

# 07619051822 **END TERM EXAMINATION**

**FIRST SEMESTER [B.TECH] JANUARY 2024**
**Paper Code: ICT-105**
**Subject: Engineering Mechanics**
**Time: 3 Hours**
**Maximum Marks: 60**
**Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit. Assume missing data.**

Q1 This question contains 10 parts and carries equal marks. This question is compulsory.

**(2×10=20)**

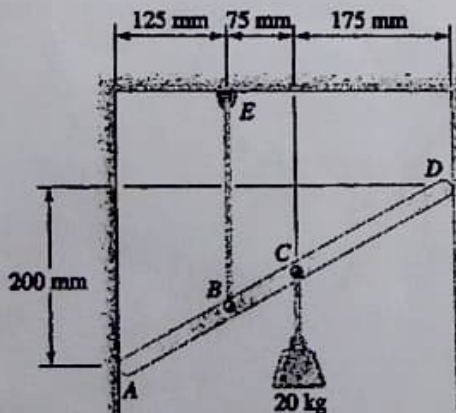
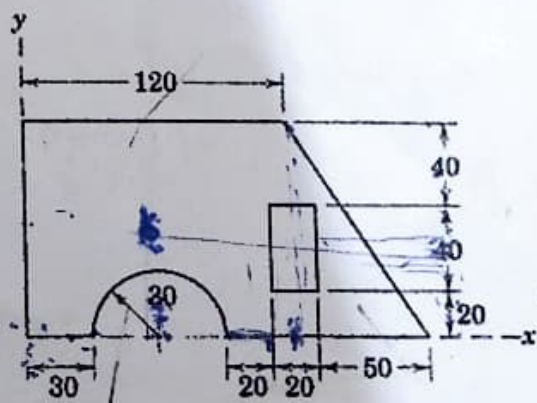
1. Explain superposition law and law of transmissibility.
2. Define the free body diagram of a body in an equilibrium system, and explain its importance.
3. Define couple, what are the conditions for forming a couple?
4. The resultant of two forces when they act at an angle of  $60^\circ$  is 14N. If the same forces are acting at right angles, their resultant is  $(136)^{1/2}$  N. Determine the magnitude of two forces.
5. State the Lamis Theorem.
6. A ladder 5 m long and of 250 N weight is placed against a vertical wall in a position where its inclination to the vertical is  $30^\circ$ . A man weighing 80 kg climbs the ladder. At what position will be induce slipping, the co-efficient of friction for both the contact surface (wall and floor) and the ladder is 0.2.
7. Differentiate centroid and center of gravity.
8. Differentiate between polar moment of inertia and product of inertia.
9. Define the term "Friction". What are coulomb's laws of dry friction?
10. Define motion. Write different types of motion.

**UNIT-I**

Q2 A light bar AD is suspended from a cable BE and supports a 20-kg block at C, as shown in Figure 1. The ends A and D of the bar are in contact with frictionless vertical walls. Determine the tension in cable BE and the reactions at A and D.

**(10)**

Q3 Locate the centroid of the area shown in Figure 2. The dimensions are in mm.

**(10)**

**Figure 1**

**Figure 2**
**P.T.O.**

## UNIT-II

- Q4 Using the method of joints, determine the force in each member of the truss shown in Figure 3. (10)

