

R18

Code No:151AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**B.Tech I Year I Semester Examinations, December - 2018****BASIC ELECTRICAL ENGINEERING**

(Common to EEE, CSE, IT)

Max. Marks: 75**Time: 3 hours**

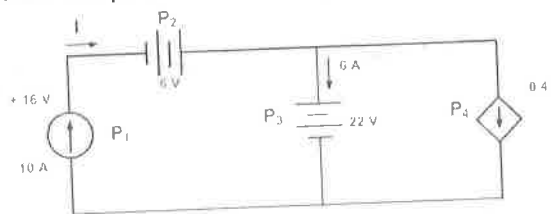
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

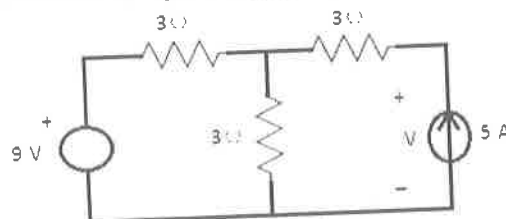
- 1.a) Define linear and non linear elements. [2]
- b) What is complex power? [2]
- c) What is meant by equivalent resistance of a 1- Φ transformer when referred to primary? [2]
- d) Write the merits and demerits of slip-ring induction motor. [2]
- e) What is MCB? [2]
- f) Five 2V cells, each having an internal resistance of 0.2Ω are connected in series to a load of resistance 14Ω . Find the current flowing in the circuit. [3]
- g) What is phase difference? Explain. [3]
- h) Write different types of losses in transformers. [3]
- i) What is the necessity of starter in starting of a 3- Φ Induction motor? [3]
- j) What is the necessity of earthing in domestic buildings? [3]

PART - B**(50 Marks)**

- 2.a) Explain about different types of sources.
- b) Calculate the power absorbed by each component in the circuit shown in figure 1. [5+5]

**Figure 1**
OR

- 3.a) State and explain Thevenin's theorem.
- b) In the circuit shown in figure 2, determine 'V' using Thevenin's theorem. [5+5]

**Figure 2**

- 4.a) Compute the average value of square wave form shown in below figure 3.

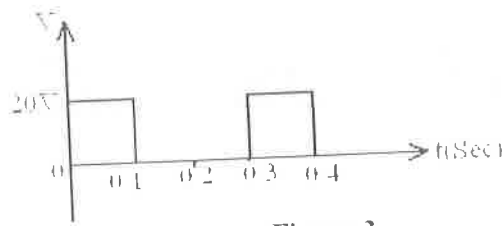


Figure 3

- b) A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit, find i) The complex power in the coil and ii) The values of R and L. [5+5]

OR

- 5.a) Derive the expression for RMS value of alternating current wave $i = I_m \sin \omega t$.
b) Derive the relation between phase and line voltages and currents in balanced three phase star connection. [5+5]

- 6.a) Explain regulation of a transformer with phasor diagrams.
b) Derive the condition for maximum efficiency in a single phase transformer. [5+5]

OR

- 7.a) Explain the operation of an auto transformer with a neat diagram.
b) What are the advantages of 3-phase Transformers? [5+5]

- 8.a) Explain the speed control of 3- Φ induction motor using Rotor resistance control.
b) Sketch the Torque-slip characteristics of Induction motor and explain. [5+5]

OR

- 9.a) Explain the principle of production of rotating magnetic field in a 3-phase induction Motor.
b) Derive the condition for maximum torque under running condition of 3-phase Induction Motor. [5+5]

- 10.a) What is ELCB? Explain the working principle of ELCB.
b) Mention advantages and disadvantages of ELCB. [5+5]

OR

- 11.a) What are the different types of wires and cables? Explain.
b) Give applications of the primary and secondary batteries. [5+5]

R18

Code No:151AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**B. Tech I Year I Semester Examinations, December - 2018****ENGINEERING PHYSICS****(Common to CE, ME, MCT, MMT, AE, MIE, PTM)****Max. Marks: 75****Time: 3 hours**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- | | | |
|------|--|-----|
| 1.a) | Write short note on friction. | [2] |
| b) | Discuss about quality factor. | [2] |
| c) | Write any four properties of standing waves. | [2] |
| d) | Why the rings are circular in Newton's rings experiment. | [2] |
| e) | Explain phenomena of total internal reflection. | [3] |
| f) | Explain transformation of scalars. | [3] |
| g) | Write the properties of damped harmonic oscillator. | [3] |
| h) | Explain reflection and transmission process. | [3] |
| i) | Write short note on diffraction grating. | [3] |
| j) | Explain losses associated with optical fibers. | [3] |

