मितिः २०८१/०१/०७

सूचना

इ.अ.सं. विद्यापरिषद्को निर्णय अनुसार प्राप्त Detail Syllabus को अधिनमा रहि, यस महाशाखाद्वारा संचालन गरिने स्नातक तह (BE/BAR) प्रथम बर्ष प्रथम खण्ड (२०८० ब्याच) को नयाँ पाठ्यक्रम अनुसार नमुना प्रश्नपत्र तयार गरि शिक्षक तथा बिद्यार्थीहरुको जानकारीका लागि प्रकाशित गरिएको छ ।

सहायक डीन

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.		New Course	
Level	BE	Full Marks	30
Programme	BAG	Pass Marks	12
Year / Part	I / I	Time	1.5 hrs.

Subject: - Agricultural Engineering & Sustainable Development (*AE 101*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. a. What are the objectives of Sustainable Development? (3)
   b. Describe the benefit of Conservation Agriculture and Precision Agriculture. (3)
2. a. Illustrate the concept of Organic Agriculture and Climate Smart Agriculture. (1.5+1.5)
   b. What are the importance of Sustainable Water Management in Nepal? (3)
3. a. Why energy efficient practices are necessary for the fundamental shift in agriculture? (3)
   b. Describe the necessity of Integrated Watershed Management Plan for sustainable development. (3)
4. a. Illustrate the role of farm machinery for sustainable development. (3)
   b. What are the impacts of Post-Harvest losses in Agriculture? (3)
5. Write Short Notes on: (Any Four) (1.5x4)
   a. Hybrid system in Energy
   b. Permaculture
   c. Soil Erosion and its conservation practices
   d. Evolution of farm machinery
   e. Component of Precision Agriculture

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.		**New Course**	
Level	BE	**Full Marks**	60
Programme	BAR	**Pass Marks**	24
Year / Part	I / I	**Time**	3 hrs.

Subject: -**Building Material I (*AR 103*)**

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **_All_** questions.
✓ The figures in the margin indicate **_Full Marks_**.
✓ Assume suitable data if necessary.

1. a. Describe the qualities of a good stone and its preservation technique. (3+3)
   b. What is meant by dressing of stones? Explain the process of quarrying by blasting. (3+3)

2. Explain briefly how the following test for bricks is carried out. (4+4)
   i. Water absorption
   ii. Compressive strength

3. Write down the properties and uses of lime. What do you understand by bulking of sand (4+4)

4. Discuss about the test of good cement. Describe different kinds of cement and their uses (4+4)

5. What is the workability of concrete? What is guniting of concrete and whyis itneeded. (4+4)

6. Write short notes on: (ANY FOUR) (4X4)

   a) Need of building material study in architecture and engineering
   b) Storage of cement.
   c) Bulking of sand
   d) Quality control of concrete
   e) Importance of market survey

Subject: -Mathematics for Architecture I (*SH 104*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt ___All___ questions.
✓ The figures in the margin indicate ___Full Marks___.
✓ Assume suitable data if necessary.

1. (a) Find the equation of ellipse whose foci are $(-2,4)$ and $(4,4)$ with length of major axis 10. Also, find its's eccentricity. [2]

   (b) Describe and sketch the conic $¿\dfrac{3}{1+\sin\theta}$. [2]

2. Evaluate the limit: $\lim\limits_{x\to\infty} x^3 e^{-x^2}$ [2]

3. Evaluate the following integrals

   a) $\displaystyle\int_0^{\pi/2} \dfrac{\sqrt{\cot x}}{1+\sqrt{\cot x}}\,dx$ [2]

   b) $\displaystyle\int_0^1 \dfrac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx$ [2]

   c $¿\displaystyle\int_0^1 \dfrac{x^6}{\sqrt{1-x^2}}\,dx$, using gamma function. [2]

4. Find the point where the line joining the points $(2,1,3)\wedge(4,-2,5)$ cuts the plane $2x+y-z-3=0.$ [2]

5. a) For $u=\log\left(x^3+y^3+z^3-3xyz\right)$, find $\left(\dfrac{\partial}{\partial x}+\dfrac{\partial}{\partial y}+\dfrac{\partial}{\partial z}\right)^2 u.$ [2]

   b) For the function $\cos u = \dfrac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}}$, prove $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=0.$ [2]

6. Evaluate the following

   a) $\displaystyle\iint_R x^2 y^2\,dxdy$ over the region $x^2+y^2\le 1$. [2]

   b) $\displaystyle\int_0^a \int_0^{\sqrt{a^2-x^2}} e^{-(x^2+y^2)}\,dy\,dx$, by changing into polar. [2]

   c) $\displaystyle\int_0^1\int_0^1\int_0^1 \left(x^2+y^2+z^2\right)dxdy\,dz$. [2]

7. Derive the standard equation of a hyperbola. [4]

8. Find all possible asymptotes to the curve
   $4x^3-3xy^2-y^3+2x^2-xy-y^2-1=0.$ [4]

9. A conical water tank is being filled with water at the rate of 3 cm^3/sec. If the height and radius of the base of the cone are 10 cm and 5cm respectively, how fast the water level rising when the water level is 4cm? [4]

10. Evaluate $\int\limits_{0}^{a} x^3 (a^2 - x^2)^{5/2} dx$, using beta and gamma function. [4]

11. Apply the integral to find the centroid of the region bounded by $y = x^2$ and $y = x$. [4]

OR

A vertical triangular plate is submerged in water as shown in the figure. Find the total hydrostatic force on one side of the triangular plate (take ✕ g = ♥ = 62.4 lb/ft³)
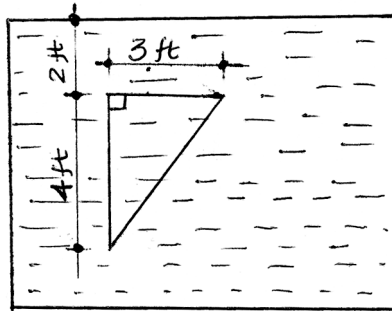
12. Find the center and radius of the circle $x^2 + y^2 + z^2 + 12x - 12y - 16z + 111 = 0$, $2x + 2y + z = 17$ [4]

13. Find the equation of right circular cone with vertex at $(1, -2, -1)$ and the axis the line $\dfrac{x-1}{3} = \dfrac{y+4}{2} = \dfrac{z+1}{5}$ and semi-vertical angle 60°. [4]

14. Find the extreme value of the function $u(x, y) = xy^2$, under the condition $x + y = 1$. [4]

15. Using double integral find the area of the curve $r = a(1 + cos\theta)$. [4]

OR

Find the volume of the sphere $x^2 + y^2 + z^2 = a^2$ by using triple integration

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.		**(New Course)**	
Level	BE	**Full Marks**	30
Programme	BAR	**Pass Marks**	12
Year / Part	I / I	**Time**	1.5 hrs.

Subject*: -* Introduction to Architecture I (*AR102*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **_All_** questions.
✓ The figures in the margin indicate **_Full Marks_**.
✓ Assume suitable data if necessary.

1. Define the built environment. Discuss in detail the components of a built environment, with examples. [2+5]

2. How does the site's geographical location influence its ecological characteristics? [7]

3. Choose a building and provide a brief discussion on its social, and cultural contexts. [4+3]

4. Write brief notes on: (Any three) [3x3]
    a. Technological advancements in Architecture
    b. Architecture is a profession in the public domain
    c. Architects interact with other professionals in the field
    d. Building bye-laws

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Subject*: -Engineering Mathematics I (SH 101)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **_All_** questions.
- ✓ The figures in the margin indicate **_Full Marks_**.
- ✓ Assume suitable data if necessary.

1. (a) Evaluate $\lim\limits_{x \to 0} \left(\dfrac{\tan x - x}{x^2 \tan x} \right)$. [2]

   (b) Expand the function $\sinh x$ in Maclaurin's series up to four terms. [2]

   (c) Show that the curvature at any point of the circle $x^2 + y^2 = a^2$ is constant. [2]

2. (a) Evaluate $\displaystyle\int_{-1}^{1} \dfrac{dx}{x^3}$. [2]

   (b) Apply beta gamma functions to evaluate $\displaystyle\int_{0}^{a} x^2 \left(a^2 - x^2\right)^{\frac{3}{2}} dx$. [2]

   (c) Find the volume of the paraboloid formed by revolving the region bounded by the parabola $y^2 = 4ax$, $x = a$ about x-axis. [2]

3. (a) Find the integrating factor of the differential equation $\dfrac{dy}{dx} = \dfrac{1}{x + y + 1}$. [2]

   (b) State Clairaut's differential equation and find its general solution. [2]

   (c) Find the particular integral of $\left(D^2 + 4D + 3\right) y = e^{-3x}$ where $D = \dfrac{d}{dx}$. [2]

4. Find the angle through which the axes be turned to reduce the equation $11x^2 + 4xy + 14y^2 = 5$ into one with xy term missing. [2]

5. (a) Prove that the line $\dfrac{x-3}{2} = \dfrac{y-4}{3} = \dfrac{z-5}{4}$ is parallel to the plane $4x + 4y - 5z = 0$. [2]

   (b) Find the equation of the sphere through the circle $x^2 + y^2 + z^2 - 2x + 3y + 4z - 5 = 0$, $x^2 + y^2 + z^2 - 3x - 4y + 5z - 6 = 0$ and passing through the point $(1, 1, 2)$. [2]

6. Find the pedal equation of the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$. [4]

7. Find the asymptotes of $(x + y)^2 (x + 2y + 2) = x + 9y - 2$. [4]

8. Apply method of differentiation under integral sign to evaluate $\int\limits_0^\infty \dfrac{e^{-kx}\sin mx}{x}\,dx$ for

$m>0$ and hence deduce that $\int\limits_0^\infty \dfrac{\sin mx}{x}\,dx=\dfrac{\pi}{2}$. [4]

OR

Apply method of integration to find the area included between the curve
$a\left(y^2-x^2\right)=x\left(x^2+y^2\right)$ and its asymptotes. [4]

9. Find the centroid of the region bounded by $y=4-x^2$ and $¿0$. [4]

10. Identify the conic $14x^2-4xy+11y^2-44x-58y+71=0$. Find its center and length of axes. [4]

11. Prove that the lines $x=\dfrac{y-2}{2}=\dfrac{z+3}{3}$ and $\dfrac{x-2}{2}=\dfrac{y-6}{3}=\dfrac{z-3}{4}$ are coplanar. Find their plane and point of intersection. [4]