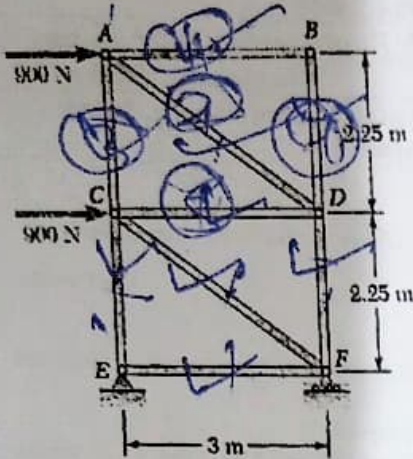


Figure 3

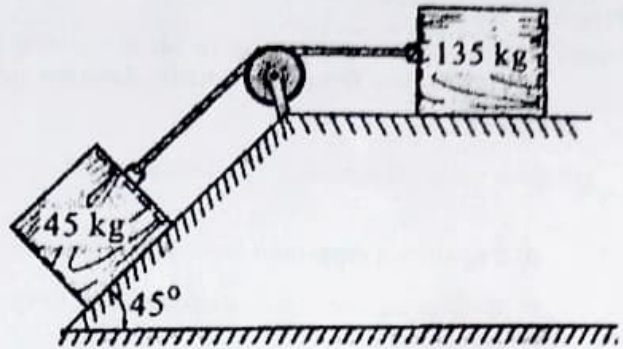


Figure 4

- Q5 a) Determine the necessary force  $P$  acting parallel to the plane to cause motion to impend shown in Figure 4. Assume coefficient of friction as 0.25 and the pulley to be smooth. (7)
- b) Define angle of repose and angle of friction. (3)

## UNIT-III

- Q6 The motion of a body is given by an equation:  $a = t^2 - 2t + 2$  where  $a$  is acceleration in  $m/s^2$  and  $t$  is time in seconds. The velocity and displacement of the body after 1 second was  $6\frac{1}{3} m/s$  and  $14\frac{3}{4} m$ , respectively. Find the velocity and displacement after 2 seconds. (10)
- Q7 The small cart is nudged with negligible velocity from its horizontal position at A on to the parabolic path that lies in a vertical plane, as shown in Figure 5. Neglect friction and show that the cart maintains contact with the path for all values of  $k$ .

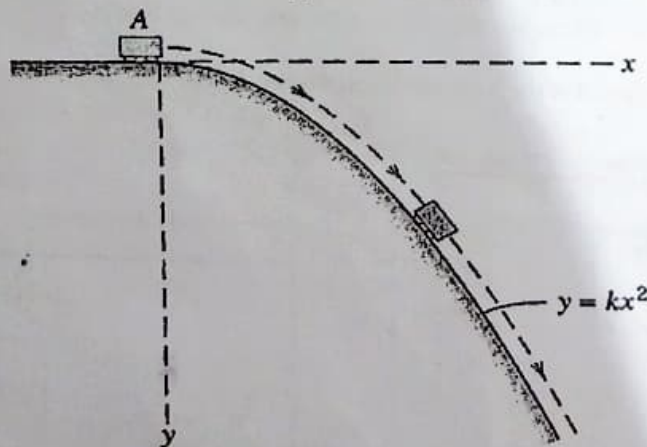


Figure 5

(10)

P.T.O.



## UNIT-IV

- Q8 In the engine system shown in **Figure 6**, the crank AB has a constant clockwise angular velocity of 2000rpm. For the crank position indicated, determine a) angular velocity of the connecting rod BD b) the velocity of piston P. (10)

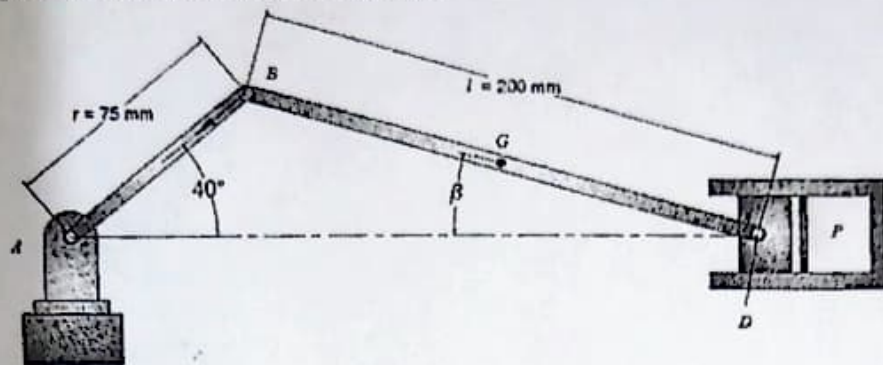


Figure 6

OR

- a) Drive work-energy theorem. (4)  
 b) Explain various types of loading and supports on beam, show them with neat figures. (6)

**END TERM EXAMINATION**

FIRST SEMESTER [B.TECH] JANUARY 2024

Paper Code: BS-113

Subject: Engineering Physics-I

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Assume missing data, if any.

