

END TERM EXAMINATION

SECOND SEMESTER [B.TECH] JUNE 2024

Paper Code: ES-102

Subject- Programming in 'C'

Time: 3hours

Max. Marks: 60

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

- Q1 Attempt all questions: [5x4=20]
- a) Difference between while and do-while loop?
 - b) Define different types of sorting?
 - c) Define pre-processor and its usage in programming?
 - d) Explain the basic structure and compilation process of C program?
 - e) Difference between structure and union?

UNIT-I

- Q2
- a) What is a token? Explain the different types of tokens like keyword, identifiers, constants, strings with examples? [5]
 - b) Difference between flowchart and algorithm? Write an algorithm and flowchart to find the factorial of a number? [5]
- Q3
- a) Define Operator? Explain with example different types of operator arithmetic, logical, bitwise and ternary operator? [6]
 - b) Find the output of the following program: - [4]
Int main()
{Char str1[20]= "Hello", Str2[20]= "World";
Printf("%s\n", strcpy(str2, strcat(str1, str2)));
Printf("s\n", strrev(str1));
Printf("s\n", strlen(str2));
return 0;}

UNIT-II

- Q4
- a) Define Recursion function? Write a C program to find the Fibonacci series using recursion? [5]
 - b) Define an array? Write the advantages of an array? Write a C program to transpose of amatrix? [5]
- Q5
- a) Explain call by value and call by reference with example? [5]
 - b) Define string? How it can be declared and initialized? Explain any five-string function with example? [5]

UNIT-III

- Q6
- a) Explain File Handling? What is the need for file handling? Discuss file access modes for text files: r, a, w, r+, a+, w+? [5]
 - b) What is the need of a structure? How will you access the members of a structure? Write a program to read and print the details of a person using Structure? [5]
- Q7
- a) Define Pointer with an example? How to access a variable through pointer? Write a C program to add two variables using Pointer? [5]
 - b) Define File Handling and explain its operations? [5]

P.T.O.

UNIT-IV

- Q8 a) What is Binary search? Search item 15 from the following sorted data elements using binary search. 2,5,8,10,15,24,38,59,75,90 [5]
b) What is insertion sort? Write a C program to implement insertion sort? [5]
- Q9 a) What is header file? Explain library functions of the following header files in detail :time.h, ctype.h , setjmp.h, string.h, stdarg.h, unistd.h, Stdio.h ,assert.h ,stdlib.h? [5]
b) Define Selection Sort? Sort the following elements using selection sort: 77,33,44,11,88,22,66,55, [5]

END TERM EXAMINATION

SECOND SEMESTER [B.TECH] JUNE 2024

Paper Code: BS-104

Subject: Applied Chemistry

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 Do **any six** parts: (2x6=12)
- (a) All coking coals are caking coals but all caking coals are not coking coals.
 - (b) Hydrocarbons that are poor gasoline fuels are quite good diesel fuels. Explain
 - (c) A eutectic mixture has a definite composition and a sharp melting point, yet it is not a compound. Justify.
 - (d) Describe the method of preparation of the polymer, Nylon-6, 6.
 - (e) Why is phosphate conditioning better than the carbon aye conditioning?
 - (f) A water sample contains 248 mg CaSO_4 per liter. Calculate the hardness in terms of CaCO_3 equivalent.
 - (g) Why impure metals corrode faster than pure metal under identical conditions?
 - (h) A pure metal rod half immersed in water starts corroding at the bottom. Give reason.

