B=15000

Cash flow	Project A	Project B
1	5000	4000
2	5000	4000
3	5000	4000
4	2000	3000
5	1500	2000
6	1500	8000

b. What are the limitations of payback method? (4)

9 a. Draw a decision tree? (5)

b. What is meant by capital budgeting? (5)

10 How does sensitivity analysis help a decision maker to choose a project ? What are the limitations? (10)

Module 6

1 a. Classify the following items under Asset and Liability sides? (6)

Petty cash, Accrued interest, copy right, Sundry debtor, Bills receivable, Dividends payable, Inventory, patent, Wages, Pension

2 a.Explain causative model?
b. GST? (4)

3 Write for limitations of a balance sheet? (6)

b. What is a balance sheet? (4)

4 Explain (10)

1.Liquidity ratio

2.Current ratio

3.working capital

4.Quick ratio

5.Leverage ratio

5	a. What are the features of forecasting?	(4)
	b. What is Delphi method?	(3)
	c. What is Naive method?	(3)
6	What are the difference between money market and capital market?	(10)
7	a. International financing?	(1)
	b. Foreign Directi Investment FDI	(3)
	c. Foreign portfolio Investment FPI	(3)
	d. Foreign Institutional investment FII	(3)
8	a. What are the basic difference between FDI&FPI?	(5)
	b. Point out three advantages and disadvantages of foreign Direct investment FDI	(5)
9	a. The principles of Taxation?	(5)
	b. Point out the difference between direct and indirect taxes?	(5)
10	Explain the main sources of capital?	(10)

ENGINEERING GEOLOGY

Part A (Module 1 and 2)

1. Explain:
   a) Chemical Weathering
   b) Soil Profile
2. Describe vertical distribution of ground water
3. What are:
   a) Exfoliation
   b) Artesian Wells
   c) Give an account of factors controlling groundwater movement
4. Explain:
   a) Evaluate the porosity and permeability factors of intact rock and rock masses.
   b) Permeability alone cannot be used to judge the flow of ground water.Discuss
   c) how long does it take for water subjected to 10m head difference to pass through a 5m length of
      1. intact granite which has an isotropic hydraulic conductivity (K) of 1×10^{-12} m/s

2. fractured sandstone with an isotropic hydraulic conductivity (K) of 1×10^{-4}m/s

d) From the above two results of time factor of water flow, which among those rocks need care while accomplishing engineering projects affecting subsurface.

5. Discuss:
   a) The significance of O and E horizons of soil profile
   b) Explian the role of acids in chemical weathering
6. Compare the effectiveness of barriers and liners to control subsurface water in construction sites
7. (a) Explain the engineering classification of weathered rock masses.
   (b) Briefly explain the types of mechanical weathering.

8. Explain:
   a) Type of aquifers.
   b) Explain the zonal distribution of groundwater.
   c) Explain geological classification of soil.
9. Explain:
   a) The soil profile with neat sketch.
   b) Detail the problems created by subsurface water in construction

Part B (Module 3 and 4)

1) Explain:
   a) cleavage
   b) lineation and foliation
   c) chemical formulae of calcite and quartz
2) Discuss seismic waves and their properties
3) Elucidate
   a) Classification of rocks based on their origin
   b) Lithosphere and Asthenosphere
   c) Point load test
4) Discuss
   a) Chemical composition alone is insufficient to name a mineral
   b) Write a short description on any two properties that are used to identify a mineral species during field work phase
   c) Why colour and streak of minerals are not always identical?
   d) Quartz occur less than 10% in majority of crustal rocks. But they form more than 60% of sand deposition on earth surface. Why?
5) Discuss
   a) Granite
   b) Basalt
   c) How do sedimentary rocks differ from metamorphic rocks?
   d) Discuss any two major rock species outcroped in the state of kerala
6) Evaluate:

a) Are the properties (related to strength) desirable for building stones and road aggregates, similar?
b) Discuss the disadvantages of intensity as a measure of earthquake strength.

7) Explain:
   a) Draw and explain internal structure of earth.
   b) List out the physical properties and chemical composition of quartz and gypsum
8) Explain:
   a) Hardness of rocks
   b) Plate tectonics
   c) Seismic waves
9) Discuss the types of rock in geological aspect.