- Q1 Attempt any four of the following:- (4x3=12)
- Discuss the thermodynamic system.
  - Explain simple harmonic motion with example.
  - What is the importance of extended source in thin film study?
  - What is the Rayleigh criterion for resolution of optical instruments?
  - Explain double refraction with examples.
  - Write the postulates of special theory of relativity.
  - Why the brightness of Laser is extremely high?
  - Give the expressions of momentum and angular momentum in electromagnetic fields.
- Q2 ~~(a)~~ State and explain the zeroth law of thermodynamics. What do you understand by reversible and irreversible processes? (2+2=2)
- ~~(b)~~ Discuss the concept of entropy. A 50 gram of water at 0°C is mixed with an equal mass of water at 80°C. Calculate resultant increase in entropy. (Specific heat of water is 1 calorie/gram×°C). (3+3)
- Q3 ~~(a)~~ What is Fresnel's biprism? How it can be used to determine wavelength of light? Why are Newton's rings circular? (1+4=2)
- ~~(b)~~ How wavelength of a light source can be measured using Michelson interferometer? 50 fringes cross the field of view, when the movable mirror of Michelson interferometer is displaced by 0.01475 mm. Calculate the wavelength of source. (3+2)
- Q4 (a) Write the physical interpretation of Maxwell's equations in vacuum. Derive the electric field wave equation. In free space, the electric field of electromagnetic wave is given by  $E(z,t) = 100 \cos(kz - \omega t) \hat{x}$  (V/m). Find the average power crossing a circular area of radius 1 m in y-z plane. (1+2+2)
- (b) State the Poynting theorem. Derive the work done on the charges by electromagnetic fields. If  $E(z,t) = 100 \cos(kz - \omega t) \hat{x}$  (V/m), determine the Poynting vector with proper direction. (1+4=2)
- Q5 (a) Derive the intensity distribution expression due to a single slit having width b. Plot the intensity distribution of a single slit. (6+3)
- (b) If the intensity of incident light is i.e.  $I_0 = 40 \text{ MW/cm}^2$ , calculate the intensities of first, second and third maxima? (3)
- Q6 (a) Obtain the intensity distribution expression due to N slits having slit width b and opaque width a. Write the expressions of positions of principle maxima and minima. (7+1+1)
- (b) Calculate the intensities of first, second & third principal maxima due to 5 slits. The intensity of incident light is given i.e.  $I_0 = 2 \text{ MW/cm}^2$ . (3)

P.T.O.



- Define Brewster and Malus law. Show that the intensity of the unpolarised light becomes half of the initial intensity when it is passed through a polariser. (2+2+2)
- Explain the construction and working of Nicol prism. How it can be used as polariser and analyser? (6)
- Q8 (a) What are Galilean and Lorentz transformations? Show that in the non-relativistic limit the Lorentz transformation reduces to the Galilean transformation. What will be the shape of a ring as seen by a stationary observer (i) if it is moving along one of its diameter (ii) if it is moving along the axis of the ring in the direction normal to the plane of ring? (2+2+2+2)
- (b) Why Michelson-Morley experiment is called a negative result experiment? An electron is moving with speed  $0.99c$ . Find its total energy. (2+2)
- Q9 Derive the Einstein coefficients A and B. Interpret the results obtained. Ruby Laser emits light with wavelength  $6943 \text{ \AA}$  with emission bandwidth  $10^6 \text{ Hz}$ . Calculate the coherence length of the light emitted by Ruby Laser. (3+2+2)
- (b) What is population inversion? Why two energy level system is insufficient to achieve population inversion? Explain the working of He-Ne Laser. (1+2+2)

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# END TERM EXAMINATION

FIRST SEMESTER [B.TECH] JANUARY-2024

Paper Code: ICT-101

Subject: Programming for Problem Solving

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five questions in all including Q.No.1 which is compulsory.  
Internal Choice is indicated.