PART - B**(50 Marks)**

- | | | |
|-----------|---|-------|
| 2.a) | Explain Newton's laws and their completeness in describing particle motion. | [5+5] |
| b) | Give an account of forces in nature. | |
| OR | | |
| 3.a) | Explain the method of solving Newton's equations in polar coordinates. | [5+5] |
| b) | Write short note on cylindrical coordinates. | |
| 4.a) | Compare working of mechanical harmonic oscillators. | [5+5] |
| b) | Discuss about energy decay in damped harmonic oscillator. | |
| OR | | |
| 5. | Explain working of damped harmonic oscillator in various conditions like heavy, critical and light damping. | [10] |
| OR | | |
| 6.a) | Explain reflection and transmission of waves at a boundary. | |
| b) | Derive expression for longitudinal wave equation and also write properties of longitudinal waves. | [5+5] |
| OR | | |
| 7.a) | Give an account of standing waves and their Eigen frequencies. | [5+5] |
| b) | Write properties of transverse waves. | |

- 8.a) Explain Fraunhofer diffraction at single slit. [5+5]
b) Discuss about interference of light by wave front splitting.

OR

- 9.a) Explain principle, theory and working of Michelson interferometer. [5+5]
b) Write short note on resolving power of a grating.

- 10.a) Describe construction, principle and working of CO₂ laser. [5+5]
b) Write applications of lasers in various fields.

OR

- 11.a) Derive an expression for acceptance angle and numerical aperture. [5+5]
b) Give an account of graded and step index fibers.

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Code No:131AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**B.Tech I Year I Semester Examinations, December - 2018****ENGINEERING PHYSICS****(Common to CE, ME, MCT, MMT, AE, PTM, CEE, MSNT)****Max. Marks: 75****Time: 3 hours**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Explain the concept of coherence. [2]
- b) Find the resolving power of grating having 5000 lines/cm in the first order diffraction. The length of the grating is 16cm. [3]
- c) Distinguish between quarter wave plate and half wave plate. [2]
- d) Write short notes on Malu's law. [3]
- e) Explain the terms numerical aperture and acceptance angle. [2]
- f) Write the classification of optical fibres. [3]
- g) Mention seven crystal systems. [2]
- h) Explain the terms i) basis, ii) Space lattice, iii) Bravice lattice. [3]
- i) Write the Bragg's law and explain the terms. [2]
- j) Explain stacking faults, twin tilt and grain boundaries. [3]

PART - B**(50 Marks)**

- 2.a) Explain the formation of Newton's rings.
- b) Obtain the expression for n^{th} bright fringe and n^{th} dark fringe in Newton's rings by reflected light. [5+5]

OR

- 3.a) Explain Fraunhofer diffraction. [5+5]
- b) Explain the determination of wavelength of light using grating.

- 4.a) Explain the theory of He-Ne laser. [5+5]
- b) With neat diagram write the working of He-Ne laser.

OR

- 5.a) Write the important elements in Ruby laser and explain its workin. [5+5]
- b) Discuss population inversion and optical activity.

- 6.a) Describe the construction of optical fibre. [5+5]
- b) Distinguish between light propagation in step index fibre and graded index fibre.

OR

- 7.a) Discuss different types of optical fibres. [5+5]
- b) Discuss the applications of optical fibres in sensors.

- 8.a) What are Miller indices and how they are obtained. [5+5]
b) Draw (111) and (110) planes in a cubic lattice.
- OR**
- 9.a) Describe crystal structure of ZnS. [5+5]
b) Obtain packing factor for FCC and BCC structures.
- 10.a) Explain different point defects. [5+5]
b) With neat diagram explain powder method in crystal structure determination.
- OR**
- 11.a) Write the elements present in Laue method and their functioning.
b) Distinguish between edge and screw dislocation. [10]
c) What is Burger's vector.