12. Find the equation of a right circular cylinder whose guiding curve is the circle
$x^2+y^2+z^2-x-y-z=0$, $x+y+z=1$. [4]

13. Solve $\dfrac{dy}{dx}-y\tan x=-y^2\sec x$. [4]

OR

Solve $4yp^2-2px+y=0$, where $¿\dfrac{dy}{dx}$. [4]

14. A mass of 1 kg is attached at one end of a spring on a frictionless horizontal surface fixed at one end. The force of 6 N applied to the string stretches 1.5 m from its natural length. If the mass from the rest 1 m to the right of its equilibrium position, determine the position of mass as a function of time . [4]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

| Exam.		**New Course**	
Level	BE	Full Marks	60
Programme	BCE/BAG	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

*Subject: -***Engineering Mechanics (*CE 101*)**

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1.a) Define Engineering Mechanics. Mention the scope of Engineering Mechanics in the field of Engineering. Explain in brief about the application of equations of static equilibrium. (1+1+1)

b) Three smooth identical spheres A, B and C are placed in a rectangular channel as shown in the figure. Calculate the reaction at all contact points. (6)
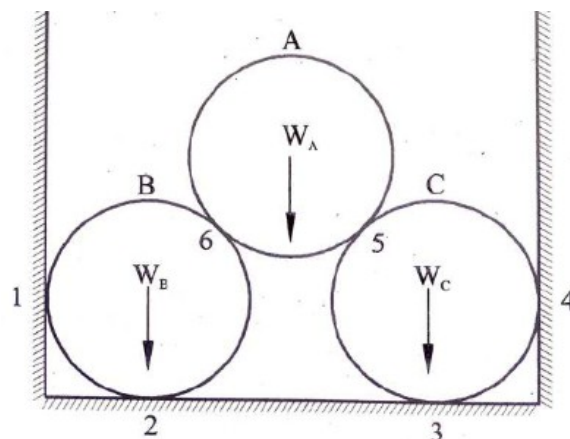

2.a) Define a couple and show that "couple is a free vector". Find the magnitude and direction of the resultant force of the given system of concurrent forces as shown in the figure below. (2+3)
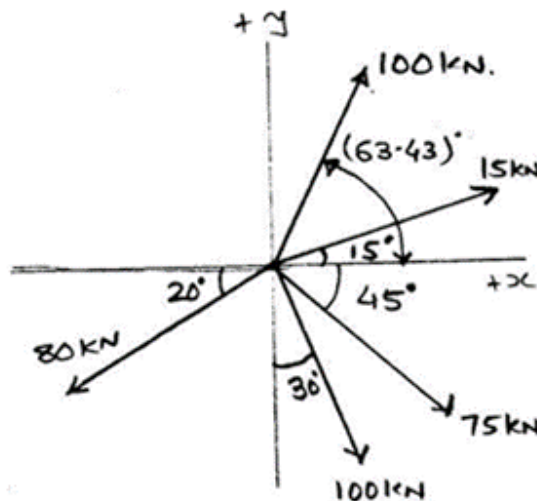
b) Define Friction and explain with suitable diagrams the different conditions of equilibrium and motion of a block. What are the applications of frictional force in our daily life? (3+1)

3.a) Mention the application of symmetricity for the analysis a plane truss. Calculate the force developed in all the members of the truss loaded as shown in figure below. (1+4)
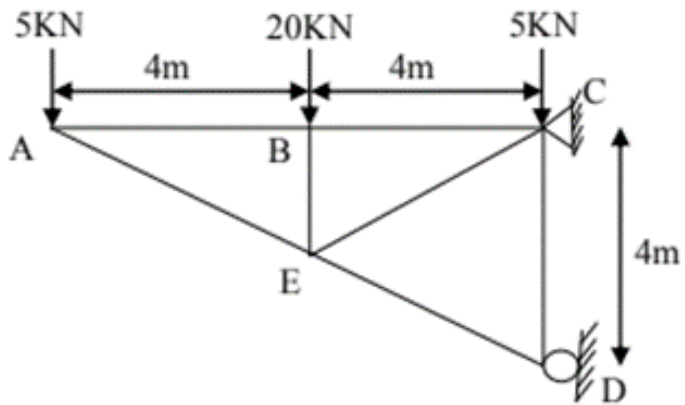

b) State and prove the parallel axis theorem for moment of inertia. Calculate the centroidal x-distance of the shaded area as shown in figure below. (2+4)
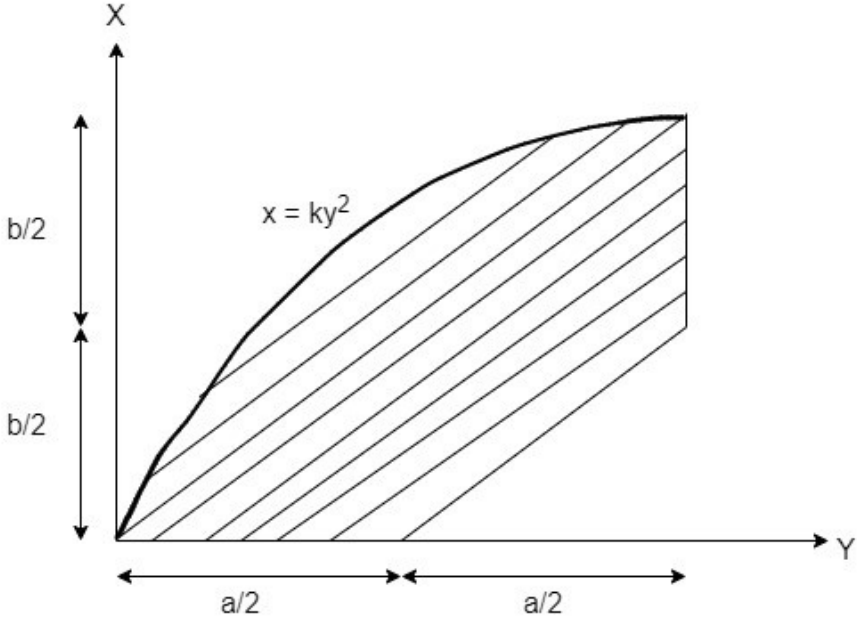

4) Explain various types of load that may occur in the structures. A Frame is loaded as shown in figure below. Draw Axial Force, Shear Force and Bending Moment Diagrams. Indicate the salient features if any. (2+12)

10 kN/m

80kN

30kNm

C

D —Internal hinge

E

F

4m

50kN ——→ B

20 kN/m

4m

—4m—

A

G

—10m—

—3m—
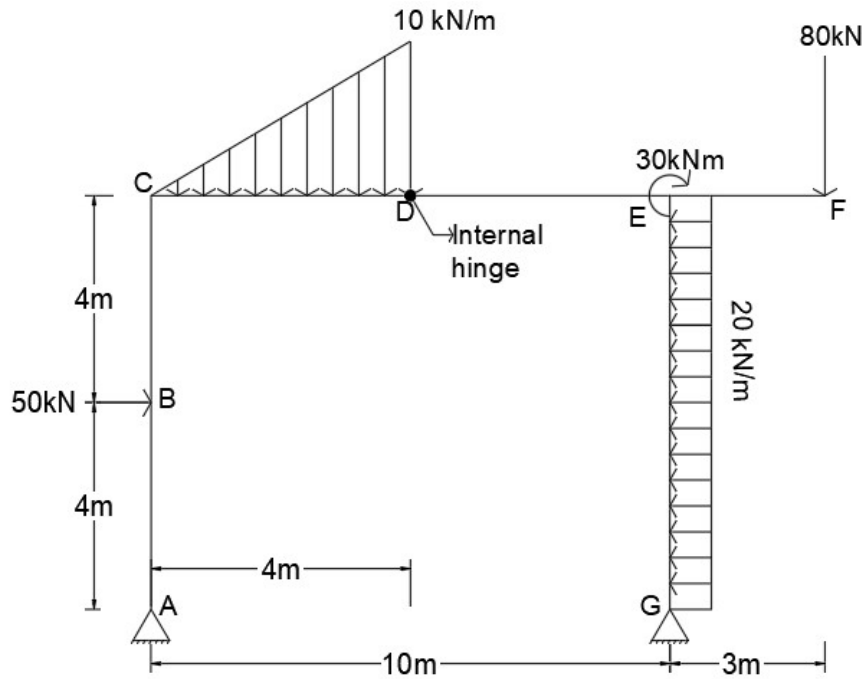
5.a) Define dependent motion of particles and deduce the expression for position, velocity and acceleration of two particles which are under dependent motion. Rotation of an arm about 'O' is defined by $\Theta=0.75t^2$ where Θ is in radians and t is in seconds. Collar B slides along the arm such that $r=1-0.3t^2$ where r is in meters. After the arm has rotated through 45°, determine a) the total velocity of the collar b) the total acceleration of the collar c) the relative acceleration of the collar with respect to the arm. (2+4)
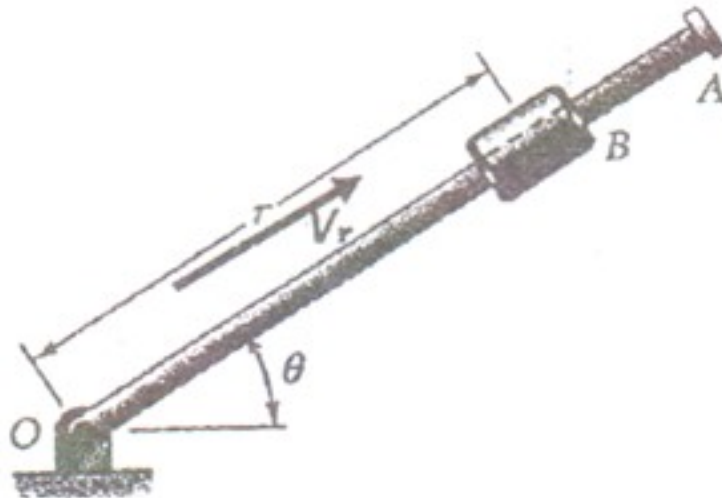
b)   List out the different types of impacts with diagrams that may occur between two particles. Two bodies A and B are connected by an inextensible and weight less cord as shown in figure. Initially the bodies are at rest. Dynamic coefficient of friction between body A and inclined surface is o.40. Compute the velocity of the bodies at any time t before the body A has reached at the end of the inclined surface.