Part C (Module 5 and 6)

1) Explain:
   a) Folds
   b) Faults
   c) Their significance in civil engineering
2) Discuss the different flood management strategies
3) Elucidate on:
   a) Longshore currents
      Engineering significance of:
   b) Dip and
   c) Strike
4) Discuss:
   a) The origin of folding and faulting of rocks
   b) Briefly discuss why the knowledge on rock joints is important for the construction of engineering structures.
   c) How do the trends of geological structures decide the location of huge civilian constructions like dam and reservoirs?
   d) Identity the category to which the fold having following geometry falls into

Strike of limb 1 –N60 degrees; Dip of limb 1-20 degrees to N 330

Strike of limb 2-N240 degrees; Dip of limb 2-20 degrees to N 330

And draw a cross section of the fold along the limbs

5) Evaluate:
   a) Assess beach nourishment and relocation of engineering structures as alternatives to hard methods of coastal protection.
   b) The negative effects of seawalls and groins as shore protection structures
6) Explain:

a) Appraise the benefits of crop rotation and strip farming as soil conservation strategies
b) Mass wasting is a tug of war between gravity and friction. Judge this statement in terms of gravity and shear strength of earth materials

7) Explain:
   a) Strike and dip
   b) Give a detailed account of engineering consideration of fault
   c) Explain the Geological factors considered in the selection of sites for construction of dams and reservoirs
8) Explain about soil erosion and soil conservation measures
9) Explain:
   a) Describe the classification of joints
   b) Elucidate the causes of landslides

SURVEYING- QUESTION BANK

MODULE -1

1. Define local attraction. Which are the different methods of eliminating local attraction in a closed traverse? 8 marks KTU Dec 2018

2. The following consecutive readings were taken with a level and 5m leveling staff on a continuously slopping ground at a common interval of 20 m, :0.385, 1.030,1.925,2.825,3.730,4.685,0.625,2.005,3.110,4.485. Prepare a page of field book and calculate the reduced level of points if first reading was taken on a bench mark of RL 208.125 m.

10 marks KTU DEC 2018

3.a.Define bearing.Which are the different systems of designating bearings?4 marks KTU may 2018

b) Distinguish between dip and declination, isogonic and agonic lines. 5 marks KTU May 2018

c) The magnetic bearing of a line AB is S 280^0 30'E. Find the true bearing if declination is $70^0$30' W. 5 marks KTU DEC 2018

4.a) Explain the different methods of orientation in plane table survey. 6 marks KTU Dec 2018

b) Define contour. Which are the different methods of locating contour? 9 marks KTU May 2019

5. (a) What are the principles of surveying ?

b) Discuss survey stations and survey lines 8 marks KTU May 2018

6.a)What do you mean by local attraction? Mention the sources for the same?

b) Write short notes on Dip, Declination, Latitude and Departure 12 marks KTU may 2018

7.What is meant by ranging out a survey line. Explain in detail direct and indirect ranging of survey lines with neat sketches ? 12 marks KTU Dec 2018

8. (a) Explain the methods of plotting contours?

(b) What are the characterestics of contours? 12 marks KTU may 2018

9. (a) What is orientation? Which are the methods of orientation?

(b) Explain with neat sketches? What type of orientation will you prefer and why?

10 marks KTU may 2018

10. What do you mean by bearing of a survey line? Explain the difference between whole circle bearing and quadrantal bearing? Also discuss fore bearing and back bearing?

12 marks KTU Dec 2018

11. The following bearings were observed in running a closed traverse. At what stations do you suspect the local attraction? Correct the bearings and also find the interior angles.

Line	F.B	B.B
AB	75° 5′	254° 20′
BC	115° 20′	296° 35′
CD	165° 35′	345° 35′
DE	224° 50′	44° 5′
EA	304° 50′	125° 5′

12 marks KTU may 2018

12. Explain the term Ranging of a line. Describe how you would range a chain line between two points which are not intervisible. 10 marks KTU Dec 2017

13. A level is set up at O on a line AB 50m from A and 1400m from B. The staff reading on A is 0.585 m and that on B is 3.695 m. Find the true level difference between A and B.