UNIT-I

- Q2 (a) A sample of coal was tested for its calorific value using Bomb's Calorimeter. Following data was obtained.
Weight of coal burnt = 0.920 gm.
Weight of water taken = 550 gm.
Water equivalent of bomb and calorimeter = 2200 gm.
Rise in temperature = 2.42°C
Fuse wire correction = 10 Cal
Acid Correction = 50 Cal
Assuming coal to contain C = 93%, H = 6% and ash = 1%,
Calculate gross and net calorific value of coal if the latent heat of condensation of steam is 580 Cal/gm. (4)
- (b) What are the advantages of catalytic cracking over thermal cracking? (4)
- (c) What do you understand by the term knocking in IC engine? Explain the relation between chemical structure and knocking in petrol engine. (4)
- Q3 (a) A sample of coal was analyzed as follows. Exactly 2.5 g was weighed into a silica crucible. After heating for an hour at 110°C , the residue weighed 2.415 g. The crucible was then covered with a vented lid and strongly heated for exactly 7 min at $950 \pm 20^\circ\text{C}$. The residue weighed 1.528 g. The crucible was then heated without the cover, until a constant weight was obtained. The last residue was found to weigh 0.245 gm. Calculate the percentage of moisture, volatile matter, ash and fixed carbon in the coal sample. (4)
- (b) What are gaseous fuels? Give some examples. What are the merits and demerits of gaseous fuels over solid and liquid fuels? (4)

P.T.O.

- (c) The composition by weight of a coal sample is: C = 80%; H = 6%; O = 8%, S = 1%; N = 2% and ash = 3%. Calculate minimum amount of air required for complete combustion of 1.0 kg of the coal. (4)

UNIT-II

- Q4 (a) What is a phase diagram? With the help of a well labelled diagram, explain the phase diagram of the water system. (6)
 (b) Describe the method of preparation, properties and application of the following. **(Any two)** (6)
- i. Teflon (PTFE),
 - ii. Polyacrylonitrile (PAN),
 - iii. Bakelite,
 - iv. Glyptal.

- Q5 (a) Explain the lead-silver system. How can this system be applied to the process of desilverisation of argentiferous lead? (6)
 (b) What are addition and condensation polymerization processes? Explain with examples. (6)

UNIT-III

- Q6 (a) 15g of CaCO₃ was dissolved in HCl and the solution was diluted to 1000 mL. 50 ml of this solution required 48 ml of EDTA solution, while 50 ml of sample water required 15 ml of the EDTA solution. On the other hand, 50 ml of boiled water sample, when titrated against EDTA, consumed 10 ml of the solution. Calculate each type of hardness. (5)
 (b) A sample of water on analysis has been found to contain the following impurities
 Mg (HCO₃)₂ = 14.6 mg/L; Mg (NO₃)₂ = 44.4 mg/L; MgSO₄ = 36 mg/L; MgCl₂ = 19.0 mg/L and CaCO₃ = 30 mg/L. Calculate the temporary and permanent hardness in ppm. (5)
 (c) What are the disadvantages of Zeolite process? (2)

- Q7 (a) 200 ml of a sample required 20 ml of N/50 HCl using methyl orange as indicator. Another 200 ml of the sample required 8 ml of N/50 HCl using phenolphthalein as an indicator. Express the alkalinity in terms of CaCO₃ equivalents. (5)
 (b) Write the principle of lime soda process and give the chemical reactions involved during the softening of water by the lime-soda process. (5)
 (c) Differentiate between priming and foaming. (2)

UNIT-IV

- Q8 (a) Explain the following factors influencing the rate of corrosion. (6)
- i. Temperature
 - ii. Nature of metal
 - iii. pH
- (b) Explain surface characterization technique BET and its applications (6)
- Q9 (a) Discuss the theory and mechanism of dry corrosion in detail. (6)
 (b) Write a short note on the following: (6)
- i. Use of alternative feed stocks
 - ii. Use of Innocuous reagents

P-2/2
BS-104

END TERM EXAMINATION,

SECOND SEMESTER [B.Tech] JUNE 2024

Paper Code: BS 106

Subject: Applied Physics-II

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 Answer the following questions: (4x5=20)

- Explain how the wave nature of particles give rise to uncertainty principle.
- For an electron in one-dimensional box of width 2 \AA calculate the separation between the lowest two levels in eV.
- A Bose-Einstein gas has two particles in the i th state whose degeneracy is three. Find the number of independent ways of selecting the particle in the state.
- Draw sketch illustrating (011), (123), (111) and (001) planes in cubic unit cell.
- What are Brillouin zones?