   (1+4)
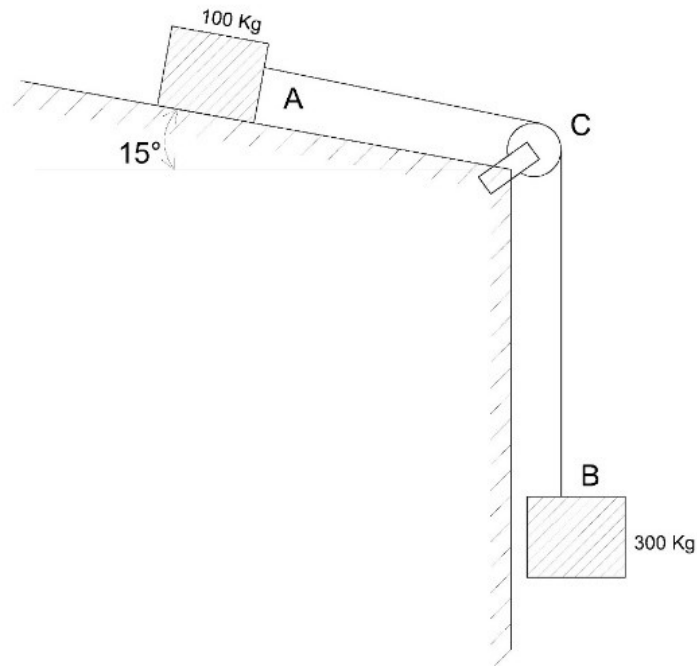
6)   Deduce the expression for Kinetic energy in translational and rotational motion of the rigid body.The center of double gear has a velocity and acceleration to the right of 1.2 m/s and 3 m/s² respectively. The lower rack is stationary. Determine a) the angular acceleration of the gear, b) the acceleration of points B, C and D.   (1+1+4)
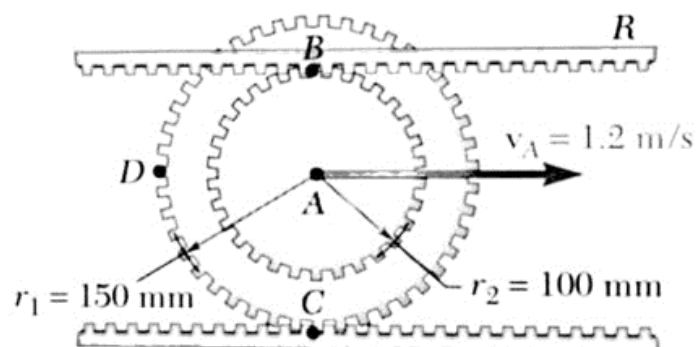

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.		New Course	
Level	BE	Full Marks	60
Programme	BCE/BCH	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

**Subject**: - Basic Electrical and Electronics Engineering (*EE103*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ Assume suitable data if necessary.

1. Explain why household electrical wiring is typically arranged in a parallel configuration rather than a series configuration. Use nodal analysis to find the current and voltage drop through 5 Ohm Resistor of the circuit shown in Fig. below. [2+4]
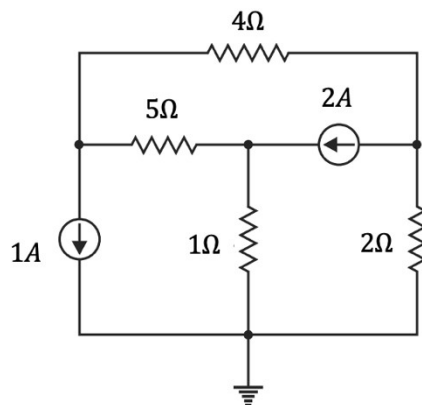
2. Two coils having impedance Z1 and Z2 are connected in series across a 230 V, 50 Hz power supply as shown in Fig. The voltage drop across Z1 is equal to 120 $\angle 30^0$ V. Calculate the value of Z2 and C_2. [6]

3. Three equal impedances each of $10 \angle 60°$ ohms are connected in star across 3-phase, 400 volts 50 Hz supply. Calculate [6]
   i. Line voltage and phase voltage
   ii. Line current and phase current
   iii. Power factor and active power consumed

4. Explain the no-load and loaded operation of transformer with equivalent circuit and phasor diagram. [6]

5. Define rotating magnetic field. A 50 Hz, 8 pole induction motor has full load slip of 4%. The resistance/phase is 0.01 Ohms and standstill reactance per phase is 0.1 ohm. Find the ratio of maximum to full load torque and the speed at which maximum torque occurs. [2+4]

6. Derive emf equation of synchronous generator. A four-pole dc machine having wave-wound armature winding has 51 slots, each slot containing 20 conductors. Calculate the back emf generated in the armature when driven at 1500 rpm. Assume flux per pole to be 0.5 mWb. [3+3]

7. Why transistor is called Bipolar Junction Transistor? Explain the operation of the npn transistor in the active mode. [6]

8. Find the Zener current from the given network when $R_L = 3$ kΩ and $V_0 = 10$ V.   [6]
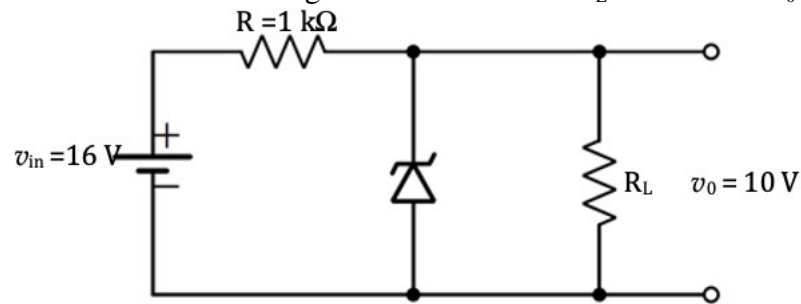
9. Compare and contrast Miniature Circuit Breakers (MCBs) and Molded Case   [6]
    Circuit Breakers (MCCBs).

10. Write Short notes on (Any Two):   [2*3=6]
    i.   PN junction diode
    ii.   Distribution Box
    iii. Types of Wires

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Exam.		New Course	
Level	BE	Full Marks	60
Programme	All Except BAR	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

Subject: - : Computer Programming (*CT 101*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Define computer program. Write an algorithm and draw a flowchart to calculate the HCF of two numbers entered by the user. [Hint: HCF is a number that divides both the numbers exactly. [1+4]

2. Why do we need type casting in C? Explain Header files & Library functions in C with an example [2+3]

3. Define Operator in C. Differentiate between pre and post-increment operators in C with proper examples. [1+3]

4. How formatted outputs are different from unformatted outputs [3]

5.a) Differentiate between counter-controlled & sentinel-controlled loops in C. Write a program in C to display the Armstrong numbers between given ranges P and Q. [Hint: An Armstrong number is a number that is equal to the sum of digits raised to the power total number of digits in the number, e.g. $1634 = 1^4+6^4+3^4+4^4 = 1+1296+81+256 = 1634$] [2+5]

   b) Display the following pattern using the concept of nested loop in C. [3]

   5
   44
   333
   2222
   11111

6.a) What is an array size? Write a program to read values of matrix of size MxN and display the second largest element. [1+5]

   b) Write a program to find the length of a string without using string handling function. [3]

   c) What is a null pointer? Differentiate between referencing and differencing in pointer. [1+2]

7. Differentiate between auto and static storage classes? Write a program in C to find the sum of N even natural numbers divisible by 5. The value of N must be taken from the main

function and passed to a function named findsum that calculates the sum and the sum must be displayed from the main. [2+5]

8. What is the need of nested structure? Write a program to read and store campus details such as name, address, established_year, and no_of_students in a structure. Input data for 4 campuses. Pass the structure variable to a function and print the names of the campus which has more than 1000 students. [1+5]

9. Write a program to read any string and write it to a file. Read the contents from the file and separate the uppercase and lowercase letters into two different files. [5]

10. Differentiate between procedural-oriented vs object-oriented paradigm. [3]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.		New Course	
Level	BE	Full Marks	60
Programme	BCE/BME/ BAG/BCH	Pass Marks	24
Year / Part	I / I	Time	3.0 hrs.

Subject: -Engineering Chemistry (*SH103*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. What is an electrochemical cell? For the galvanic cell, $Zn(s)/Zn^{++}(aq\ 0.100M)//Pb^{++}(aq\text{xM})/Pb(s)$, the measured potential is +0.45V at 25°C. Calculate the concentration of $Pb^{++}(aq)$. The standard cell potential is +0.64V. [1+4]

OR,

What is over potential? Explain about it with suitable example. [2+3]

2.(a) Addition of small amount of acid or base does not change the pH of a solution having equimolar mixture of acetic acid and sodium acetate. Explain the mechanism. [2]

(b) A student wants to prepare 1 litre of solution buffered at pH 10. How many grams of ammonium chloride has to be added into 1 litre of 0.25 M ammonia to make such a buffer? (pk_b for ammonia is 4.74). [3]

3. Briefly discuss any four properties required for a catalytic material for industrial applications. Name any two catalytic materials for degradation of dyes in wastewater. [4+1]

4. For the complex ion $[Fe(CN)_6]^{4-}$, [2+1+1+1]
    (a) Predict the shape on the basis of valence bond theory.
    (b) Predict magnetic behavior.
    (c) Write IUPAC name of the complex ion.
    (d) Write the formula of the following coordination compounds;
        i. Tetrahydroxoplatinate(II) ion
        ii. Tris(ethylenediammine)chromium(III) chloride

5. (a) Discuss the crystal field splitting of d^6 orbitals in octahedral complexes. [3]

    (b) What are rare earth elements? Write the importance of cerium. [1+1]

6. What is the principle of Infra-red spectroscopy? Write its applications. [3+2]

OR,

Briefly discuss principle of UV-visible spectroscopy and point out its applications.

7. a) What is the motif of green chemistry? Mention any four principles of green chemistry. [1+4]

    b) Briefly explain biological oxygen demand and chemical oxygen demand and their consequences with reference to water pollution. [5]

    c) What are addition polymers? Briefly explain mechanism of free radical polymerization. [1+4]

8. What are silicone oils, silicone rubbers and silicone resins, chemically? Mention their applications in engineering. [3+2]

OR,

(a) Write the preparation of polyurethane. What are applications of polyurethane? [1.5+1.5]

(b) How does natural polymer differ from synthetic polymers? Give any two applications of a natural polymer in engineering. [1+1]

9. What are nanomaterials? Briefly explain 0D, 1D, 2D and 3D nanomaterials. [1+4]

10. (a) Write the preparation any one explosive and mention its uses [2]

(b) What are lubricants? What the importance of solid lubricant in engineering? [3]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.		New Course	
Level	BE	**Full Marks**	30
Programme	BCE	**Pass Marks**	12
Year / Part	I / I	**Time**	1.5 hrs

Subject: - Civil Engineering Material (*CE 103*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ Assume suitable data if necessary.

