Pimpri Chinchwad University

End-Semester Examination; May /June 2024

Program   : F.Y. B. Tech   Batch :   Semester: II

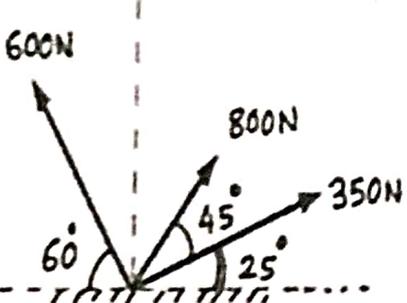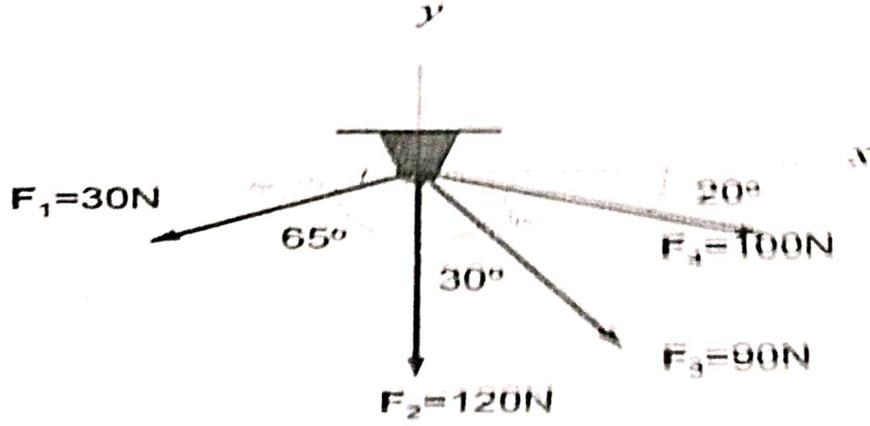Maximum Marks: 60 marks   Time: 2.5 Hrs.

**Course Name: Engineering Mechanics and Basic Civil Engineering   Course Code   : CM101**

Course Outcomes (COs):
1. To impart knowledge about resolution and composition of forces
2. To impart knowledge of free body diagrams, determine reaction of beams, calculate member forces in trusses, cables and frames using principles of equilibrium.
3. To impart knowledge to solve problems related to particle mechanics using principles of kinematics
4. To train students to solve problems related to particle mechanics using principles of kinetics
5. Apply and understand linkage of different specializations of Civil Engineering.
6. To impart knowledge of methods of surveying and building planning

Question	CO	BL	Marks
Q.1) Attempt any Two of the following **Q.1. a) Determine the magnitude and direction of the Equilibrant of the three forces acting on the rigid body as shown in the figure.** 	1	3	5
Q.1.b) Find the resultant of the coplanar concurrent force system shown in Figure. 	1	4	5

Q.1. c) Determine the Resultant force and find the resultant moment with respect to point "O" for the given force system.
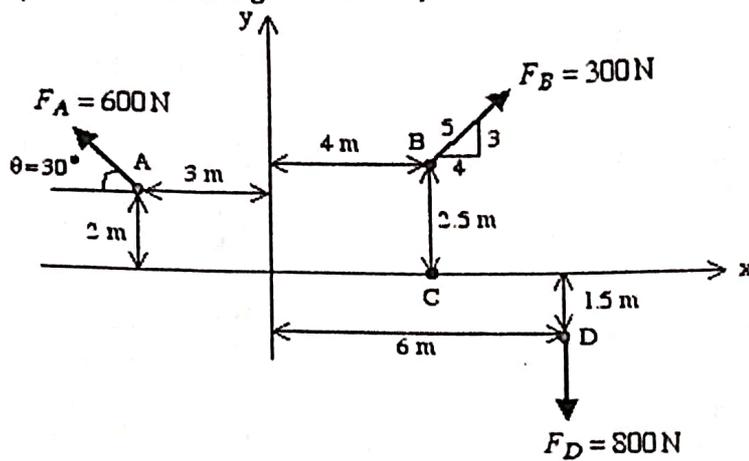
Q.2) Attempt any Two of the following