UNIT-I

- What do you mean by the dual nature of matter and wave? Describe an experiment to support it. (5)
- Set up Schrodinger equation for a free quantum particle. Discuss the properties of wave function. (3)
- Calculate the expectation value $\langle p_x \rangle$ of the momentum of a particle trapped inside a one-dimensional box. (2)

Q3 a) What is potential barrier and tunnel effect? Calculate the transmission probability for rectangular barrier for the condition of $E < V_0$, where E is the total energy of the particle. (7)

b) A particle constrained to move along the x-axis is described by the wave function

$$\psi(x) = 2x \quad 0 < x < 1$$

= 0 elsewhere
Calculate the probability of finding the particle within the interval (0, 0.4). (3)

UNIT-II

- Distinguish between quantum and classical statistics. (3)
- How many photons are present in 100 cm^2 of radiation in thermal equilibrium at 1000 K ? (3)
- Which type of statistics shall be applicable for a gas of (i) photons, (ii) electrons? Justify your answer. (4)

Q5 a) Show that the Fermi energy E_F of electrons in a metal at $T = 0$ is given by,

$$E_F = \frac{h^2}{2m} \left(\frac{3n}{8\pi} \right)^{2/3}$$

where symbols have their usual meanings. (6)

P.T.O.

- Fermi energy for Gold is 5.54 eV . Calculate the Fermi temperature, given Boltz's man constant $1.38 \times 10^{-23} \text{ JK}^{-1}$. (2)
- How white/black dwarfs explain the concept of dying star? (2)

UNIT-III

Q6 a) Find the Miller indices of a plane that makes an intercept of 3 \AA , 4 \AA and 5 \AA on the coordinate axes of an orthorhombic crystal with $a:b:c = 1:2:5$. Find the equation of the plane. (6)

b) Using Bragg's equation, argue that greater is the angle of diffraction, greater is the accuracy in determining the lattice parameter. (4)

Q7 a) Differentiate the term amorphous and crystalline and amorphous solids. Write down seven crystal system with their lattice parameters. (3)

b) Show that the number of Frenkel defects in equilibrium at a given temperature is proportional to $(Nn)^{1/2}$ where N be number of atoms and n be the interstitial atoms. (5)

c) If X-rays of wavelength 0.5 \AA are diffracted at an angle of 5° in the first order, what is the spacing between the adjacent planes of the crystal? At what angle will second maximum occur? (2)

UNIT-IV

Q8 a) What are Bloch functions? Explain the origin of allowed and forbidden energy bands for electrons in solids. What is the number of orbitals in an energy bands? (6)

b) In an intrinsic semiconductor $[E_g = 0.676 \text{ eV}]$, $m_e = 0.09 m$ and $m_h = 0.36 m$. Calculate the concentration of intrinsic charge carriers at 300 K . (2)

c) What do you understand by effective mass of an electron? Explain its significance. (2)

Q9 Write short note on (2x5=10)

- Zener Breakdown
- Tunnel diode
- LED
- Fermi energy
- PN-junction diode

P1/2

P2/2

END TERM EXAMINATION

SECOND SEMESTER [B.TECH] JUNE 2024

Paper Code: ES-108

Subject: Electrical Science

Time: 3 Hours

Maximum Marks: 60

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

Q1 Attempt all

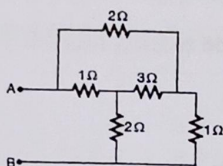
(4x5=20)

- (a) An alternating current is given by $i = 14.14 \sin 377 t$. Find the time taken for the current to reach 10 Ampere for the first time after passing through zero value.
- (b) What are the different losses in transformers?
- (c) What is the meaning of time domain analysis of first order R-L and R-C circuits?
- (d) What are the two difference between induction and synchronous motor?
- (e) What are the different torques associated with measuring instruments?