1. Explain how the thermal properties effect in selection of materials in some construction projects with examples. (2)

2. Enlist the selection criteria of a good quarry site for a building stone. (3)

3. Write in brief about the manufacturing process of local brick. Define about properties of roof tiles. (2+1)

4. Define slaking of lime? Write a short note types of lime. (0.5+1.5)

5. Difference between wet and dry process of cement manufacturing. Define role of gypsum and pozzolana when added in cement. (3+1)

6. Explain in steps about the hand mixing process for preparation of cement mortar. (2)

7. Define about air seasoning and kiln seasoning. Write a short note on bamboo (1.5+1.5)

8. Difference between pig iron and cast iron. Write short note on Aluminum and surface hardening. (2+1+1)

9. Write about the functions of the paint and varnish. Write down the process of application of varnish. (1.5+1.5)

10. Write about the properties and use of bitumen. Write in short about glass and rubber with their uses. (2+2)

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Exam.		New Course	
Level	BE	**Full Marks**	30
Programme	BCE	**Pass Marks**	12
Year / Part	I / I	**Time**	1.5 hrs.

Subject: -Engineering Geology I (*CE 102*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. What is engineering geology? Discuss its importance in civil engineering. [3]

2. How earth was originated? Describe the internal structure of earth with neat sketch [2+2]

3. a. Define crystal. Discuss the different symmetry of crystal. [1+2]

   b. Mention the different field identification criteria of igneous rock with its IUGS classification. [1+2]

4. a. Define attitude of rock. Differentiate between foliation plane and bedding plane. [2+2]

   b. Describe the geometric classification of joints. [3]

5. a. Describe the different landform produced by glaciers. [3]

   b. Can we predict volcano? Discuss the different landform produced by volcano. [1+2]

6. Discuss the process of Himalayan evolution with its different tectonic units. [2+2]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.		New Course	
Level	BE	Full Marks	60
Programme	All except BAR	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

Subject: -Engineering Physics (*SH 102*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. (a) What is degree of freedom? [1]

   (b) Write the significance of numerical aperture of an optical fiber. [1]

   (c) Write down the relation between electric field intensity and potential gradient. [1]

   (d) Define displacement current. [1]

2. (a) A particle of mass 100gm is in oscillation in a medium having damping constant 0.05kg/s with a system of force constant 250N/m. Calculate the angular frequency for this system. [2]

   (b) Derive the Maxwell's third thermo-dynamical relation. [2]

   (c) Prove continuity equation by using Maxwell's equations. [2]

   (d) Calculate the error in the velocity for an electron if error in displacement is 1Å. [2]

3. Derive time period of oscillation of a compound pendulum in terms of equivalent length of a simple pendulum. [4]

OR

Derive the differential equation of forced oscillation and write the amplitude of forced oscillation. Explain the condition of resonance with a graph. [4]

4. A hall has dimension 10m×12m×6m, and average absorption coefficient of hall is 0.5. Calculate the (a) number of reflections of sound wave made per second in the hall and (b) reverberation time of the hall. Velocity of sound wave is 350m/s. [2+2]

5. Derive the specific heat of solid using Einstein's method and explain the result with necessary graph. [4]

OR

Derive the Vander Waal equation for real gas in terms of critical constants a and b. [4]

6. (a) Prove that in Newton's rings experiment due to reflected light, the diameter of bright ring is proportional to the square root of odd number multiple of half of wavelength. [4]

   (b) Light of wavelength 550 nm is incident normally on a grating that has 400 lines per mm. At what angle does the second order principal maximum occur? [4]

   (c) What is Nicol prism? How does it work as polarizer and analyzer? [4]

   (d) Two thin convex lenses having focal lengths 10 cm and 4 cm are coaxially separated by a distance of 5 cm. Find the equivalent focal length of the combination. Also, find the positions of principal points. [2+1+1]

7. (a) Derive the electric field due to short electric dipole at any point on equatorial line. [4]

OR

Derive the electric potential at a point due to charged disc. [4]

(b) A parallel plate capacitor of capacitance 100 pF with each of area 100 cm^2 and potential difference 50 V. If a mica of dielectric constant 5.4 is inserted between the plates, find the magnitude of (a) electric field strength in mica and (b) polarization vector. [2+2]

8. Calculate the displacement current between the capacitor plates of area 1.5×10^{-2} m^2 and rate of electric field charge is 1.5×10^{12} Vm^{-1}s^{-1}. Also, calculate the displacement current density. [2+2]

9. Define Poynting vector and prove the relation $\vec{S}=\dfrac{1}{\mu}\left(\vec{E}\times\vec{B}\right)$. [1+3]

10. Define de-Broglie wavelength. Derive the time dependent Schrodinger wave equation. [1+3]

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TRIBHUVAN UNIVERSITY
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Examination Control Division
(Sample Question)

Exam.		New Course	
Level	BE	**Full Marks**	60
Programme	BCH	**Pass Marks**	24
Year / Part	I / I	Time	3 hrs.

Subject: -Fundamentals of Thermodynamics and Heat Transfer (*ME 105*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. a) Define a polytropic process. Sketch polytropic processes with *n = 0, 1, 1.4 and ∞* on a common *P-V* diagram. Derive the mathematical expression for work transfer for an ideal gas undergoing polytropic process. (3)

   b) Explain why quality is necessary to define the state of a two phase mixture. Also derive the expression for specific volume of the pure substance in a two phase mixture in terms of quality. (3)

   c) Derive expressions for inside and outside overall heat transfer coefficients for a composite cylinder with two layers subjected to convection medium on both sidesby using electrical analogy approach. (3)

2. State and explain first law of thermodynamics for a control mass and a control mass undergoing a cyclic process. (5)

3. Define refrigerator and its COP. Explain how first law and second law of thermodynamics can be applied to analyze the performance of the refrigerator. (5)

4. Describe briefly about the Linde liquefaction process. (5)

5. A vertical piston – cylinder device shown in contains a gas at a pressure of 100 kPa. The piston has a mass of 5 kg and a diameter of 12 cm. Pressure of the gas is to be increased by placing some weights on the piston as shown in **Figure P.5**. Determine the local atmospheric pressure and the mass of the weights that will double the pressure of the gas inside the cylinder. (5)

Figure P.5

WEIGHTS

GAS
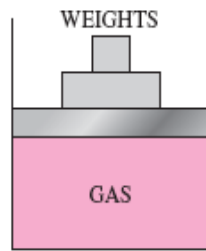
6. Water (1.5 kg) is contained in a piston cylinder device shown in **Figure** (5)
P.6 initially at a pressure of 400 kPa with a quality of 50 %. There is a heat
transfer to the system until it reaches a final temperature of $500^0 C$. It takes a
pressure of 800 kPa to lift the piston. Sketch the process on P-v and T-v
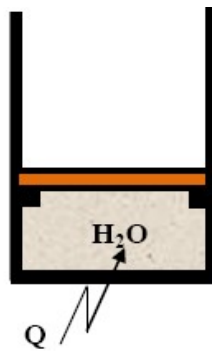diagrams and determine the total work during the processes.

H_2O

Q

Figure P.6

7. Air flows at a rate of $1.2 \, kg/s$ through a compressor, entering at $100 \, kPa$, (7)
$25^0 C$, with a velocity of $60 \, m/s$ and leaving at $500 \, kPa$, $150^0 C$, with a
velocity of $120 \, m/s$. Heat lost by the compressor to the surrounding is
estimated to be 20 kJ/kg. Calculate the power required to drive the
compressor and diameters of inlet and exhaust pipes. [Take $R = 287 \, J/kgK$
and $c_P = 1005 \, J/kgK$]

8. A rigid vessel consists of $0.4 \, kg$ of hydrogen initially at $200 \, kPa$ and $27^0 C$. (7)
Heat is transferred to the system from a reservoir at $600 \, K$ until its
temperature reaches $450 \, K$. Determine the heat transfer, the change in
entropy of hydrogen and the amount of entropy produced. [Take
$c_V = 10.183 \, kJ/kgK$]

9. The compression ratio of an ideal Otto cycle is 8.5. At the beginning of the (7)
compression stroke, air is at 100 kPa and 27°C. The pressure is doubled
during the constant volume heat addition process. Determine:

   (a) the heat added per kg of air,

   (b) the net work output per kg of air,

(c) the thermal efficiency, and

(d) the mean effective pressure.

[Take C_p = 1005 J/kgK, C_v = 718 J/kgK, R = 287 J/kgK, and γ = 1.4]

10. A steel pipe having an outside diameter of 2 cm is to be covered with two layers of insulation, each having a thickness of 1 cm. The average conductivity of one material is 5 times that of the other. Assuming that the inner and outer surface temperatures of the composite insulation are fixed, calculate by what percentage the heat transfer will be reduced when the better insulating material is next to the pipe than it is away from the pipe. (5)

Table 1: Properties of SATURATED WATER – Pressure Table

P kPa	T ⁰C	v_l m³/kg	v_{lg} m³/kg	v_g m³/kg	u_l kJ/kg	u_{lg} kJ/kg	u_g kJ/kg	h_l kJ/kg	h_{lg} kJ/kg	h_g kJ/kg	s_l kJ/kg.K	s_{lg} kJ/kg.K	s_g kJ/kg.K
350	138.89	0.001079	0.5232	0.5243	584.10	1964.8	2548.9	584.48	2147.9	2732.4	1.7278	5.2129	6.9407
375	141.33	0.001081	0.4903	0.4914	594.56	1956.7	2551.3	594.96	2140.6	2735.6	1.7531	5.1646	6.9177
400	143.64	0.001084	0.4614	0.4625	604.47	1949.0	2553.5	604.91	2133.6	2738.5	1.7770	5.1191	6.8961
425	145.84	0.001086	0.4357	0.4368	613.91	1941.7	2555.6	614.37	2126.9	2741.3	1.7996	5.0762	6.8758
750	167.79	0.001111	0.2544	0.2555	708.76	1865.8	2574.6	709.59	2056.6	2766.2	2.0203	4.6642	6.6845
800	170.44	0.001115	0.2393	0.2404	720.33	1856.3	2576.6	721.23	2047.7	2768.9	2.0464	4.6161	6.6625
850	172.97	0.001118	0.2258	0.2269	731.37	1847.1	2578.5	732.32	2039.1	2771.4	2.0712	4.5706	6.6418

