

Dr. D. Y. PATIL INSTITUTE OF TECHNOLOGY PIMPRI, PUNE-411 018

DEPARTMENT OF FIRST YEAR ENGINEERING

CLASS: F.E. - (SEM – II)

Assignment-3

SUB: Engineering Physics

ACADEMIC YEAR: 2022-23

CO	Statement	POs
CO3	Understand concepts and principles in quantum mechanics. Relate them to some applications	1, 2, 8

No.	Questions	Marks	CO	Bloom Level
1	Explain de Broglie hypothesis. Derive the equation of de Broglie wavelength in terms of K.E and of an electron.	05	CO3	L2
2	State and explain Heisenberg's uncertainty principle.	04	CO3	L5
3	Derive Schrodinger's time independent wave equation.	06	CO3	L2
4	Derive the equation of wave function of the particle enclosed in one dimensional rigid box (infinite potential well) of length L. Draw the representation of the wave function and its probability density.	06	CO3	L2
5	Explain tunneling effect and give brief explanation about its use in tunnel diode.	04	CO3	L2
6	Lowest energy of an electron trapped in a potential well is 38 eV. Calculate the width of the well.	04	CO3	L3

**Dr. D. Y. PATIL INSTITUTE OF TECHNOLOGY PIMPRI, PUNE-411
018**

DEPARTMENT OF FIRST YEAR ENGINEERING

CLASS: F.E.

Assignment 3

SUB: Basic Electrical Engineering

ACADEMIC YEAR: 2022-23

COs	Statement	POs
3	Students will be able to derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram	1,2,3,4,5,6,9,10,12

Q. No	Question Statement	CO Mapping	Blooms Level	Marks
1	Define and state the unit of admittance, conductance and susceptance.	CO114.3	3	04
2	The series circuit having resistance 5Ω and inductance $0.1H$ and capacitance of $150\mu F$ is connected to 1 phase, 200V, 50Hz AC supply. Calculate (i) Inductive reactance (ii) capacitive reactance (iii) Net reactance (iv) Impedance (v) current drawn by the circuit and power factor	CO114.3	3	06
3	Obtain the expression for current and power when voltage $v=V_m \sin \omega t$ is applied across purely resistive circuit. also draw waveform for voltage, current and power on common X-axis. A coil having resistance of 7Ω and an inductance of $31.8mH$ is connected to 230V, 50Hz supply. Calculate-	CO114.3	1	06
4	i. The circuit current ii. Phase angle iii. Power factor iv. Power consumed v. Voltage drop across resistance and inductor	CO114.3	3	05
5	What is series resonance? Derive the expression for the resonant frequency The series circuit having resistance 5Ω and capacitance of $150\mu F$ is connected to 1-phase, 200V, 50Hz AC supply. Calculate-	CO114.3	1,3	05
6	i. Impedance ii. Current drawn by the circuit iii. Power factor iv. Active and reactive power	CO114.3	3	05

COs	Statement	POs
3	Demonstrate significant experience with the Python program development environment.	1,2,3,4,5 11,12

Que. No:	Question Description	Marks	CO	Blooms Level
Que.01	Explain variable scope and lifetime with suitable example.	5	3	L1
Que.02	Explain Required argument & Keyword argument type with example.	5	3	L2
Que.03	What is lambda or anonymous functions in python? Explain with example	5	3	L2
Que.04	Explain return statement with example.	5	3	L1
Que.05	Write a program using function for a) Factorial of a positive number b) Check the given number is even or odd	5	3	L3

Dr. D. Y. PATIL INSTITUTE OF TECHNOLOGY PIMPRI, PUNE-411 018
DEPARTMENT OF FIRST YEAR ENGINEERING

CLASS: F.E. - (SEM – II)

Assignment 3

SUB: Engineering Mathematics - II

ACADEMIC YEAR: 2022-23

COs	Statement	POs
2	The student will be able to learn advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.	1,2,3,12

Que. No.	Question Description	Marks	CO	Blooms Level
Que.1	If $I_n = \int_0^{\pi/4} \tan^n x \, dx$, then prove that $I_n = \frac{1}{n-1} - I_{n-2}$	5	2	L3
Que.2	If $I_n = \int_0^{\pi/2} x^n \cos^n x \, dx$, then prove that $I_n = \left(\frac{\pi}{2}\right)^n - n(n-1)I_{n-2}$	5	2	L3
Que.3	Evaluate $\int_0^\infty \sqrt{x} \cdot e^{-x^3} \, dx$	5	2	L3
Que.4	Evaluate $\int_0^1 x^3 \cdot (1 - \sqrt{x})^5 \, dx$	5	2	L3
Que.5	Prove that $\int_0^\infty \frac{e^{-ax} \sin x}{x} \, dx = \cot^{-1} a$	5	2	L3
Que.6	Prove that $\int_0^\infty e^{-x^2 - 2bx} \, dx = \frac{\sqrt{\pi}}{2} e^{b^2} [1 - \operatorname{erf}(b)]$	5	2	L3