UNIT-I

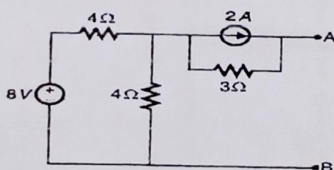
- Q2 (a) Find the equivalent resistance R_{AB} between terminal A & B in Figure 1 by Star-Delta transformation. (6)

Figure-1



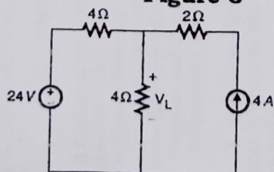
- (b) Find Thevenin's equivalent of the circuit shown in Figure 2. (4)

Figure-2



- Q3 (a) Find the voltage V_L in the circuit shown in Figure 3 using the principle of superposition. (3)

Figure-3

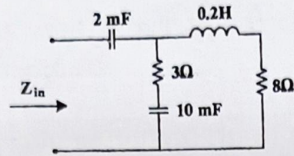


- (b) State and prove maximum power transfer theorem. (7)

UNIT-II

- Q4 (a) An inductor coil takes 10 A and dissipates 1000 W when fed from 250 V 25Hz supply. Find the impedance, resistance, inductance, and power factor of the coil. (6)
- (b) Explain the series resonance phenomenon in the series R-L-C circuit and derive the bandwidth formula of the circuit. (4)

- Q5 (a) Find the input impedance of the circuit shown in Figure 2. If circuit operates at frequency 50Hz. (6)



- (b) A 400V, 3-phase supply is connected across a balance load of three impedances each consisting of a 32Ω resistance and 24Ω inductive reactance in series. Determine the line current drawn by the load if the three impedances and source are connected star or Y-connected. (4)

UNIT-III

- Q6 (a) Explain the principal of operation and speed control methods of DC motors. (7)
 (b) Derive an expression for the emf induced in DC machine. (3)

- Q7 An 8 kW, 200 V dc generator has a full load current of 40 A at 1200 rpm. Given that the armature resistance $R_a = 0.5 \Omega$. Draw the model diagram of generator with resistive load R_L and determine the full load voltage for the generator at 900 rpm. (10)

UNIT-IV

- Q8 (a) Draw and explain the phaser diagram of a single phase transformer at no-load and full-load. (7)
 (b) Explain the details of attraction type moving iron instruments. (3)

- Q9 Write the brief notes on the following: (2x5=10)

- (a) Voltmeter and ammeter.
 (b) Moving coil instruments.
 (c) Voltage regulation in transformers.
 (d) Open and short circuit test of a transformer.
 (e) Dynamometer type instruments.

END TERM EXAMINATION

SECOND SEMESTER [B. Tech] JUNE 2024

Subject: Environmental Studies

Time: 3 Hours

Maximum Marks: 60

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

Q1

- (a) Attempt all questions.
- (b) What is meant by eutrophication? (2)
- (c) What is AIDS? What is its causative agent? (2)
- (d) What is meant by the following terms? (2)

 - (i) Thermal pollution (2)
 - (ii) Ecological succession (2)
 - (iii) Population explosion (2)

- (e) Define an ecosystem. What are its types? (2)

UNIT-I

Q2

- (a) What is Environmental Science? Discuss the multidisciplinary nature of environmental science and its importance. (4)
- (b) What is Chipko Movement? By whom and when was it started? Elaborate its social/environmental impact. (4)
- (c) What is the difference between? (4)

 - (i) Biopiracy and Bioprospecting (4)
 - (ii) Endangered species and endemic species (4)

Q3

- (a) Comment on 'India as a Mega Diversity Nation'. (4)
- (b) Difference between ex-situ conservation and in-situ conservation along with example. (4)
- (c) Explain in detail 'phosphorous cycle' along with diagrammatic representation. (4)

UNIT-II

Q4

- (a) Explain in detail the devices used for the control of air pollution with the help of diagrams. (4)
- (b) What are the different processes involved in disaster management? Elaborate with the help of case study on Japan earth quake and tsunami in 2011. (4)
- (c) What is marine pollution? What are the sources of marine pollution? (4)

Q5

- (a) Give an appraisal on recycling and reuse of solid wastes? (4)
- (b) Write a short note on: (2)

 - (i) Biodegradation (2)
 - (ii) Landfill (2)

- (c) What is radiation pollution? Explain its effects and controlling measures. (4)

P.T.O.