a) Find the support reactions to maintain the beam in equilibrium.
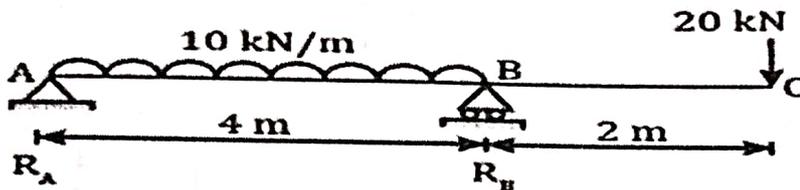
b) Find the support reactions and tension in each cables to maintain the system is in equilibrium. The weight of block 500 N is applied on the attached system as shown in figure.
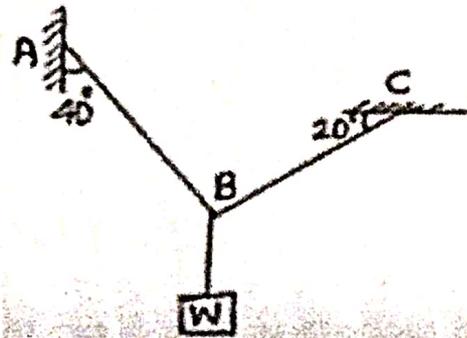
c) Determine the forces and its nature in AB, BD, DC and CA members as shown in figure.
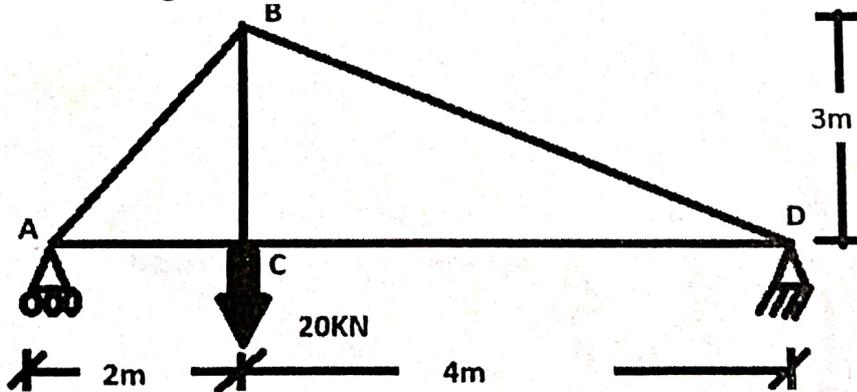
Q.3) Attempt any Two of the following

a) A ball is thrown vertically upward with an initial speed of 80 m/s from the 10 m height of building. Find the Maximum Height attends by the Ball from ground and time at which it will reach the ground.

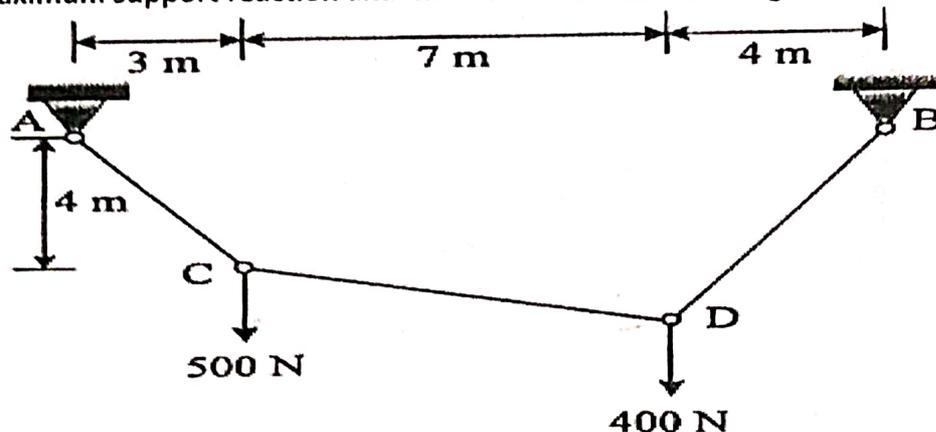|			
b) A projectile is thrown with an initial velocity of 25 m/s at an angle of 30 degree. Find the maximum height and range of the projectile.	4	3	5
c) The cable segment support the loading as shown in Figure. Determine the maximum support reaction and minimum tension in the segment of cable.	4	3	5