COs	Statement	POs
3	Student will be able to demonstrate the knowledge of advanced engineering materials for various engineering applications.	1,2,7,9,11,12

Que. No:	Question Description	Marks	CO	Blooms Level
Que.01	What are biodegradable Polymers? Give important features of biodegradable polymers. How are they classified? Give the structure, properties and applications of PHBV.	6	3	BL1 & BL5
Que.02	What are conducting polymers? What are the structural requirements for a polymer to be conducting? Explain intrinsically and extrinsically conducting polymers. How conductivity of intrinsically conducting polymers (ICP) can be increased using doping process? Explain with suitable examples.	5	3	BL2
Que.03	What are polymer composites? What are the constituents of polymer composite? What is carbon fibre reinforced polymer composites? Give advantages and applications of carbon fibre reinforced polymer composites.	6	3	BL1
Que.04	What are electroluminescent Polymers? Give structure, properties and applications of electroluminescent Polymer polyphenylene vinylene (PPV). Explain construction and working of basic polymer LED based on PPV.	4	3	BL2
Que.05	What are nanomaterials? Give classification of nanomaterials with examples. Explain following properties of nanomaterials with suitable example: a)Optical property, b] Electrical property, c] Mechanical property.	6	3	BL5

Que.06	<p>What are carbon nanotubes? Discuss the different types of carbon nanotubes with respect to their structure. State different applications of CNT based on</p> <p>a] Structural properties b] Electrical properties c] Chemical properties.</p>	5	3	BL1 & BL5
Que.07	<p>What are Quantum dots? Explain with suitable examples different types of semiconductor quantum dots. What are the main properties and applications of Quantum dots?</p>	5	3	BL 1& BL5
Que.08	<p>Explain the structure of Graphene with the help of diagram. Give properties and applications of graphene.</p>	4	3	BL5

COs	Statement	POs
3	Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.	1,2,3,9,12

Que. No:	Question Description	Marks	CO	Blooms Level
Que.01	Convert the following numbers: 1. $(1101101)_2$ to $(\dots)_{10}$ 2. $(197.56)_{10}$ to $(\dots)_2$ 3. $(1762.46)_8$ to $(\dots)_{16}$ 4. $(2AB)_{16}$ to $(\dots)_8$ 5. $(6534.04)_8$ to $(\dots)_{10}$ 6. $(420.6)_{10}$ to $(\dots)_8$ 7. $(AF9.B0D)_{16}$ to $(\dots)_2$ 8. $(10110)_2$ to $(\dots)_{16}$	5	3	L3
Que.02	Add the following binary numbers a. $1011+1101+1001+1111$ b. $10111.101+110111.01$ c. $1010.11+1101.0+1001.1+1111.11$	5	3	L3
Que.03	Subtract the following binary numbers a. $1011 - 101$ b. $1100.10 - 111.01$ c. $10001.01 - 1111.11$	5	3	L3
Que.04	Explain the following gates with truth table. i) AND ii) NAND iii) Ex-OR iv) Ex-NOR	5	3	L2
Que.05	State and Prove De-Morgans theorems.	5	3	L1,5
Que.06	Explain NAND and NOR as universal gates	5	3	L2
Que.07	Explain the working of full adder with the help of truth table and give equations for sum and carry.	5	3	L2

Que.08	Draw and explain JK flip Flop using truth table.	5	3	L2,3
Que.9	Explain with block diagram microcontroller. Also compare microcontroller with microprocessor.	5	3	L2,4
Que.10	Explain with block diagram microprocessor.	5	3	L2

COs	Statement	POs
3	Student will be able to calculate reactions of a beam and to find internal forces in cables using equations of equilibrium.	1,2,3,4,5, 11,12

Que. No:	Question Description	Marks	CO	Blooms Level
Que.01	A system of connected flexible cables shown in Fig.01 is supporting two loads 400N and 500N at points B and D. Determine tensions in various segments of the cable.	5	3	L2