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R16

Code No:131AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**B.Tech I Year I Semester Examinations, December - 2018****ENGINEERING CHEMISTRY****(Common to EEE, ECE, CSE, EIE, IT)****Max. Marks: 75****Time: 3 hours**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Why hardness is expressed in terms of calcium carbonate equivalent? [2]
- b) Which salts are responsible for temporary and permanent hardness of water? [3]
- c) Why do electrochemical cells stop working after some time? [2]
- d) Write a short note on calomel electrode. [3]
- e) What is the functionality of a monomer? [2]
- f) What are the applications of Bakelite? [3]
- g) What are primary and secondary fuels? [2]
- h) What is CNG? Why it is preferred over LPG? [3]
- i) How is thermal conductivity of a refractory related to its porosity? [2]
- j) What are the characteristics of good refractories? [3]

PART - B**(50 Marks)**

- 2.a) Discuss the ion exchange process of softening hard water. [8+2]
 - b) What is Caustic embrittlement?
- OR**
- 3.a) What is potable water? What are the steps taken to obtain pure drinking water? [7+3]
 - b) Write the names of three sludge forming and three scale forming compounds.
- 4.a) Describe the construction of lead - acid battery with the reactions occurring during discharge. [6+4]
 - b) Write short note on glass electrode.
- OR**
- 5.a) Distinguish between galvanic cell and a concentration cell. [6+4]
 - b) Write a short note on factors influencing e.m.f of batteries.
- 6.a) Explain addition and condensation polymerisation with suitable examples. [7+3]
 - b) Write a short note on vulcanization process.
- OR**
- 7.a) What is chain polymerization and explain the steps involved? [6+4]
 - b) Classify conducting polymers with suitable example.

- 8.a) Explain refining of petroleum. [7+3]
b) Why a good fuel must have low ash content?

OR

- 9.a) Explain ultimate analysis of coal. [8+2]
b) Define calorific value of fuel.

- 10.a) Explain manufacture of cement in detail. [8+2]
b) Write any two types of refractories and their uses.

OR

- 11.a) Discuss four essential properties of a good refractory material. [6+4]
b) Write the classification of lubricants with example.

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R13

Code No:111AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**B.Tech I Year Examinations, December – 2018****ENGINEERING CHEMISTRY****(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, MIE, PTM, AGE)****Max. Marks: 75****Time: 3 hours**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) What is molar conductivity ? Explain the temperature effect on molar conductivity. [2]
- b) What are the cathode, anode and electrolyte in Ni-Cd cell. [3]
- c) What are the conducting polymers and give two examples. [2]
- d) Write any two applications of nanomaterials. [3]
- e) Why is $\text{NH}_3\text{-NH}_4\text{Cl}$ buffer solution added during determination of hardness of water by EDTA method? [2]
- f) What is reverse osmosis? Explain. [3]
- g) Why should an ideal fuel have moderate ignition temperature? [2]
- h) Why is net calorific value less than gross calorific value? Give reason. [3]
- i) Define phase rule. [2]
- j) Explain classification of colloids. [3]

PART - B**(50 Marks)**

- 2.a) Explain construction and working of Calomel electrode. [5+5]
 - b) Explain the electrochemical theory of corrosion.
- OR**
- 3.a) Explain construction working and applications of glass electrode. [5+5]
 - b) What are fuel cells ? How methanol fuel cell works and writes its applications.
- 4.a) Classify the following into plastics, elastomers and fibers and write their preparation with chemical equation.
i) PVC ii) Nylon iii) BUNA - S [5+5]
 - b) What is vulcanization of rubber ? Write its uses.
- OR**
- 5.a) Explain preparation, properties and applications of Bakelite.
 - b) Explain the concept of Biodegradable polymers ? Write preparation and applications of polylactic acid. [5+5]

- 6.a) What are the water quality parameters ? Write their significance.
b) What are Boiler troubles? Name them and explain the internal treatment methods of boiler feed water. [5+5]

OR

- 7.a) What is meant by sterilization of water ? Explain how sterilization of water is carried out by using chlorine and ozone.
b) How to estimate hardness of water by EDTA method. [5+5]

- 8.a) What is meant by knocking ? How is it related to chemical constitution ? describe the functions of TEL.

- b) Differentiate proximate and ultimate analysis of coal. [5+5]

OR

- 9.a) What is synthetic petrol ? With neat diagram and chemical equations how synthetic petrol is prepared by Fischer-Tropsch's process.
b) Explain the composition, properties and applications of LPG and CNG. [5+5]

- 10.a) Explain phase diagram of lead-silver system.