Q.4) Attempt any Two of the following

a) A ball has a mass of 30 kg is thrown upward with a speed of 15 m/s. Determine the time and distance travelled by the Ball before stopping. Use impulse momentum principle.	4	3	5
b) The velocity of two identical steel balls of mass 0.6 Kg before impact are V_A= 4 m/s rightward and V_b = 2 m/s leftward. After impact velocity of ball B is found to be 2.5 m/s to the right. Determine the coefficient of restitution between the blocks.	4	3	5
c) A car comes to completely rest from initial speed of 50 m/s in a distance of 100 m with the same constant acceleration. What would be the stopping distance from an initial speed of 70 m/s.	4	3	5

Q.5) Attempt any Two of the following

a) Following are the reding observed while doing profile levelling using Dumpy Level and 4 m Levelling Staff of Least count is 0.005m. 1.255, 0.575, 2.785, 3.990, 1.005, 2.525, 1.775, 0.850, 2.095, 2.010 and 2.220. The first reading is taken from Temporary Bench Mark whose R.L. is 500.000 m. Find the reduced level of the remaining stations.	5 / 6	3 / 3	5 / 5
b) Identify the system which acquire the information from far distances without being Physical content and explain about it with neat sketch.	5	2	5
c) Explain the following terms 1. Fly ash bricks 2. Bricks mortar 3. DPC 4. Pre-stress concrete			

Q.6) Attempt any Two of the following

a) Explain Remote sensing its process and GIS system.	6	2	5
b) Classify the role of Civil Engineer in planning, construction project, real estate and Infrastructural development.	6	2	5
c) Describe the principles of system which is used for trekking and navigation with suitable examples.	5	2	5

Pimpri Chinchwad University

Established under Govt. of Maharashtra Act No. V of 2023
Sate, Maval (PMRDA) Dist - Pune, Maharashtra - 412 106.

PCU'S
Pimpri
Chinchwad
University
Learn | Grow | Achieve

End-Semester Examination – May /June - 2024

Program: F. Y. B. Tech
Batch :2023-24
Semester: II (Regular)

Maximum Marks: 60 marks
Time: 2.5 Hrs.

Course Name: Advanced C Programming   **Course Code: UBTFY112**

Course Outcomes (CO):

CLO1: Illustrate and explain the basic computer concepts and programming principles of C language.

CLO2: Understand and solve simple and complex mathematical problems

CLO3: Develop C programs to solve simple engineering problems using Pointers

CLO4: Implement C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.

Instructions:
1. *Attempt all questions as per the instruction given.*
2. *Assume missing data suitably, if any.*

Question	CO	BL	Marks
Q.1) Attempt ANY TWO of the following a) Explain how one-dimensional arrays are implemented using loops with sample C program. b) What is string? Explain in detail with sample C program. c) Write C program to concatenate two strings with or without using string handling function. Accept strings from the user.	CO 4 CO 1 CO 2	BL 4 BL 1 BL 2	(10 marks) 5 5 5
Q.2) Attempt ANY TWO of the following a) Enlist the categories of user defined functions in C and explain (any two) in short with necessary pseudocode/syntax. b) Write sample C code to explain nesting of functions. c) Write C code for finding Fibonacci series with recursion.	CO 2 CO 4 CO 4	BL 2 BL 2 BL 3	(10 marks) 5 5 5
Q.3) Attempt ANY TWO of the following a) Write a program in C to store n elements in an array and print the elements using a pointer. b) What is pointer? Describe significance and limitations of pointers along with its applications. c) Differentiate in between calloc() and malloc() functions with necessary syntax.	CO 4 CO 3 CO 2	BL 3 BL 2 BL 3	(10 marks) 5 5 5

Question	CO	BL	Marks
Q.4) Attempt ANY TWO of the following a) Write a C program to swap values of two elements. Use function and pass argument using call by value. b) Write C code to declare and access the pointer variable. c) Write a C program to find average of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function.	CO 4 CO 3 CO 4	BL 3 BL 2 BL 3	(10 marks) 5 5 5
Q.5) Attempt ANY TWO of the following a) Write a sample C program using an array of structures. b) Define structure in C. Write sample C code to display the various approaches of variable declaration. c) Explain with necessary syntax the concept of union in C along with different ways to define union variable.	CO 4 CO 3 CO 4	BL 2 BL 3 BL 3	(10 marks) 5 5 5
Q.6) Attempt ANY TWO of the following a) Enlist and explain the difference of structure and union. b) Explain with sample C program the usage of sizeof() operator for malloc() function. c) What are the advantages and disadvantages for array of structures.	CO 4 CO 3 CO 2	BL 2 BL 3 BL 2	(10 marks) 5 5 5

Pimpri Chinchwad University

Established under Govt. of Maharashtra Act No. V of 2023
Sate, Maval (PMRDA) Dist - Pune, Maharashtra - 412 106.