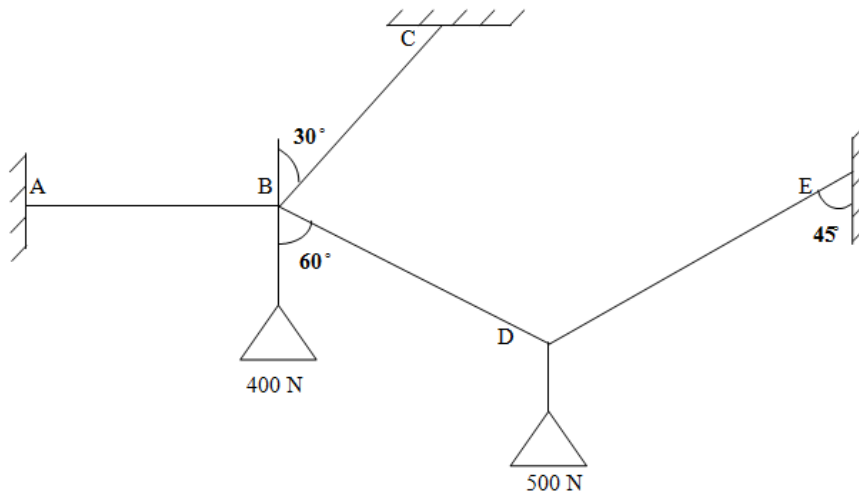


Fig.01

Que.02	Two smooth spheres of radius 150 mm each and weighing 250N each rest in a horizontal channel having vertical walls, the distance between the walls being 560mm. Find the reactions at the points of contact A, B, C and D. Fig.02.	5	3	L2&L3
--------	---	---	---	-------

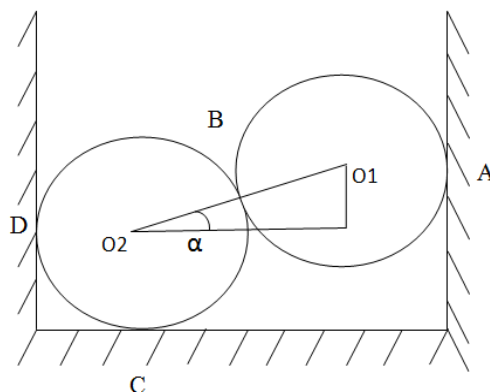


Fig.02

Que.03 Determine the support reaction for the beam loaded & supported as shown **Fig.03**. That 50 kN force is inclined at 30° to the horizontal. 5 3 L2

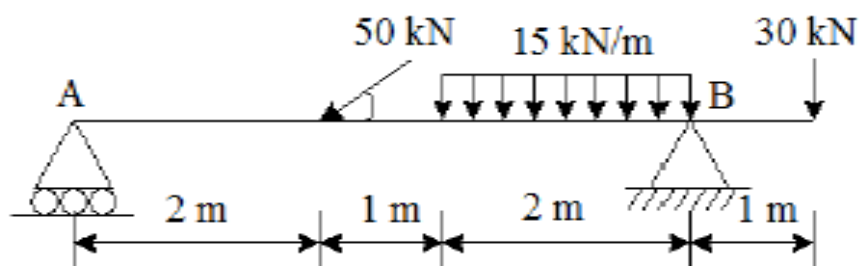


Fig.03

Que.04 Determine reaction at A and B for the beam loaded and supported as shown in **Fig.04**. 5 3 L2

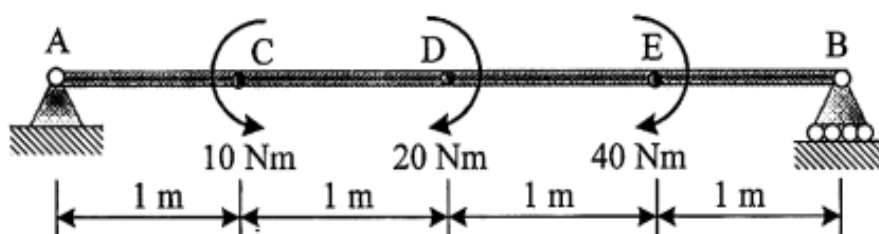


Fig.04

Que.05 Determine the resultant of two forces. Refer **Fig.05** 5 3 L3

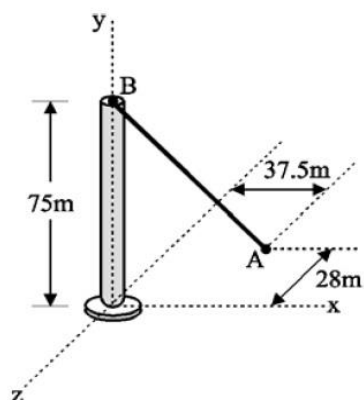


Fig. 05

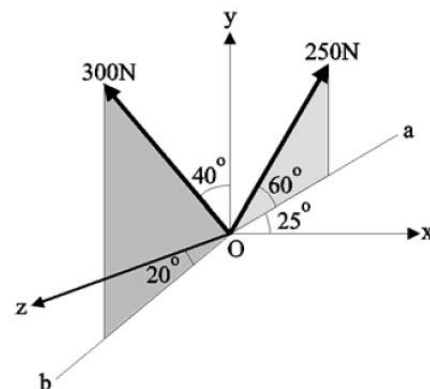


Fig.06

Que.06 A wire is connected by a bolt at A. If tension in wire is 3 kN, determine components of force acting at A and θ_x , θ_y & θ_z . Refer **Fig.06** 5 3 L3