10 marks KTU may 2018

MODULE - 2

1. a) Explain repetition method of measurement of horizontal angle. 5 marks 12 KTU may 2018

b) Two triangulation stations A and B are 60 km apart and have elevation 240 m and 280 m respectively. Find minimum height of signal required at B so that line of sight may not pass near the ground than 2 m. The intervening ground has an elevation of 200 m.

12 marks KTU Dec 2018

2. The following consecutive readings were taken with a dumpy level at 20 m intervals.

1.535, 2.020, 2.720, 2.965, 3.015, 2.625, 1.620, 1.895, 2.320, 2.710, 1.960, 2.34. The instrument was shifted after the 4^{th}, 7^{th} and 9^{th} readings. Reduced level of first point was 120 m. Calculate the reduced level of all stations and Find the gradient of the line connecting first and last points. 12 marks KTU may 2019

3. The following consecutive readings were taken with a level and a 4m leveling staff on a continuously sloping ground at common intervals of 30m. 8.855 (on A), 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845 (on B).
The RL of A was 380.500m. Make entries in a level field book and apply the usualchecks. Determine the gradient. 12 marks KTU may 2018

4(a). Write short notes on simple levelling & differential levelling with neat sketches
(b) Differentiate between profile levelling & cross sectioning?
(c) Explain reciprocal leveling 15 marks KTU may 2018

5. (a). What are the uses of contours?
(b). What are the temporary adjustments of a dumpy level ? 10 marks KTU may 2018
6.a. Define i) Contour ii) contour Interval iii) Contour Gradient iv) Horizontal Equivalent.
b. Explain the factors affecting the choice of contour interval. 10 marks KTU Dec 2018

MODULE 3

1(a) Briefly explain any two methods for computation of area 6 marks KTU may 2018
(b) A series of offsets were taken from a chain line to a curved boundary at 15 m intervals in the following order. 0, 2.65 , 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m. Compute the area enclosed between the ordinates using
(1) average ordinate rule
(2) trapezoidal rule
(3) Simpson's one third rule 12 marks KTU Dec 2018

2. What is Mass Haul diagram? What are the characteristics and discuss its uses?
8 marks KTU Dec 2018

3. A road embankment is 8 m wide and 200 m in length, at the formation level, with a side slope of 1.5:1. The embankment has a rising gradient of 1 in 100. The ground levels are given below. The formation level of zero chainage is 166 m. Calculate the volume of earthwork using end area formula and prismoidal formula. 12 marks KTU may 2018

Distance m)	0	50	100	150	200
R.L (m)	164.5	165.2	166.8	167	167.2

4. a) Define mass diagram. What are its uses? 5 marks KTU Dec 2018

b) Explain the different steps in triangulation survey. 10 marks KTU may 2018

5. a) Explain prismoidal rule for calculating volume of a plot. 5 marks KTU may 2019

b) A railway embankment is 10 m wide with side slope 1.5 (H) : 1 (V). Assuming the ground to be levelled in a direction transverse to centre line, calculate the volume contained in a length of 120 m, the centre height at 20 m interval being in metres 2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5 using trapezoidal and prismoidal formulae. 12 marks KTU may 2019

6. Volume of earth work is to be calculated for a railway embankment 12m wide with side slope 1.5:1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a 180m length, the centre heights at 30m intervals in meters as 0.70,1.20,1.75,1.45,1.20,0.95,0.65 using a) prismoidal rule and b) trapezoidal rule.

10 marks KTU Dec 2018

7. a. List the temporary adjustments of a theodolite. 5 marks KTU may 2018

c) Explain the horizontal angle measurement procedure. 6 marks KTU may 2018

MODULE 4

1.Two triangulation stations A and B are 60 km apart and have elevation 240 m and 280 m respectively. Find minimum height of signal required at B so that line of sight may not pass near the ground than 2 m. The intervening ground has an elevation of 200 m.

10 marks KTU Dec 2018

2. The elevation of two triangulation stations A and B, 100 km apart, are 180 m and 450 m respectively. The intervening obstruction situated at C, 75 km from A, has an elevation of 259 m. Ascertain if A and B are intervisible. If not, by how much B should be raised so that the line of sight must nowhere be less than 3 m above the surface of the ground, assuming A as the ground station. 10 marks KTU May 2018

(a) What is meant by eccentricity of signal? How would you correct the observation when made upon an eccentric signal? 8 marks KTU Dec 2018

3. Discuss the classification of triangulation figures?

(b) Explain the term strength of figure? 10 marks KTU may 2018

4 .(a)Write short notes on intervisibility of triangulation stations?