UNIT-III

Q6

- (a) Explain the concept of sustainable development. How do you propose that development work progresses along with sustenance of our environment? (4)
- (b) Write a note on: (2)

 - (i) Consumerism (2)
 - (ii) Kyoto Protocol (2)

- (c) What is the Environmental Impact Assessment? Explain its significance. (4)

Q7

- (a) What is the role of urbanization over environmental problems? (4)
- (b) What are the laws related to environment? State 'Water (Prevention) and Control of Pollution Act, 1974. (4)
- (c) What do you understand by carbon credits? What are its merits and demerits? (4)

UNIT-IV

Q8

- (a) What do you mean by population density? What are the consequences of population growth? (4)
- (b) What is waste land reclamation? Explain with the help of case study on Jatropa curcas cultivation. (4)
- (c) What are the various Women and Child welfare programmes launched by Govt? (4)

Q9

- (a) What do you understand by HIV? Write the transmission mode of HIV and prevention of AIDS. (4)
- (b) What is the role of IT in environment and healthcare industry? (4)
- (c) What is the aim of 'Family welfare programmes'? Discuss the problems of these welfare programmes. (4)

P-1/2
RC-110

P-2/2
RC-110

END TERM EXAMINATION

SECOND SEMESTER [B.TECH] JUNE 2024

Paper Code: BS-112

Subject: Applied Mathematics-II

Time: 3 Hours

Maximum Marks: 60

Note: Attempt any five questions including Q.No1 which is compulsory.

Select one question from each unit.

(3x4=12)

Q1 Attempt all of the following:-

- (a) Resolve $e^{\sin(x+iy)}$ into real and imaginary parts
- (b) Find the image of infinite strip $\frac{1}{4} \leq y \leq \frac{1}{2}$ under the transformation $w = \frac{1}{z}$.
- (c) Find the Laplace transform of $\frac{\cos at - \cos bt}{t}$.
- (d) Using the method of Separation of variable, solve $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$

Where $(x, 0) = 6e^{-3x}$.

UNIT-I

Q2 (a) Find the value of C_1 and C_2 such that the function (6)

$f(z) = x^2 + C_1y^2 - 2xy + i(C_2x^2 - y^2 + 2xy)$ is analytics. Also find $f'(z)$.

(b) Show that the function $u = \frac{1}{2} \log(x^2 + y^2)$ is harmonic. Find its harmonic

Conjugate. (6)

Q3 (a) State Cauchy Integral formula and hence evaluate (6)

$$\int_C \frac{3z^2 + z}{z^2 - 1} dz, \text{ where } C \text{ is the circle } |z - 1| = 1.$$

(b) Evaluate the Line Integral $\int_C z^2 dz$, Where C is the boundary of a triangle with

vertices $0, 0 + i, -1 + i$, Clockwise. (6)

UNIT-II

Q4 (a) Evaluate $\int_C \frac{z^2}{(z-1)^2(z+2)} dz$, Where C is $|z| = 3$ by using Cauchy residue theorem. (6)

(b) Evaluate Laurents series which represents the function (6)

$$f(z) = \frac{z^2 - 1}{(z+2)(z+3)} \text{ When (i) } |z| < 2, \quad \text{(ii) } 2 < |z| < 3.$$

Q5 (a) Apply the calculus of residues to evaluate (6)

$$\int_{-\infty}^{\infty} \frac{\cos x}{(x^2 + a^2)(x^2 + b^2)} dx, \quad a > b > 0.$$

(b) Let $f(z)$ be a bilinear transformation such that $f(\infty) = 1, f(i) = i$, and $f(-i) = -i$

Find the image of unit disk (c) $\{z \in \mathbb{C}; |z| < 1\}$ under (z) . (6)

P.T.O.

