

FACULTY OF ENGINEERING
B.E. I-Semester (CBCS)(Backlog) Examination, October 2021

Subject: Engineering Mechanics – I

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

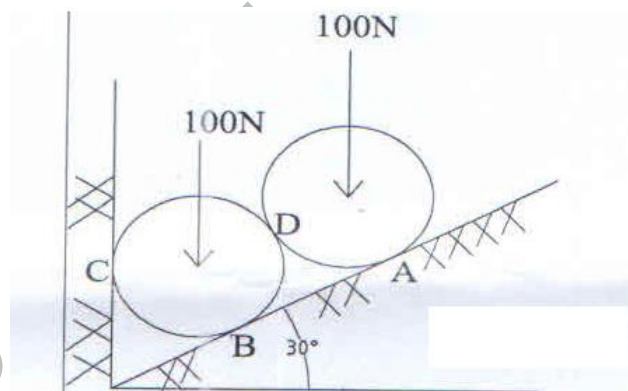
- 1 Principle of transmissibility.
- 2 Differentiate between centroid, and centre of gravity.
- 3 State parallelogram law of force system.
- 4 Explain free body diagram with an example.
- 5 State laws of friction.
- 6 Explain parallel axis theorem.
- 7 When do we use method sections?
- 8 Find polar moment of inertia of a solid circular section of dia 300mm.
- 9 Find centroid of quarter circular arc.
- 10 Define coefficient of friction.

PART – B

Answer any four questions.

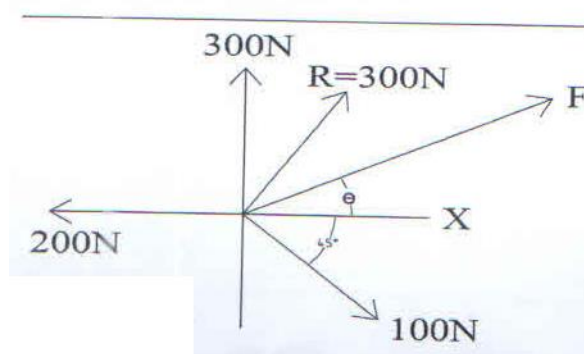
(4x15 = 60 Marks)

- 11 Two identical rollers each of weight 100N are supported by an incline and vertical wall as shown in figure 1 assuming smooth surfaces, find the reaction induced at point A, B & C.

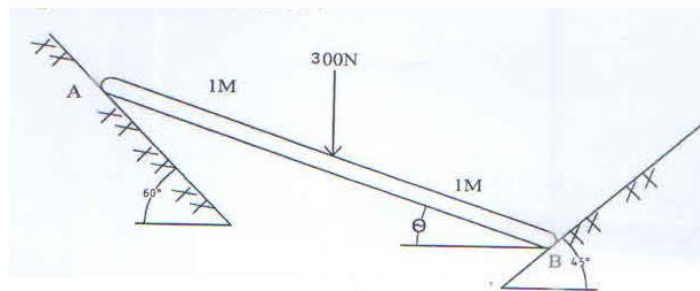


- 12 The force system shown in figure 2 has a resultant of 300N acting upto the right with slope of 3H : 4V, compute the value of F and θ required to give this resultant.

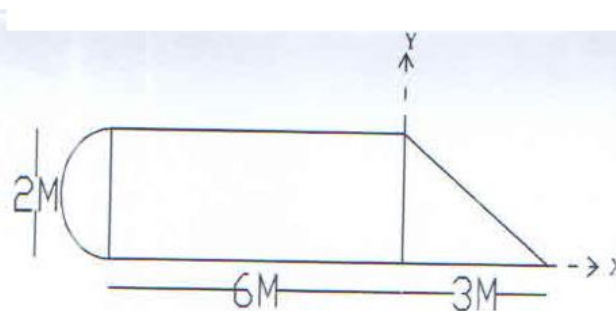
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- 13 A uniform bar of weight of 300N and length 2m is placed as shown in figure 3 with its contacts with the inclined planes. The angle of friction is 10° . Determine the maximum value of θ at which the slipping impends angle at A is 60° and B is 45° .



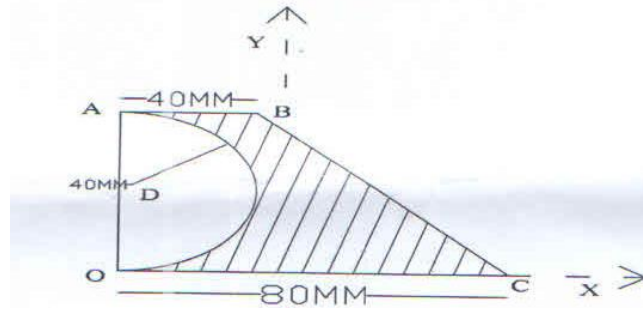
- 14 Determine the centroid of the area shown in figure 4 with reference to the axes shown.



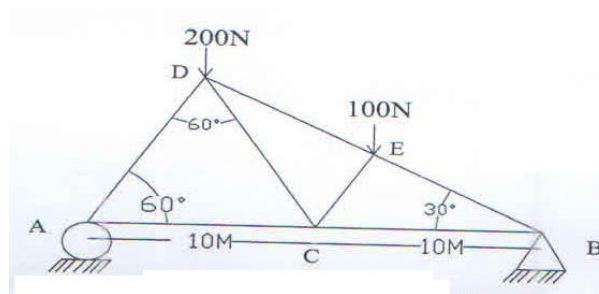
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15 Find the M.I of the shaded area with reference to X axis and Y axis.