Table 2: Properties of SUPERHEATED STEAM

P kPa	T ⁰C	v m³/kg	u kJ/kg	h kJ/kg	s kJ/kg.K
800	(170.44)	(0.2404)	(2576.6)	(2768.9)	(6.6625)
	400	0.3843	2959.6	3267.0	7.5713
	450	0.4139	3042.2	3373.3	7.7237
	500	0.4433	3126.1	3480.7	7.8673
	550	0.4726	3211.3	3589.4	8.0036

***

Subject: -Fundamental of Electrical and Electronics Engineering (*EX 101*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Differentiate current source with voltage sources. An aluminum wire 7.5 m long is connected in parallel with a copper wire 6 m long. When a current of 5 A is passed through the combination, it is found that the current in the aluminum wire is 3 A. The diameter of the aluminum wire is 1 mm. Determine the diameter of the copper wire. The resistivity of copper is 0.017 $\mu\Omega$-m; that of aluminum is 0.028 $\mu\Omega$-m. [2+4]

2. Derive the condition for maximum power transfer in a circuit. [3]

3 A certain waveform has a form factor of 1.2 and a peak factor of 1.5. If the maximum value is 100, find the r.m.s and average values. [3]

4. Explain what a waveform is in the context of electrical signals and discuss its key characteristics. [3]

5. The waveforms of the voltage and current of a circuit are given by,
e= 120 sin (314 t) and i = 10 sin (314 t + π/6)
Calculate the values of the resistance, capacitance which are connected in series to form the circuit. Also, calculate power factor and power consumed by the circuit. [6]

6. Three identical coils, each having resistance of 10 Ω and inductance of 0.03 H are connected in delta across a three-phase, 400 V, 50 Hz supply. Calculate: 1) The phase current, ii) The line current, iii) The total power consumed, iv) p.f. and pf. angle. Draw a neat phasor diagram. [6]

7. Explain IV characteristics of PN junction diode in detail. [4]

8. A Zener regulator has 9 volt Zener voltage with variable load resistance as shown: [4]
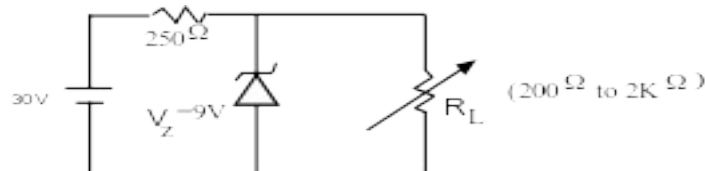
Calculate:
   a. Current through the series resistance
   b. Maximum and minimum load current.
   c. Maximum and minimum zener current
   d. Maximum and minimum power dissipation in the zener diode.

9. Sketch the output waveform for given circuit and input waveform [4]
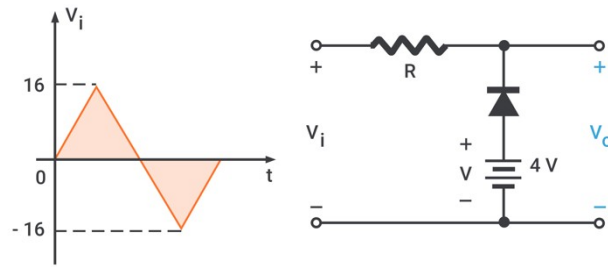
10 Explain the working principle and current flow mechanism of npn transistor with necessary diagrams. [4]

11 What is biasing? Explain different types of biasing in BJT. [4]

12 Explain the construction and working of n channel depletion type MOSFETwith the help of drain and transfer characteristics curve [4]

13. a) Explain OP-AMP as an integrator and adder (summing circuit). [4]

b) Draw the circuit diagram of Phase shift Oscillator and derive the frequency of oscillation. [5]

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*Subject: -*Engineering Drawing (*ME101*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Draw an ellipse with major axis and minor axis of 80 mm and 50 mm respectively. [3]

2. Top view of a straight line **AB** measures 50 mm. The line is parallel to the VP and inclined to the HP at 30^0. Its end **A** is 10 mm above the HP and 15 mm in front of VP. Draw its projections and determine its true length. [3]

Or

Orthographic projection of a line **AB** is given in **Figure P.2**. Determine its true length and inclination with the HP. [3]

3. Pictorial view of an object is shown in **Figure P.3**. Draw (with dimension) its **(a)** sectional front view and **(b)** top view. [9]
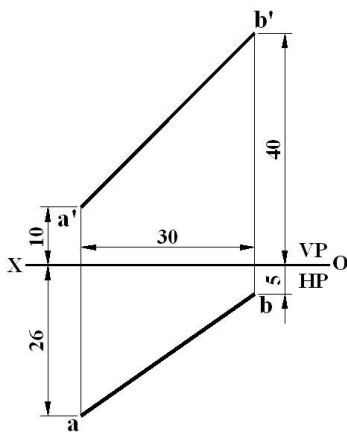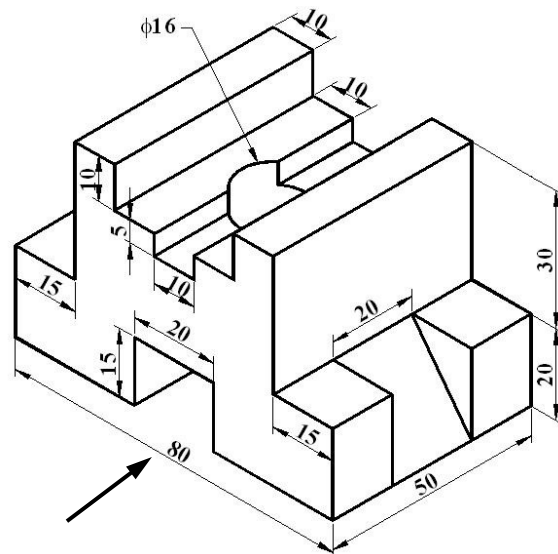
| Figure P.2 | Figure P.3 |

4. Draw front and top viewsof a right solid cut by a plane as shown in **Figure P.4(a)**. Find the true shape of the section. Then develop lateral surface of the solid. [8]

Or

Draw the lines of intersection of the surfaces of geometrical solids shown in **Figure P.4(b)**. Also develop the lateral surface of the vertical solid. [8]

5. Draw isometric drawing from the given orthographic views as shown in **Figure P.5(a)**. [7]

Or

Draw oblique drawing from the given orthographic views as shown in **Figure** [7]

P.5(b).
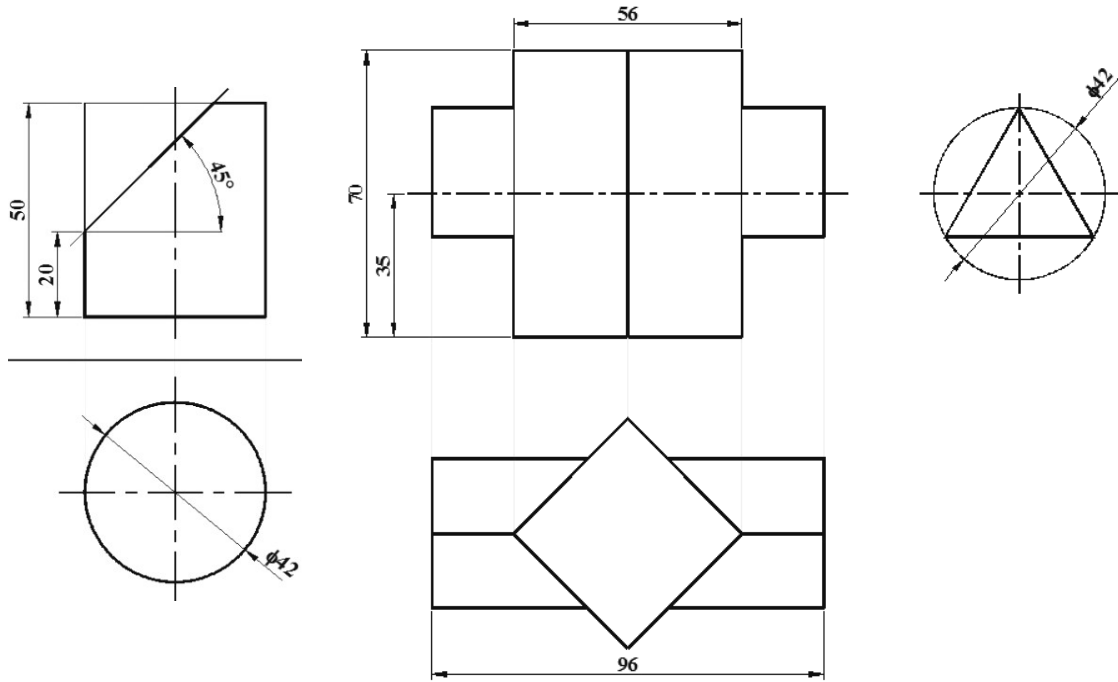
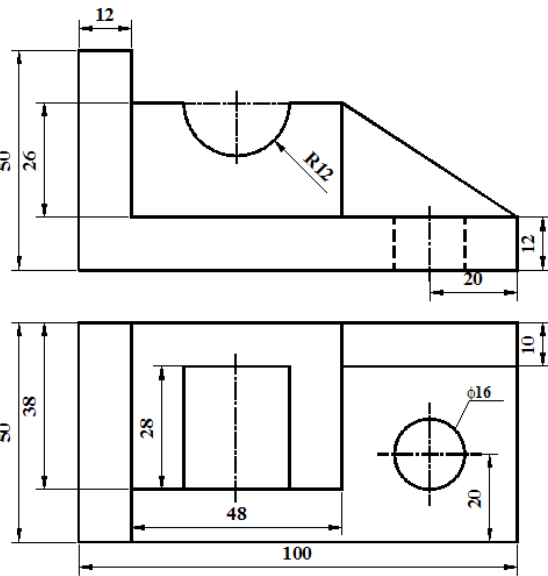

**Figure P.4(a)**

Figure P.4(b)
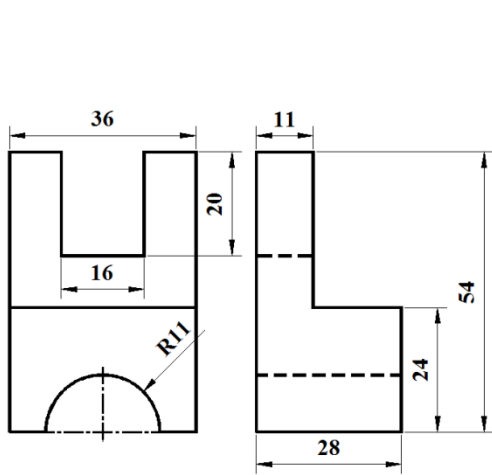
Figure P.5(a)

Figure P.5(b)

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Examination Control Division
(Sample Question)

Exam.		**New Course**	
Level	BE	**Full Marks**	60
Programme	BEL	**Pass Marks**	24
Year / Part	I / I	**Time**	3 hrs.