UNIT-III

Q6 (a) Find the Inverse Laplace transform of $F(s) = \log \left[\frac{s+a}{s+b} \right]$. (6)

(b) Find the Fourier series for $f(x) = -\pi$, $-\pi < x < 0$
 $= x$, $0 < x < \pi$

And deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$. (6)

Q7 (a) Solve $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 0$, Given $y = \frac{dy}{dt} = 0, \frac{d^2y}{dt^2} = 6$ at $t = 0$. (6)

By using Laplace transformation .

(b) Find Fourier Transform of $f(x) = \begin{cases} 1, & |x| < 1 \\ 0, & |x| > 1 \end{cases}$ (6)

Hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$.

UNIT-IV

Q8 (a) A String is stretched and fastened to two points l apart. Motion is started By displacing the string in the form $y = a \sin \frac{\pi x}{l}$ from which it is released at Time $t = 0$. Show that the displacement of any point at a distance x from One end at time t is given by $y(x, t) = a \sin\left(\frac{\pi x}{l}\right) \cos\left(\frac{\pi ct}{l}\right)$. (6)

(b) Find the temperature in a bar of length 2 whose ends are kept at zero and lateral Surface insulated if the initial temperature is $\sin \frac{\pi x}{2} + 3 \sin \frac{5\pi x}{2}$. (6)

Q9 (a) An infinitely long plane uniform plate is bounded by two parallel edges and an end At right angles to them. The breadth is π . This end is maintained at temperature u_0 At all points and the other edges are at zero temperature. Determine the temperature At any point of the plate in the steady state. (6)

(b) Solve $\frac{1}{4}u_{xx} = u_{tt}$, With Initial Condition (6)

$u(x, 0) = 0, u_t(x, 0) = 8 \sin 2x$. using by D'Alembert Principal.

58

(b) A straight rod AB, 50cm long has one end B moving with a velocity of 4m/s and the other end A moving along a vertical line YO as shown in figure 8. Find the velocity of the end A and of the midpoint of the rod when it is inclined at 60° with horizontal. (3)

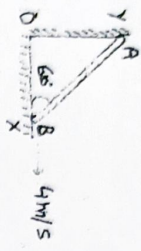


Figure 8

Q9 (a) A reciprocating engine mechanism is shown in figure 9. The crank OA is of length 15cm and rotating at 600 r.p.m. The connecting rod AB is 70cm long. Find the (i) Angular velocity of the connecting rod (ii) The velocity of piston B. (7)

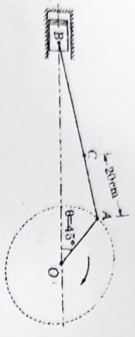


Figure 9

(b) A roller of radius 5.0 cm rides between two horizontal bars moving in the opposite directions as shown in figure 10. Calculate the distance 'd' defining the position of instantaneous centre of rotation of the roller. Assume no slip conditions at the point of contact A and B. (3)

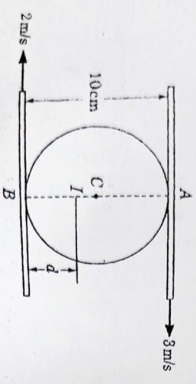


Figure 10

P-4/4
ES-114

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END TERM EXAMINATION

Exam Roll No.

Paper Code: ES-114

SECOND SEMESTER [B.TECH] June 2024
Subject: Engineering Mechanics

Time: 3 Hours

Maximum Marks: 60

Note: Attempt all question as directed. Internal choice is Indicated.