(b) What are the factors to be considered while selecting triangulation stations?

12 marks KTU Dec 2018

5. (a) Write short notes towers and signals 6 marks KTU Dec 2017

(b) What are satellite stations and Reduction to centre? 10 marks KTU Dec 2017

6. (a)What is mean by triangulation adjustment? Explain the different conditions and cases with sketches.

(b)What are well conditioned and ill conditioned triangles? 8 marks KTU Dec 2017

7. Explain the steps in ascertaining the intervisibility between triangulation stations.

8 marks KTU May 2018

8. List the factors which determine the inter-visibility between triangulation stations.

8 marks KTU Dec 2018

MODULE 5

1. Write short note on weight of an observation (5)

b) Explain the principle of least squares. (5)

c) Explain the principle of EDM measurement. (5) 15 marks KTU Dec 2018

2.) The following are the mean values observed in the measurement of three angles

A, B, C at one station, Calculate the most probable value.

$A = 76^0 42' 46.2''$	weight 4
$A+B = 134^0 36' 32.6''$	weight 3
$B+C = 185^0 35' 24.8''$	weight 2
$A+B+C = 262^0 18' 10.4''$	weight 1.

10 marks KTU May 2018

3. Form the normal equation for x, y, z in the following equation

3x+3y+z-4=0	weight 2
x+2y+2z-6=0	weight 3
5x+y+4z-21=0	weight 1

10 marks KTU May 2018

4. State the laws of weights with examples. 6 marks KTU Dec 2018

5. Determine the most probable values of A, B and C of a triangle ABC from the following measurements.

A=63º 54_ 40_ weight 1

B=75º 34_ 29_ weight 2

C= 40º 30_ 56_ weight 1 8 marks KTU Dec 2018

6. What is a true value? What is most probable value?` 8 marks KTU Dec 2018

7. Find the most probable values of the angles A, B and C from the following observations at a station P using method of differences.

A = 38o 25' 20" wt.1

B = 32o 36" 12" wt.1

A +B = 71o 01" 29" wt .2

A + B+ C = 119 o 10" 43" wt.1

B + C = 80o 45" 28 wt.2 12 marks KTU May 2019

8. Form the normal equation for x, y, z in the following equations

a. $3x+3y+z-4 = 0$,

b. $x+2y+z-2 = 0$

c. $5x+y+4z-21 = 0$ 10 marks KTU May 2018

Also form the normal equation, if weights of the equations are 2, 3 and 1 respectively.

MODULE 6

1. Define celestial horizon, hour angle, Zenith, Nadir, celestial equator.10 marks KTU May 2018

2. Explain the operation of total station. 10 marks KTU May 2018

3 a) Explain different types of EDM instruments.

b. Which are the different types of modulation of electromagnetic waves?

8 marks KTU Dec 2017

4a) What is EDM? Discuss the principles of EDM?

(b) What is electromagnetic wave?

(c) Define "Geodimeter" 12 marks KTU May 2019

5. (a) Define Total Station .

(b) What are the basic principles of Total Station?

(c) List out the total station Instruments 12 marks KTU Dec 2018

6. a) Write the parts of the Total Station?

(b) Explain in detail about Electromagnetic Spectrum and its applications

(c)Explain in detail about the different types of EDM 12 marks KTU Dec 2017

7 (a) Why phase comparison and modulation is preferred over time measurement in EDM

(b) Explain in detail about the sources of errors in Total station and EDM.

10 marks KTU May 2019

8. a) Explain in detail about the fundamental measurements of the Total Station.

b) Explain the working principle of "Tellurometer" 10 marks KTU Dec 2018

9 a) Explain the working principle of "Geodimeter '"

(b) Explain the working principle of "Wild Distomats" 10 marks KTU Dec 2017

10 a). Explain in detail about the properties of electromagnetic waves. How are they useful in measuring distances

b) What are the advantages of using Total station survey 15 marks KTU May 2018

11 a) Briefly explain the field procedure of Total station survey for co ordinate determination

b) Explain the steps to be followed for the set up of a total station over a point during field work. 20 marks KTU Dec 2018