End-Semester Examination – May /June - 2024

Program	: B. Tech 1st Year	Batch : 2023-2024	Semester:I/II

Maximum Marks: 60 marks   Time: 2.5 hrs.

Course Name: Basic Electronics Engineering   **Course Code : UBTFY 105**

Course Outcomes (CO):

1: Describe the operation of diode and their role in simple electronic applications.
2: Understand the operation of BJT, and MOSFET and Compare it.
3: Use of Operational Amplifier for various applications.
4: Study and Classify active and passive sensors.
5: Understand the basic principles of communication systems and measure the modulation index of AM/FM.
6: Build and Test digital circuits using universal/basic gates.

Instructions :

1) All questions are compulsory

2) Assume suitable data wherever necessary

NotesSociety

Question	CO	BL	Marks
			(10 marks)
Q.1) Attempt ANY TWO of the following a) Draw the bridge rectifier and explain it with waveforms.	CO1	3	5
b) Draw the block diagram of regulated power supply and explain in detail.	CO1	3	5
c) Explain relation between α & β, and also derive expression of emitter current.	CO2	2	5
Q.2) Attempt ANY TWO of the following a) Analyse Op-amp as a Subtractor with neat diagram.			
b) Prove that $V0 = 1 + Rf/R1$ with diagram.	CO3	4	5
	CO3	5	5
c) Compare CE, CB & CC configuration	CO2	5	5
Q.3) Attempt ANY TWO of the following a) Which transducer used for measurement of temperature and explain in details	CO4	1	**(10 marks)** 5
b) Explain the gas sensor in detail	CO4	2	5
c) Explain the bio sensor in detail.	CO4	2	5

Q.4) Attempt ANY TWO of the following a) Draw the block diagram of AM transmitter and explain in detail.	CO5	3	**(10 marks)** 5
b) What is Cellular system and state their features. Also explain Frequency reuse concept.	CO5	1,2	5
c) Derive the equation for FM wave and draw the FM wave.	CO5	5	5
Q.5) Attempt ANY TWO of the following a) State the de-Morgan's theorem and prove it. b) Solve the following using 2's Complement 1) 7-5 2) 5-7	CO6 CO6	4 5	**(10 marks)** 5 5
c) Draw the block diagram of 8051 and explain each block in detail.	CO6	3	5
Q.6) Attempt ANY TWO of the following a) Explain the any one strain gauge transducer with diagram. b) What is modulation. Compare AM and FM c) Solve the following 1) $(35.45)_{10}= (\ \ )_8$ for 2 marks 2) $(9B2.1A)_{16}= (\ \ )_{10}$ for 2 marks 3) $(1101100010011011\ )_2 = (\ \ )_{16}$ for 1 marks	CO4 CO5 CO6	2 1 5	**(10 marks)** 5 5 5

Pimpri Chinchwad University

Established under Govt. of Maharashtra Act No. V of 2023
Sate, Maval (PMRDA) Dist - Pune, Maharashtra - 412 106.

End-Semester Examination – May /June - 2024

Program : BTech-First year   Batch : 2023-2027   Semester: I/II

Maximum Marks: 60 marks   Time: 2.5 hrs.

Course Name: Engineering Physics   Course Code : UBTFY103

Course Outcomes (CO):

1. Understand, analyze, and apply the concepts of reflection, refraction, and diffraction for various engineering applications and perform lab experiment based on these phenomena.
2. Interpret crystal structure theory and semiconductor Physics, and their application in the field of solid-state Physics.
3. Illustrate the working principle of laser, their prominent applications and hands-on experience through lab practical.
4. Acquire fundamental understanding of magnetism, interpret properties superconductors, and their applications in advanced technologies.
5. To distinguish wave behavior of a matter particle for the manipulation of the processes at quantum scale.
6. Understand the basic properties of nanostructures/nanomaterials and their modeling and applications on the basis of quantum Physics.