Q1 Answer the following questions (any four)

- State the principle of transmissibility of forces.
- State the mathematical condition for a rigid or a perfect truss.
- State D'Alembert's principle.
- What is the point of contraflexure in case of a beam.
- Define instantaneous centre of rotation.
- What is a self locking condition in case of a machine.

(4x5=20)

UNIT-1

Q2

- State and proof Varignon's Theorem. (3)
- Find the moment of inertia of the cross section of the iron beam [Fig. 1] with respect to the centroidal axis. (7)

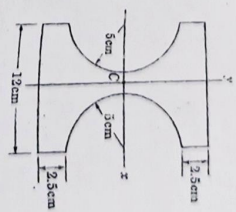


Figure 1

Q3

- State Pappus Theorem with an example. (1)
- State the prove parallel axis theorem. (3)
- Two equal weights each of 1000N is supported by a flexible string [Fig. 2]. Find the tensions in the portion AB, BC and CD of the string. (6)

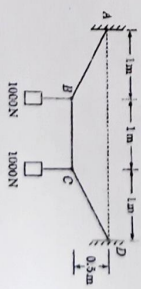


Figure 2

P-1/4
ES-114

UNIT-II

- Q4 (a) Two blocks are connected by a horizontal link AB and rest on two planes (Fig.3) What is the smallest weight W_A of the block A for which the equilibrium can exist? Assume the coefficient of friction for the block A and the horizontal surface to be 0.4 and the angle of friction for the block B on the inclined plane is 20° . (6)

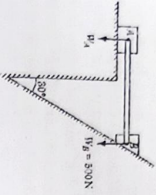


Figure 3

- (b) A truss is loaded and supported (Fig. 4). Find the axial forces in the members AB, EF and CD. (4)

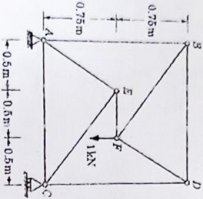


Figure 4

- Q5 (a) For a belt drive, prove that $T_1/T_2 = e^{\mu\theta}$ (3)
 (b) A truss has been loaded and supported as shown in Fig. 5. Find out the forces in all the members of the truss when joint A is hinged and joint B is roller supported. (7)

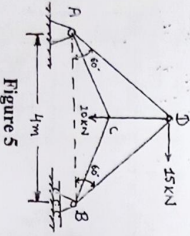


Figure 5

Q 2/4

P.T.O.

UNIT-III

- Q6 (a) A small block rests on a turn table which, starting from rest, is rotated in such a way that the block undergoes a constant tangential acceleration $a_t = 2\pi/s^2$. Determine how long it will take for the block to start slipping on the turntable and the speed v of the block at that instant. Refer Fig.6. (5)

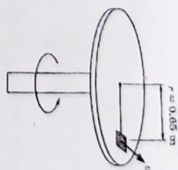


Figure 6

- (b) A sphere of weight 12N moving at 4m/sec strikes another sphere of weight 60N moving in the same direction at 0.8m/sec. Find the loss of kinetic energy during the impact and show that the direction of motion of first sphere is reversed, $e=0.75$. (4)

- Q7 (a) A passenger weighing 800N enters an elevator weighing 9kN. When the elevator accelerates upwards, the passenger experiences an apparent weight gain of 90N. When the elevator decelerates to zero velocity, the passenger experiences an apparent weight loss of 110N. Find the values of (i) Acceleration and deceleration. (ii) Elevator cable tension in the beginning and at the end. (6)

- (b) A glass ball is dropped on to a smooth horizontal floor from which it bounces to a height of 9m. On the second bounce it rises to a height of 6m. From what height the ball was dropped and what is the coefficient of restitution between the glass and the floor. (4)

UNIT-IV

- Q8 (a) Draw the shear force and bending moment diagram for a cantilever beam as shown in figure 7. Also locate the point of contraflexure, if it exists for such a beam. (7)

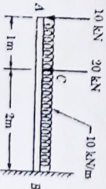


Figure 7

Q 3/4