- b) What are the applications of colloids in industry? [5+5]

OR

- 11.a) Explain phase diagram of water system.

- b) What are the applications of adsorption? [5+5]

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R09

Code No: 51008

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech I Year Examinations, December - 2018****MATHEMATICAL METHODS**

(Common to EEE, ECE, CSE, EIE, BME, IT)

Max. Marks: 75**Time: 3 hours****Answer any five questions
All questions carry equal marks**

- 1.a) Find the values of λ and μ such that the equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$ have i) no solution ii) unique solution and iii) an infinite number of solutions.
- b) Solve the system of equations $x + y + z + w = 0$, $x + y + z - w = 4$, $x + y - z + w = -4$, $x - y + z + w = 2$ by Gauss elimination method. [8+7]

- 2.a) Find the Eigen values and the corresponding Eigen vectors of $A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 1 \end{pmatrix}$.
- b) Using Cayley-Hamilton theorem, find A^{-1} and A^{-2} if $A = \begin{pmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{pmatrix}$. [7+8]

- 3.a) If $A = \begin{pmatrix} 0 & 1+2i \\ -1+2i & 0 \end{pmatrix}$, show that the matrix $(I - A)(I + A)^{-1}$ is Unitary.

- b) Reduce the quadratic form $Q = x^2 + 3y^2 + 3z^2 - 2yz$ to canonical form. [5+10]
- 4.a) Derive the Newton-Raphson iterative formula to find the square root of a positive Number N and hence find the square root of 10.
- b) Using Newton's forward and backward interpolation formulae, find the values of $y(5)$ and $y(9)$ for the following data: [7+8]

x:	4	6	8	10
y:	1	3	8	16

- 5.a) Fit a second degree curve of the form $y = ax^2 + bx + c$ for the following data:

x:	0	1	2	3	4
y:	1	1.8	1.3	2.5	6.3

- b) Apply Simpson's $\frac{3}{8}$ rule to evaluate $\int_0^1 \frac{dx}{1+x^2}$ with $h = \frac{1}{9}$. [8+7]

6. Using Runge-Kutta methods of order 2 and order 4, find an approximate value of $y(0.2)$ for $y' = x + y^2$, $y(0) = 1$ with $h = 0.1$. [15]

- 7.a) Find the Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$ and hence deduce that

$$\text{i) } 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \frac{\pi^2}{6} \quad \text{ii) } 1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$$

- b) Obtain the half-range Fourier sine series of $f(x) = e^x$, $0 < x < \pi$. [9+6]

- 8.a) Find a partial differential equation by eliminating the arbitrary constants a and b

$$\text{from } 2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}.$$

- b) Solve $x(y-z)p + y(z-x)q = z(x-y)$.

- c) Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial u}{\partial y} = 0$ by the method of separation of variables. [4+5+6]

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Code No: 51003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, December - 2018

ENGINEERING MECHANICS

(Common to CE, ME, AE, MIE)

Max. Marks: 75

Time: 3 hours

Answer any five questions

All questions carry equal marks

Illustrate your answer with NEAT sketches wherever necessary

- I. A body is acted upon by a system of forces and a couple, as shown in figure 1. Determine the resultant of the system of forces. Also locate the points of intersection of the system of forces. Further locate the points of intersection of the resultant with the arms PQ, QR, and RS. The thickness of each arm is 0.25 m. (Figure 1 is not to scale). [15]