Instructions: - All questions are compulsory.
- The symbols here have their usual meanings.
- Assume suitable data, if necessary.

Question	CO	BL	Marks
Q.1) A. Attempt ANY TWO of the following			**(20 marks)**
a) Describe the Simple cubic (SC) crystal structure with a suitable diagram and find the packing fraction for it.	CO2	BL3	5
b) Determine the Miller indices for the planes (3 3 4) and (3 3 3).	CO2	BL3	5
c) Describe in brief the term total internal reflection with suitable diagrams.	CO1	BL1	5
Q.2) A. Attempt ANY TWO of the following			
a) What are coherent and incoherent sources of light? Describe briefly with a suitable wave diagram.	CO3	BL1	5
b) Describe the population inversion and write any 4 methods by which it can be achieved.	CO3	BL2	5
c) What is anti-reflecting (AR) coating. Write the conditions for a thin film to act as an AR coating.	CO1	BL2	5
Q.3) Attempt ANY TWO of the following			**(10 marks)**
a) Explain the following terms: Magnetization, Magnetic susceptibility, Curie temperature and Neel temperature.	CO4	BL1	5
b) At zero magnetic field a superconducting material has a critical temperature of 4.7 K and a magnetic field of 0.0306 Tesla at 0 K. Find the critical field at 2.5 K.	CO4	BL4	5

(P.T.o.)

c) Describe the BCS theory of superconductivity with suitable diagrams.	CO4	BL2	5
Q.4) Attempt ANY TWO of the following			**(10 marks)**
a) Derive the De Broglie wavelength relation for an electron which is accelerated through a potential difference of V.	CO5	BL3	5
b) Write the conditions for an acceptable wave function. Is $\psi = x^2$ an acceptable wave function? Explain the reasons.	CO5	BL3	5
c) A metal whose work function is 4.2 eV is irradiated by radiation whose wavelength is 2000 A. Find the maximum kinetic energy emitted electron in eV.	CO5	BL4	5
Q.5) Attempt ANY TWO of the following			**(10 marks)**
a) How nanomaterials can be synthesized? Explain Sol-gel method with suitable diagrams.	CO6	BL2	5
b) Differentiate between the properties of Nano and bulk materials based on the surface to volume ratio.	CO6	BL3	5
c) If edge length of two cubes is 3 cm and 2 cm respectively then which cube is having the bigger surface to volume ratio. Calculate the answer.	CO6	BL4	5
Q.6) Attempt ANY TWO of the following			**(10 marks)**
a) Explain adiabatic demagnetization with suitable diagram.	CO4	BL2	5
b) Determine the De Broglie wavelength of an electron which is moving with a velocity of 5.5×10^6 m/s. Given the mass of an electron is 9.1×10^{-31} kg.	CO5	BL4	5
c) Describe the principle of energy dispersive X-ray analysis method with suitable diagrams.	CO6	BL2	5

PCET's Pimpri Chinchwad University

Pimpri Chinchwad University
Established under Govt. of Maharashtra Act No. V of 2023
Sate, Maval (PMRDA) Dist - Pune, Maharashtra - 412 106.

Learn | Grow | Achieve

End-Semester Examination – May /June - 2024

Program: F.Y.B.Tech. (All) Batch : 2023-27 Semester: II (Regular)

Maximum Marks: 60 marks Time: 2.5 hrs.

Course Name: Integral Calculus and Numerical Techniques. **Course Code : UBTFY102**

Course Outcomes (CO):

1. To Demonstrate ability to solve a variety of differential equations (ordinary differential equations) using appropriate methods and techniques.
2. To utilize integration techniques for solving complex integrations.
3. To determine the area, volume of various surfaces & three dimensional objects.
4. To apply vector calculus to modernized techniques in various computing systems.
5. To implement appropriate numerical techniques to approximate solutions for differential equations, optimization problems, linear algebraic equations & interpolation methods to construct approximate functions.