Subject: -Applied Mechanics (*CE 104*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **_All_** questions.
✓ The figures in the margin indicate **_Full Marks_**.
✓ Assume suitable data if necessary.

1. a) Define Mechanics and explain its basic principles. (2)
   b) Find out the magnitude, direction and line of action of the resultant force of the given system of forces as shown in figure below. (3)
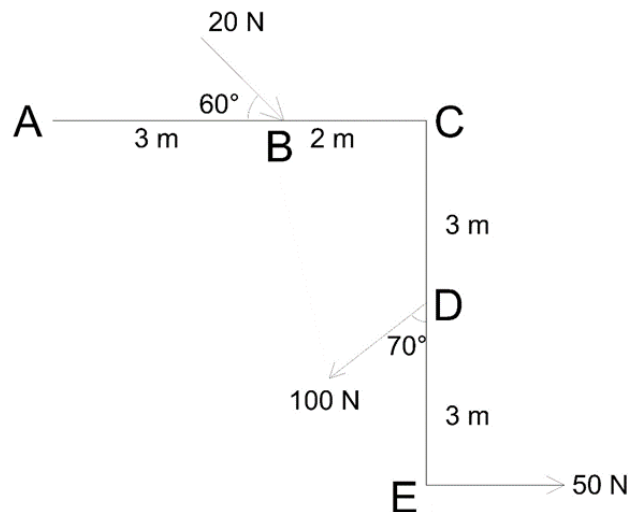
2. a) Determine the reaction at all contact points and the force developed in the cable BA which holds a post BC of 5m length from sliding as shown in figure. The post has mass of 50 kg. Assume all surfaces are smooth. (5)
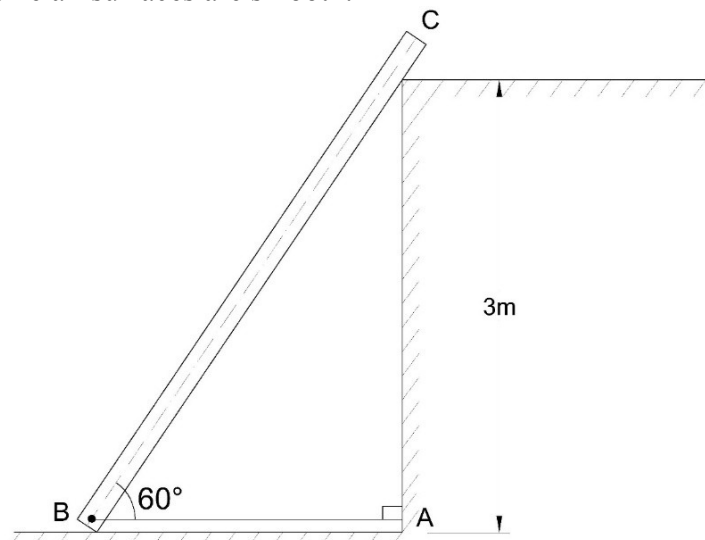

   b) Provide suitable examples to show the use of "Principle of transmissibility" and "Resolution of force and a couple". Find the resultant of force couple system about point A as shown in figure below. Where F_1 = 600 kN and F_2 =800 kN. (2+6)
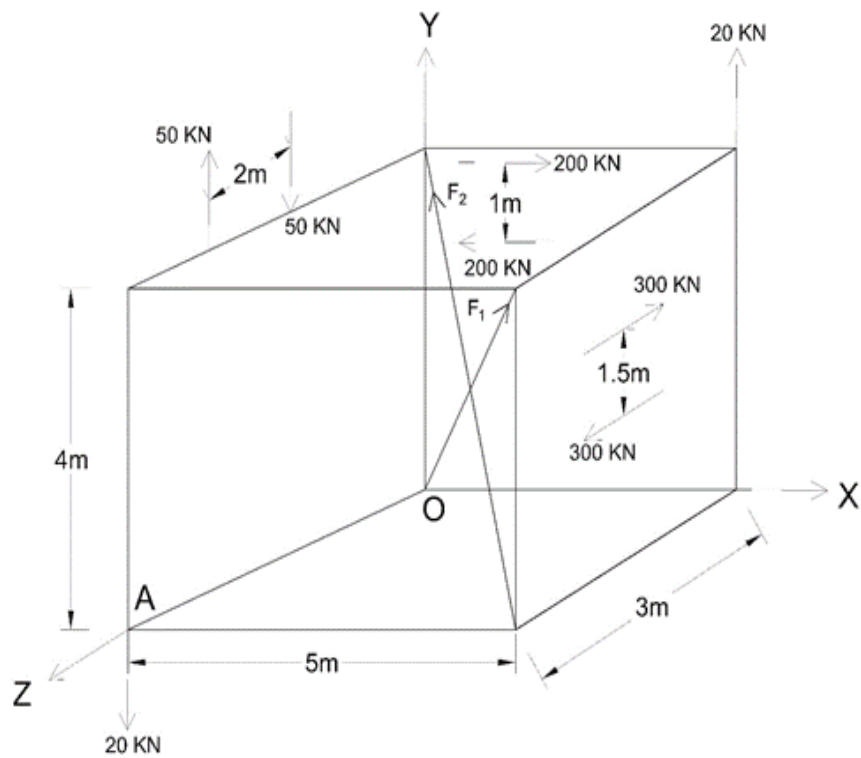
3.a) What are the basic laws of dry friction? (2)

b) A block of weight W1= 1200 N rests on a horizontal surface and supports on top of it another block of weight W2= 300 N as shown in figure. The block W2 is attached to a vertical wall by the string. Find the magnitude of the horizontal force P, applied to the lower block for just motion of it. The coefficient of static friction for all contact surfaces is 0.35. (4)
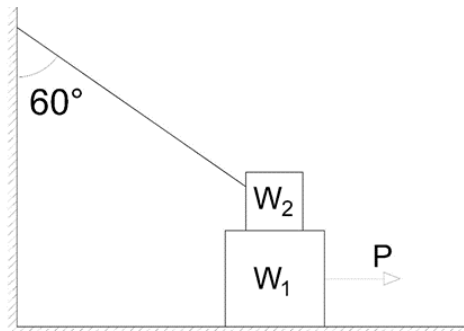

4.a). "Assembly of individual element only is not sufficient to form a structure" Do you agree with the statement. Explain. Draw shear force and bending moment diagram for the beam shown below. (2+4)
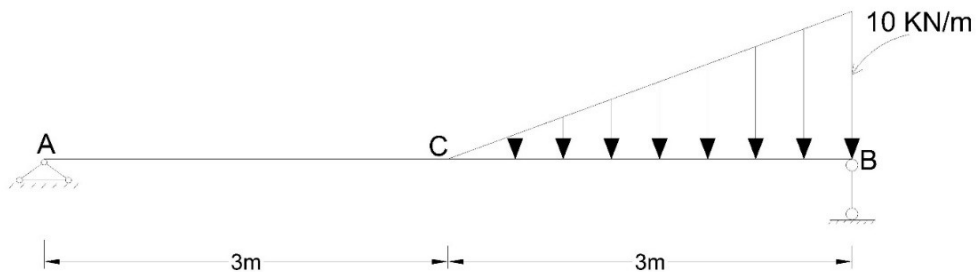

b) A Frame is loaded as shown in figure below. Draw Axial Force, Shear Force and Bending Moment Diagrams. Indicate the salient features if any. (12)
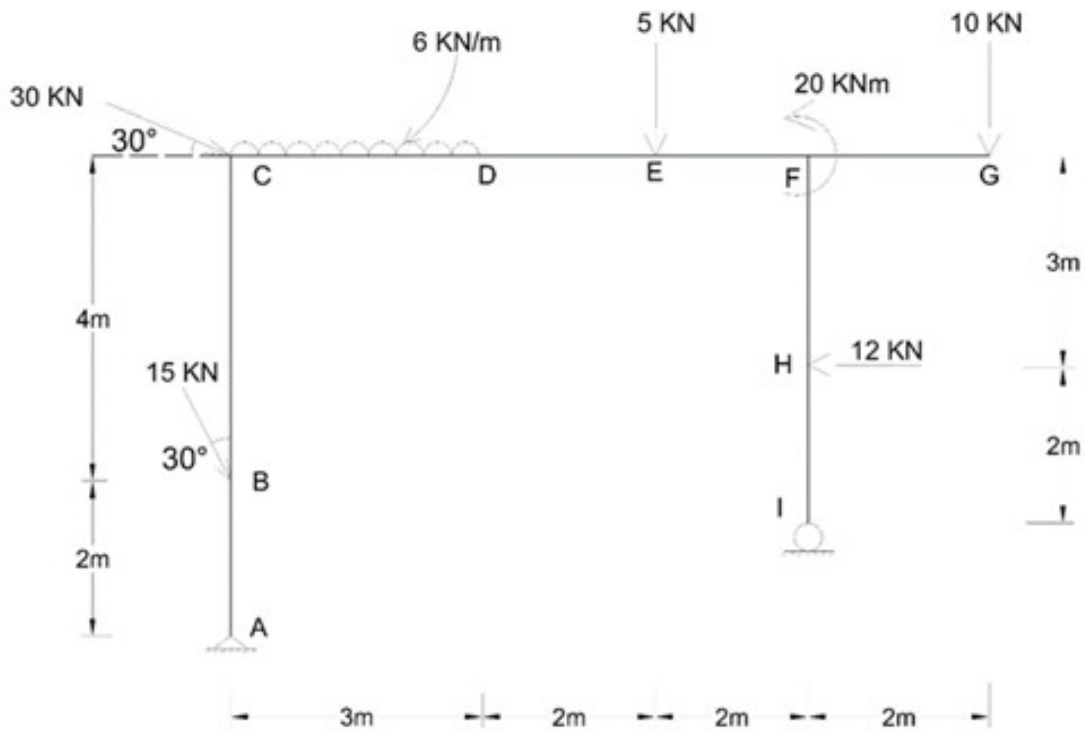
5.a) Write down the assumptions of ideal truss and also do the comment on them for their validity in the practical field? (3)