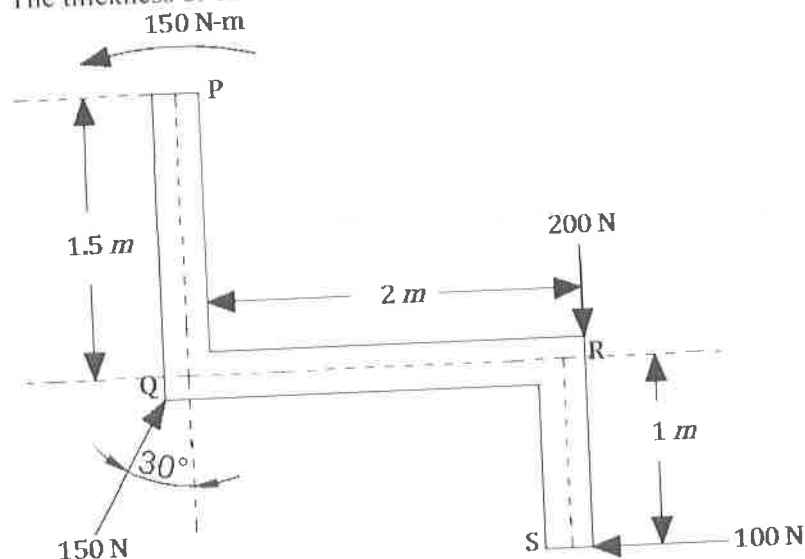


Figure: 1

- 2.a) Explain the procedure for solving a problem in which a particle moving in a rectilinear path is acted upon by a constant force.
- b) A bullet is fired with an initial velocity of 250 m/s at a target located at a horizontal distance of 4 km and a vertical distance of 700 m above the gun. Find the value of the firing angle to hit the target. Neglect air resistance. [7+8]
- 3.a) Establish the work – energy equation for translation.
- b) A railway wagon of mass 12000 kg moving at 27 km/hour strikes 6 buffer springs and stops. If the stiffness of each spring is 600 kN/m, find the maximum contraction of the springs before the wagon comes to rest. Also find the force on each spring. [7+8]

4. A load of 4 kN acts on a beam held by a cable PQ, as shown in figure 2. The weight of the beam may be neglected. Draw the free body diagram of the beam, and find the tension in the cable PQ. Also find the reaction force at R. (Figure 2 is not to scale). [15]

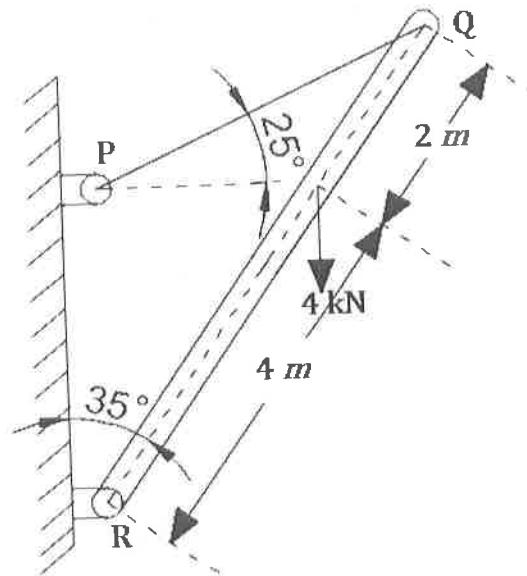


Figure: 2

5. Find the position of the centroid of the solid combination, consisting of a solid cone of height 50 mm and base diameter 80 mm and a cylinder of base diameter 80 mm and height 100 mm, with a semi-circular cut at bottom as shown in figure 3. [15]

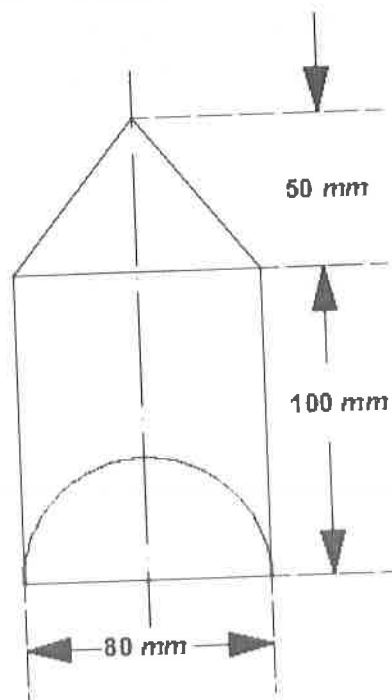


Figure: 3

6. The cross section of a machine part is shown in figure 4. Determine its M.I. and radius of gyration about the horizontal centroidal axis. [15]