Q1 Attempt all questions

(5x4=20)

- (a) What are logical operators available in C. Explain with example. (4)  
(b) Explain the concept of switch statement with an example. - control flow statements } 20  
(c) What is pointer arithmetic? Explain. (4)  
(d) What is Binary search tree? How do you create and explain its use. (4)

- (e) What are modify operators used in C? Explain the steps to solve any equation with modify operators? (6)  
(f) What is the difference between compiling and interpretation? (4) } 30

- (g) What is the difference between 'do while' and 'while' statement. Give an example. (4)  
(h) What is 2D array? Write a program to explain matrix addition and take input matrices from the user. (6)

- (i) Define structure? Write a program to explain its use through example. (4)  
(j) What is dynamic memory allocation? Explain its need and how to use. (6) } 40

- (k) What is single linked list? Explain how list is created and its use with example. (7)  
(l) Define pointer and explain its usage. (3)

- (m) What are storage classes available in C. Explain. (5)  
(n) What is the concept of call by reference in functions? (5)

- Q7 (a) How many modes files can be opened? Explain the concept of file handling in C. (6)  
(b) What is recursion? Explain the concept. (4) } 50

- Q8 (a) What is array data type? Explain where to use with example. (4)  
(b) What is the basic structure of C program? Explain significance of each part. (6) } 60

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Exam Roll No. ....

# END TERM EXAMINATION

FIRST SEMESTER (B.TECH) JANUARY-2024

Paper Code: ICT-103

Subject: Electrical Science

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five question in all including. Q.no.1 which is compulsory. Internal choice is indicated. Assume missing data, if any.

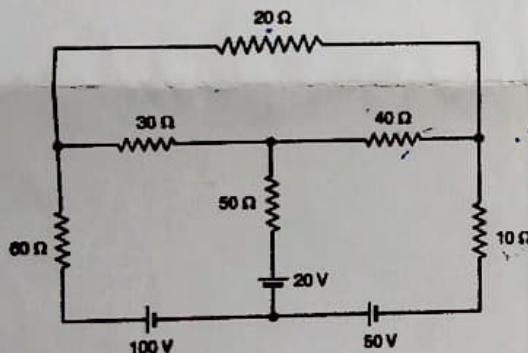
Q1. Attempt any four

(3x4=12)

- a) State Kirchoff's law.
- b) What is called synchronous speed in AC machines?
- c) What is KVA rating of a transformer?
- d) Define a slip of an induction motor.
- e) Define Real power, Reactive power and Apparent power.

Q2. Give in detail analysis of RC and RL circuits. Give relevant waveforms and mathematical derivations where necessary. (12)

Q3. Determine the currents in all branches of the circuit as shown in below figure, using Mesh current method. (12)



Q4. Give analysis of single phase AC circuits consisting of RLC combination in series and parallel. (12)

Q5. Explain 3 phase circuits giving voltages and current values in star and delta combinations. (12)

Q6. Describe the working principle and slip-torque characteristics of a three-phase Induction motor. (12)

Q7. Explain working principal of DC generators and motors. Give relevant diagrams and mathematical derivations where necessary. Also explain speed control of series motor. (12)

Q8. Explain the performance of principal of operation of single phase transformer. (12)

Q9. Explain the working principle of PMMC type equipment using torque equation. (12)

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