16 Find member forces of truss by using method of joints.



- 17(a) Write short note on classification of engineering mechanics.
 (b) Write short note on equivalent force couple system.
 (c) Write short note on perpendicular axis theorem.

FACULTY OF ENGINEERING**B.E. I-Year (Backlog) Examination, October 2021****Subject: Engineering Physics****Time: 2 Hours****Max marks: 75****Missing data, if any, may be suitably assumed****PART – A****Note: Answers any Seven questions.****(7x3=21 Marks)**

1. Distinguish between Coherent and Incoherent sources?
2. Give four applications holography?
3. Define Numerical Aperture of optical fibre?
4. Give properties of wave function?
5. Define Fermi energy level?
6. Define Packing fraction of crystal?
7. Explain the Meissner effect?
8. Give account of 'space charge polarization'?
9. Give classification of Nanomaterials?
10. Define fluorescence?

PART-B**Note: Answers any Three questions.****(3x18=54 Marks)**

- 11 a. Define Double refraction? Discuss the construction and working of Nicol's Prism?
b. Discuss the Fraunhofer diffraction due to single slit?
- 12 a. Deduce the expression for quantized energy levels of particle in 1-D Infinite Square well?
b. Deduce the Rayleigh Jeans Law and Wien's law from Plank's law?
- 13 a. Discuss the Hall effect? Deduce the Hall coefficient
b. Discuss the experimental determination of lattice constant by Powder diffraction method?
- 14 a. Define Type-I and Type-II superconductors Discuss the BCS theory of superconductors?
b. Discuss the estimation method of dielectric constant by Capacitance Bridge method?
- 15 a. Discuss the working of Scanning Electron Microscope?
b. Discuss the ideas of Carbon nanotubes?
16. a. Define optical activity? Discuss the working of Laurent's Half shade Polarimeter?
b. Discuss the classification of Insulator, Semiconductor and Conductor based on band theory of solids?
17. a. Explain Bose-Einstein Statistics?
b. Discuss the magnetic hysteresis curve? How soft and hard magnetic materials can be classified?

FACULTY OF ENGINEERING
B.E. I - Semester (AICTE) (Main) Examination, October 2021

Subject: Engineering Physics

Time: 2 Hours

Max. Marks: 70

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may be suitably assumed.

Note: Answer any four questions.

(4x4 = 16 Marks)

- 1 (a) Define the terms (i) Bravais lattice (ii) Crystal structure
 (b) Give the physical significance of ' ψ '.
 (c) What is Meissner effect?
 (d) Define acceptance angle and numerical aperture.
 (e) What are ferrites and give two applications of them.
 (f) Show the saturation magnetization, remnant induction and coercive field in a hysteresis curve of a ferromagnetic material.
 (g) Differentiate between line and screw dislocations?

(3x18 = 54 Marks)

- 2 (a) Explain Bragg's law. Describe the powder method to calculate the lattice constant of a given crystal.
 (b) What are Frenkel defects? Obtain an expression for concentration of Frenkel defects in ionic crystals?
- 3 (a) Explain Hall Effect and calculate the Hall coefficient. Mention few applications of Hall Effect.
 (b) Define dielectric polarization and derive an equation for electronic polarizability in dielectric materials.
- 4 (a) Derive an expression for 1 D Schrodinger time independent wave equation.
 (b) Write the differential form of Maxwell's equations and deduce the equation for the propagation of plane electromagnetic wave in free space.
- 5 (a) Explain in detail the classification of dia, para, ferro, antiferro and ferri magnetic materials.
 (b) What are super conductors? Distinguish between type-I and type-II superconductors.
6. (a) Give the characteristics of lasers. Explain the construction and working of He – Ne laser with neat diagram.
 (b) What is an optical fiber? Explain in detail the classification of optical fibers?
- 7 (a) Explain in detail about Kronig-Penny model and based on this explain classification of solids.
 (b) State and explain Poynting theorem.

FACULTY OF ENGINEERING
B.E. I - Semester (AICTE) (Backlog) Examination, October 2021

Subject: Physics

Time: 2 Hours

Max. Marks: 70

Note: (Missing data, if any, may be suitably assumed)

PART – A

Note: Answer any five questions. (5x2 = 10 Marks)

- 1 Atomic radius of S.C.C. crystal is $2A$ then find inter planar distance of $\langle 101 \rangle$ planes.
- 2 Define Edge and screw dislocations in a crystal.
- 3 What are the applications of P-N diode?
- 4 What do you mean by dielectric material and mention its applications?
- 5 Find the de-Broglies wave length of a proton in 10kv potential difference.
- 6 Explain displacement current.
- 7 What are ferrites and write their structure?
- 8 Explain about High T_c superconductors.
- 9 What mean by stimulated and spontaneous emission in a LASER?
- 10 Write four applications of LASER.

PART – B

Note: Answer any four questions. (4x15 = 60 Marks)

- 11 Derive Bragg's law and explain powder method to find crystal structure.
- 12 Explain the kronig penny model.
- 13 (a) What are Ferroelectric materials discuss their applications?
(b) Explain the Barrium Titanate crystal structure.
- 14 Derive time independent schrodinger equation and. Discuss properties of wave function.
- 15 (a) Explain classification of Magnetic materials.
(b) Discuss about Type-I and Type-II superconductors.
- 16 (a) Explain the production mechanism of He-Ne laser.
(b) Discuss about optical fibers and mention their uses.
- 17 (a) Derive equation for conductivity in a semiconductor.
(b) Find de-Broglies wave length of electron in 10kv potential difference?