b) A truss is loaded as shown in figure below. Calculate the force developed in BD, BE, DE & EG members. (5)
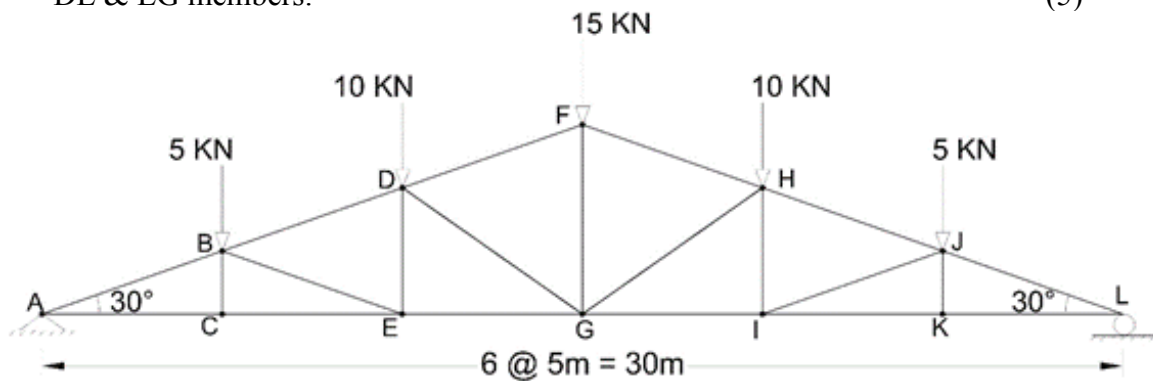
6.a) Define center of gravity, centroid and axis of symmetry. (2)

b) Calculate the Moment of Inertia of the given shaded composite area about centroidal axes. (8)
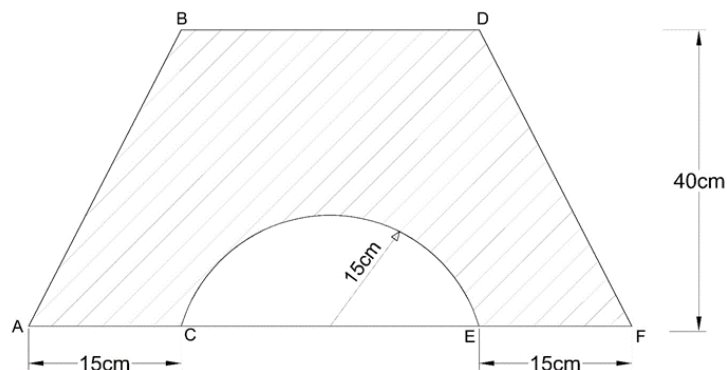
Subject: - Electric Circuit I (*EE101*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Define Ideal and Practical Voltage Sources. A resistance element having a cross-sectional area of 10 mm^2 and a length of 10 meters takes a current of 4A from a 220V supply at an ambient temperature of 20^{0}C. Find out i) the resistivity of the material and ii) the current it will take when the temperature rises to 60^{0}C. Assume $\alpha_{20}=0.0003 \, \dot{c}^0 C$.   [2+4]

2.a) A resistance of 10 ohms is connected in series with a combination of two resistances arranged in parallel each of value 20 ohms. Determine the resistance R3 which should be shunted across the parallel combination so that current drawn by the circuit is 1.5 A with applied voltage of 20 V.   [3]

   b) Find the current supplied by the 10V battery using star delta transformation.   [3]
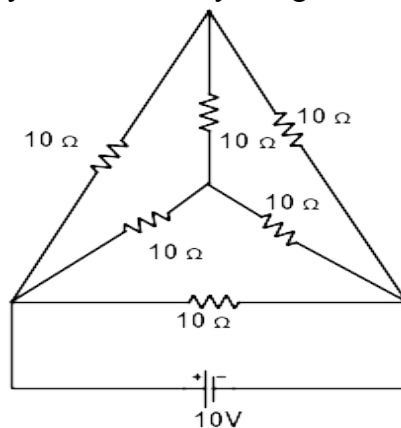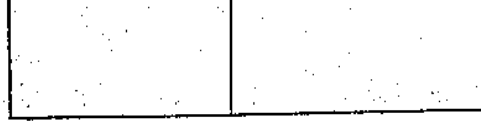

3. Determine the current through 4 Ohm resistor using Mesh Analysis.   [6]
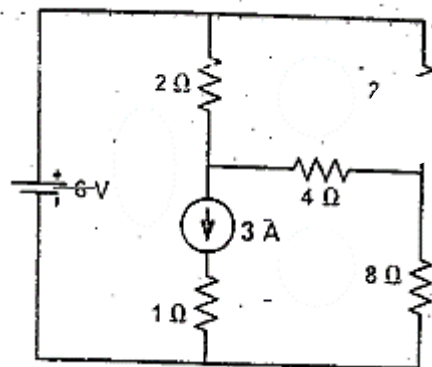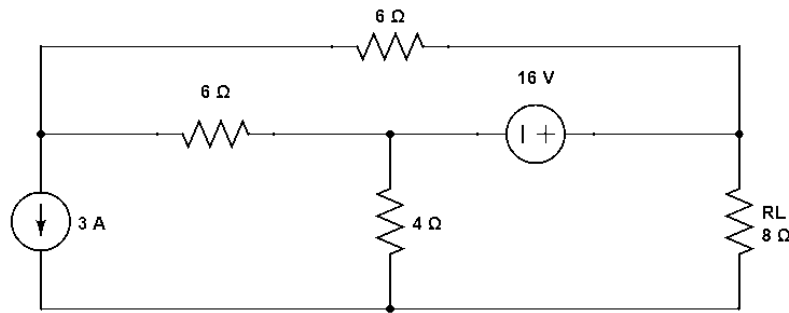


4. Find i using Superposition Theorem.   [6]
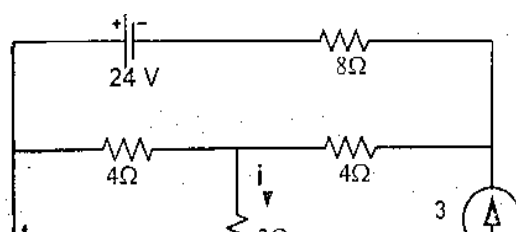
5. For the circuit shown in the figure below, calculate the current in the 8-ohm resistance using Thevenin's theorem. [6]

6.a. Derive the equivalent inductance for two parallelly connected inductor with aiding mutual inductance. [3]

b. What are the causes and consequences of poor power factor? [3]

7. Find Form Factor and Peak Factor of waveform shown in figure below. [6]
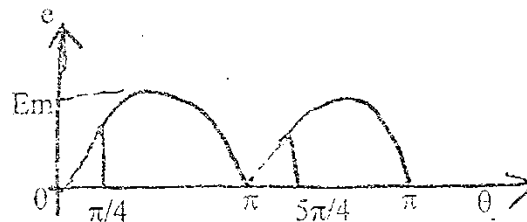
8. For a series LCR circuit comprising 1mH inductor, 2.2nF Capacitor and 338 Ohm Resistor connected to a 100V Single Phase AC Supply. Calculate the frequency so that the current in the circuit will be maximum. Also, find the maximum current and voltage drop across inductor and capacitor. [6]

9. A parallel circuit consists of two branches, one containing a coil of resistances 5Ω and inductance 38.2 mH, the other a non-inductive resistance 16 Ω in series with a capacitor of 300 μF capacitance. The circuit is connected to a 240 V, 50 Hz supply. Determine: a) the current in each branch; b) the total current; c) the circuit phase angle d) the circuit impedance; e) the components of an equivalent circuit consisting of a resistance and reactance. [6]

10.a) Derive the relation between phase and line quantities of a three-phase star connected system. [3]

b) Define Blondel theorem and how it is used to measure active power in three phase AC system. [3]

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(Sample Question)

Exam.		New Course	
Level	BE	Full Marks	30
Programme	BGE	Pass Marks	12
Year / Part	I / I	Time	1.5 hrs.

Subject: -Basic Geo-Information Science (*GE 101*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **_All_** questions.
✓ The figures in the margin indicate **_Full Marks_**.
✓ Assume suitable data if necessary.

1. Define geoinformation science and write its brief history. (2+3)

2. Define photogrammetry. What are the application of remote sensing? (2+3)

3. What is the fundamental concept of surveying? and where are its applications? (2.5+2.5)

4. Overview the cadastral system of Nepal after 2021 B.S. (5)

5. What is GNSS? How is it important in Geospatial Engineering application? (2+3)

6. How do explain about the importance of GIS Technology in the development of the country? (5)

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Exam.		New Course	
Level	BE	Full Marks	60
Programme	BGE	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

Subject: -Engineering Thermodynamics I *(ME 104)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1.a) Define extensive and intensive properties with example. State zeroth law of thermodynamics. [4]

 b) Define stored and transient energy with examples. Derive the expression for work done in an adiabatic process. [2+3]

2.a) What is a pure substance? State Boyle's law and Charle's law. [2+2]

 b) State first law of thermodynamics for a control mass. [2]

 c) Explain heat engines and refrigerators and write down the expression for COP. [4]

3.a) Define availability. What is a dead state in a system? [2]

 b) What is reversible work? Write the expression for reversible work and irreversibility for a steady state process. [4]

4.a) Briefly explain virial equation and van der Waals equation. [3]

 b) Derive the Clapeyron equation. [4]

5. Define dew point, relative humidity and humidity ratio. What is an adiabatic saturation process? [3+2]

6. 5 kg of H_2O is contained in a closed rigid container with an initial pressure and quality of 200 kPa and 36% respectively. Heat is added to the system until the container holds only saturated vapor. Sketch the process on P-v and T-v diagrams and determine: [4]
   i. The volume of the container
   ii. The final pressure

7. 0.8 kg of gas is contained within a piston–cylinder assembly. The gas undergoes a process for which the pressure–volume relationship is $PV^{1.5}$ = constant. The initial pressure is 350 kPa, the initial volume is 0.1 m³, and the final volume is 0.2 m³. The change in specific internal energy of the gas in the process is $u_2 - u_1 = -55$ kJ/kg. There are no significant changes in kinetic or potential energy. Determine the net heat transfer for the process. [4]

8. Air at 100 kPa and 280 K is compressed steadily to 600 kPa and 400 K. The mass flow rate of the air is 0.02 kg/s, and a [5]

heat loss of 16 kJ/kg occurs during the process. Assuming the changes in kinetic and potential energies are negligible, determine the necessary power input to the compressor.