Instructions:

1. All questions are compulsory.
2. Assume suitable and necessary data wherever required

Question	CO	BL	Marks
Q.1) **Attempt ANY TWO of the following**			**(10)**
a) Solve the following differential equations $\left(xy + 2x^2 y^2\right) y\,dx + \left(xy - x^2 y^2\right) x\,dy = 0$	CO1	BL2	5
b) By using rule of DUIS, Prove that $\int_0^\infty \dfrac{e^{-ax} - e^{-bx}}{x}\,dx = \log\left(\dfrac{b}{a}\right)$; $a > 0$, $b > 0$.	CO2	BL3	5
c) Evaluate $\iint\limits_R \dfrac{x^2 y^2}{x^2 + y^2}\,dx\,dy$ over annulus region between the circle $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$	CO3	BL3	5
Q.2) **Attempt ANY TWO of the following**			**(10)**
a) Water at temperature $100°C$ cools in 10 minutes to $88°C$ in a room of temperature $25°C$. Find temperature of water after 20 minutes?	CO1	BL3	5
b) Evaluate : $\int_0^1 x^3 \left(1 - \sqrt{x}\right)^3 dx$	CO2	BL3	5
c) Find the volume of cylinder $x^2 + y^2 = 9$ intercepted by the plane $z = 1$ and $z = 4$.	CO3	BL3	5

Q.3) **Attempt ANY TWO of the following** (10)

a) Find the directional derivative of $\varphi = xy^2 + yz^2 - zx^2$ at the point $P(-1, 3, 4)$ in the direction of the line PQ where $Q(1, 2, 2)$.   CO4   BL2   5

b) If $\bar{F} = (3x^2 + 6y)\,\bar{i} - 14yz\,\bar{j} + 20xz^2\bar{k}$ then evaluate $\int_C \bar{F} \cdot d\bar{r}$ from $(0,0,0)$ and $(1,1,1)$ along the path $C : x = t, y = t^2, z = t^3$ CO4   BL2   5

c) By Stoke's theorem evaluate $\int_C \bar{F} \cdot d\bar{r}$ for $\bar{F} = 4y\bar{i} + 2z\,\bar{j} + 6y\bar{k}$ along the boundary of triangle bounded by $x = 1, y = 0, y = x$ CO4   BL3   5

Q.4) **Attempt ANY TWO of the following** (10)

a) Find a real root of the equation $x^3 - 2x - 5 = 0$ using secant method correct to three decimal places taking $x_0 = 2$. and $x_1 = 3$.   CO5   BL3   5

b) Find Lagrange's interpolating polynomial passing through set of points $(0,2), (2,-2), (3,-1)$. Use it to find $x = 1.7$ and $\dfrac{dy}{dx}$ at $x = 1$.   CO5   BL3   5

c) Given that   CO5   BL3   5

x	0	1	2	3	4
y	1	5	25	100	250

using Newton's forward formula, find the value of y when $x = 0.5$.

Q.5) **Attempt ANY TWO of the following** (10)

a) Find the root of the equation $x - e^{-x} = 0$ that lies between 0.5 and 1 by Newton-Raphson method correct to four decimal places.   CO5   BL3   5

b) Find the area bounded by the curve $f(x) = \dfrac{1}{1+x}$ and the x-axis from $x = 0$ to $x = 3$ by taking 7 ordinates using Trapezoidal rule.   CO5   BL3   5

c) Evaluate $\int_0^\pi \dfrac{\sin^2 x}{5 + 4\cos x}\,dx$, by Simpson's $\dfrac{3}{8}^{th}$ rule, taking $h = \dfrac{\pi}{6}$ CO5   BL3   5

Q.6) **Attempt ANY TWO of the following** (10)

a) Use Simpson's $\left(\dfrac{1}{3}\right)^{rd}$ rule to evaluate $\int_0^{0.8} e^{-x^2}\,dx$ by taking $h = 0.1$ CO5   BL3   5

b) Use the Runge-Kutta fourth order method to find the value of y when $x = 0.2$, given that $\dfrac{dy}{dx} = y + xy; y(0) = 1$ [Taking h = 0.2].   CO5   BL3   5

c) Use modified Euler's method to find the value of y satisfying the equation $\dfrac{dy}{dx} = \log_e (x + y); y(1) = 2$ for $x = 1.2$ taking $h = 0.2$ correct up to three decimal places.   CO5   BL3   5

*****