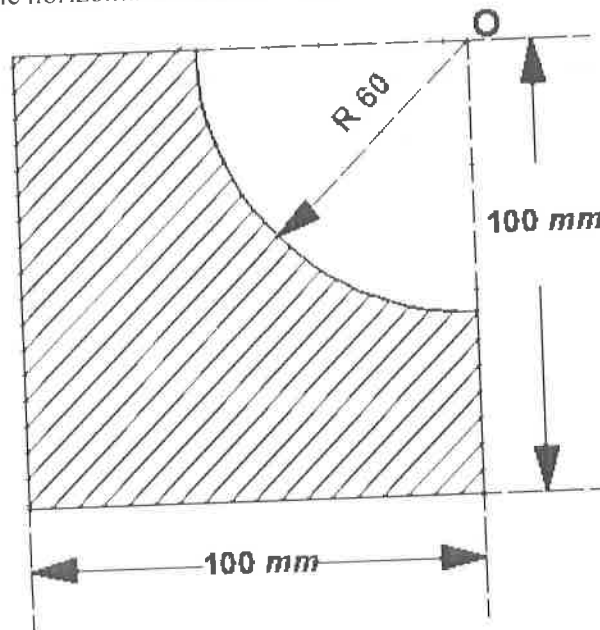


Figure: 4

7. Determine the forces in the members AB, BD, CD, FH, DF, and DG of the truss shown in figure 5. Use the method of joints. [15]

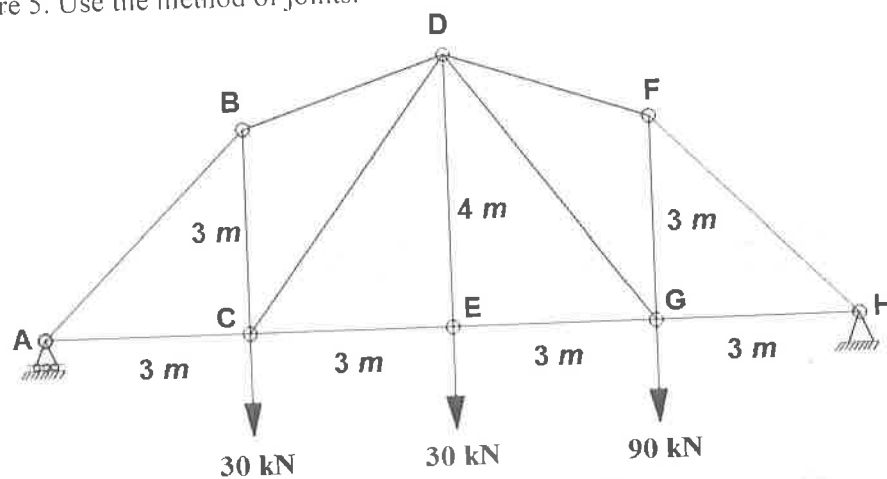


Figure: 5

8. A prismatic bar AB of length l and weight Q stands in a vertical plane, and is supported by smooth surfaces at A and B. Using the principle of virtual work, find the magnitude of the horizontal force P applied at A, if the bar is in equilibrium. (Refer to figure 6). [15]

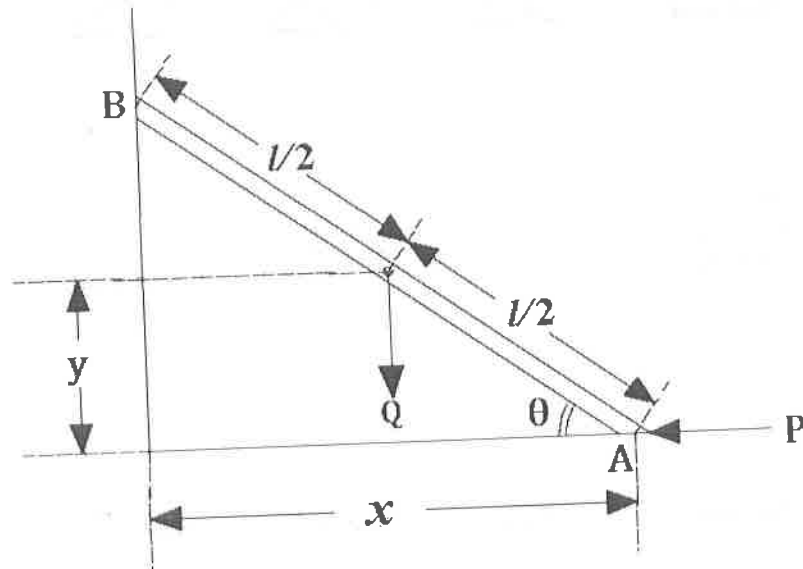


Figure: 6

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