9. A piston cylinder contains 2 kg of water initially at 175 kPa with 20% of quality. The mass of the piston is such that a pressure of 600 kPa is required to lift the piston. Heat is added to the system until its temperature reaches 350 °C. Sketch the process on P-v diagram and determine the total entropy generation during the process. [5]

10. Steam enters the nozzle at 1 MPa, 300 °C with a velocity of 30 m/s. The pressure of the steam at the nozzle exit is 0.5 MPa. Determine the exit velocity of the steam from the nozzle, assuming a reversible and adiabatic flow process. [5]

P	T	v_f	v_g	v_{fg}	h_f	h_g	h_{fg}	u_f	u_g	u_{fg}	s_f	s_g	s_{fg}
kPa	°C	m³/kg	m³/kg	m³/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/(kg K)	kJ/(kg K)	kJ/(kg K)
2	17.50	0.001000	67.00	67.00	73.42	2534.32	2460.90	73.42	2400.31	2326.89	0.2606	8.7254	8.4648
3	24.09	0.001002	45.66	45.66	100.97	2546.23	2445.26	100.97	2409.25	2308.28	0.3544	8.5791	8.2247
4	28.98	0.001003	34.79	34.79	121.38	2554.99	2433.61	121.38	2415.82	2294.44	0.4225	8.4759	8.0534
175	116.06	0.001057	1.00	1.00	486.78	2700.13	2213.35	486.59	2524.54	2037.95	1.4843	7.1708	5.6865
200	120.23	0.001061	0.8855	0.8844	504.47	2706.17	2201.70	504.26	2529.07	2024.82	1.5295	7.1260	5.5966
225	123.99	0.001064	0.7930	0.7920	520.46	2711.52	2191.06	520.22	2533.09	2012.86	1.5699	7.0866	5.5167
575	157.17	0.001099	0.3286	0.3275	662.89	2753.76	2090.87	662.26	2564.83	1902.58	1.9132	6.7717	4.8585
600	158.83	0.001101	0.3156	0.3145	670.07	2755.60	2085.52	669.41	2566.22	1896.80	1.9298	6.7573	4.8275

	P=0.6	MPa		
T	v	h	u	s
°C	m³/kg	kJ/kg	kJ/kg	kJ/(kg·K)
158.83	0.3156	2755.60	2566.22	6.7573
200	0.3522	2850.25	2638.93	6.9669
250	0.3940	2957.24	2720.82	7.1820
300	0.4345	3061.33	2800.62	7.3720
350	0.4743	3164.89	2880.29	7.5452
400	0.5138	3268.93	2960.67	7.7058

	P=1	MPa		
T	v	h	u	s
°C	m³/kg	kJ/kg	kJ/kg	kJ/(kg K)
179.87	0.1945	2776.28	2581.82	6.5828
200	0.2060	2827.37	2621.35	6.6931
250	0.2328	2942.81	2709.98	6.9252
300	0.2581	3051.15	2793.09	7.1230
350	0.2825	3157.19	2874.65	7.3004
400	0.3066	3262.82	2956.22	7.4634
450	0.3304	3368.93	3038.52	7.6155
500	0.3541	3475.99	3121.94	7.7586
550	0.3776	3584.27	3206.69	7.8943

***

Subject: -Engineering Mechanics I (*ME103*)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **_All_** questions.
✓ The figures in the margin indicate **_Full Marks_**.
✓ Assume suitable data if necessary.

1. Write down the conditions required for the equilibrium of a particle in a plane and space. [2]

2. Find the magnitude and direction of the resultant of the two forcesshownin **Figure P.2**. [6]

3. Replace the force and couple moment system acting on the beam shown in**Figure P.3** by an equivalent resultant force, and find where its line ofaction intersects the beam, measured from point *O*. [8]
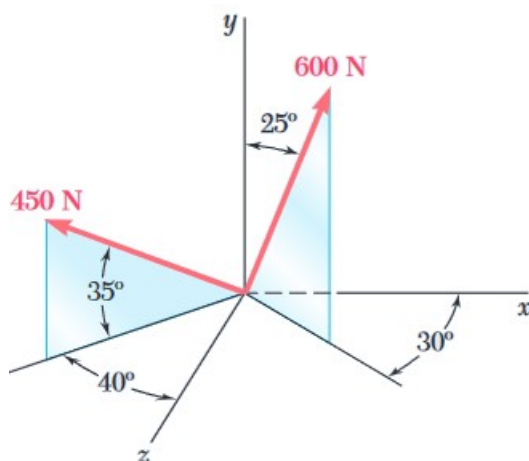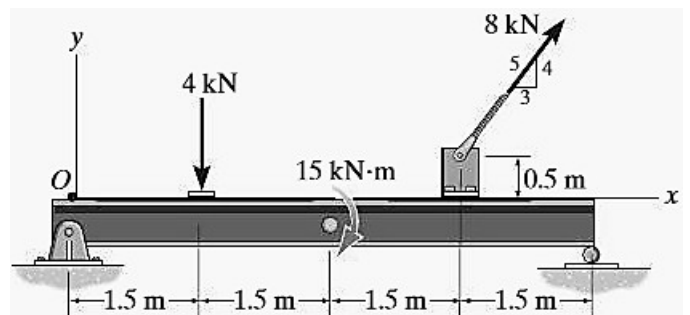

<center>**Figure P.2**   **Figure P.3**</center>

4. Determine by direct integration the centroid of the shaded areashown in **Figure P.4**. [6]

5. Differentiate between center of gravity and centroid. [2]

6. Why moment of inertia of area is necessary?Write down the expressions for moment of inertias of an area with respect to rectangular coordinate axes. [2]

7. Determine the moment of inertia of the compositearea shown in **Figure P.7** about the *x* axis. [8]

8. Determine whether the block shown in **Figure P.8** is in equilibrium and find themagnitude and direction of the friction force when $P=150\,N$. [8]

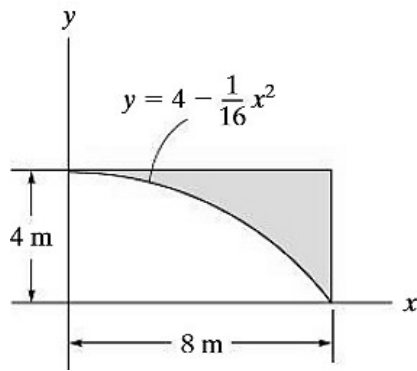9. Draw the shear and bending moment diagrams for the beamshown in **Figure P.9**. [10]

$$y = 4 - \frac{1}{16}x^2$$
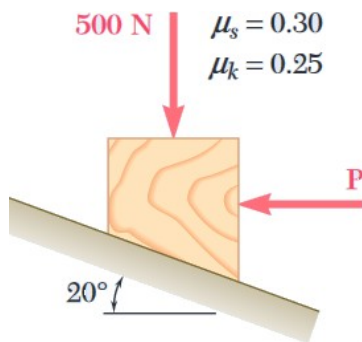
4 m

8 m

Figure P.4

100 mm — 100 mm — 150 mm

150 mm

150 mm

75 mm

O

Figure P.7

500 N $\mu_s = 0.30$
         $\mu_k = 0.25$

P

20°

Figure P.8

20 kN/m

30kNm

20 kN

E D

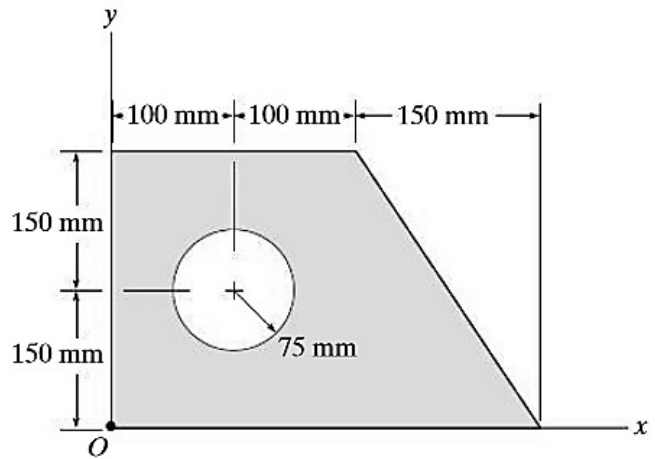A   D   B

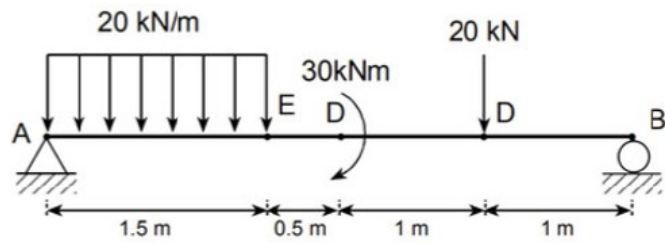1.5 m   0.5 m   1 m   1 m

Figure P.9

10.   Determine the force in each member of the truss shown in **Figure P.10**.Indicate
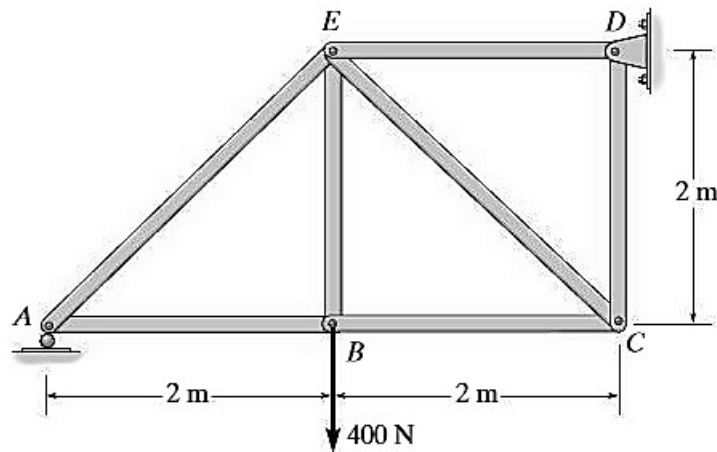   whether the members are in tension or compression.   [8]

E   D

2 m

A   B   C

2 m   2 m

400 N

Figure P.10

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