



Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai - 400058



END SEMESTER/ DE-EXAMINATION MAY 2025/JUNE 2025

Program: First Year Engineering (Civil)

Duration: 3 Hours

Course Code: BS-BTC201

Maximum Points: 100

Course Name: Integral Calculus and Differential Equations

Semester: II

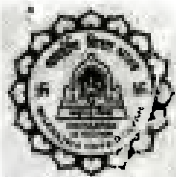
Note:

1. Attempt Any Five Questions
2. Answers to the sub questions should be grouped together

	Questions	Points	CO	BL	Module
1	a Solve $(D^3 + 1)y = (e^{-x} + 1)^2$	6	CO1	BL3	2
	b Evaluate $\int_0^3 \int_0^{\sqrt{9-y^2}} \sqrt{9-x^2-y^2} dx dy$	6	CO2	BL5	3
	c Evaluate $\iiint_V \frac{1}{(1+x+y+z)^3} dx dy dz$ over the volume of the tetrahedron bounded by the planes $x=0, y=0, z=0$ and $x+y+z=1$	8	CO3	BL4	4
2	a Find the volume bounded by the cylinder $x^2 = y, y^2 = x$ and the planes $z=0, x+y+z=2$.	6	CO3	BL3	5
	b Change the order of double integral $\int_0^a \int_{\sqrt{a^2-x^2}}^{x+3a} f(x,y) dx dy$	6	CO2	BL2	3
	c Solve $(D^2 + 9)y = \tan 3x$	8	CO1	BL4	2

**END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025**

3	a	Evaluate $\int_0^{\infty} x e^{-x^3} dx \cdot \int_0^{\infty} x^2 e^{-x^4} dx$	6	CO2	BL5	SL
	b	Solve $(x\sqrt{x^2+y^2}-y)dx + (y\sqrt{x^2+y^2}-x)dy = 0$	6	CO1	BL4	1
	c	Evaluate $\iint_R \frac{1}{\sqrt{1-x^2-y^2}} dx dy$, where R is the region of ellipse $2x^2 + y^2 = 1$ in the first quadrant.	8	CO2	BL5	3
4	a	Solve $(D^2 + 3D + 2)y = e^{-x} \sin\left(\frac{x}{2}\right)$	6	CO1	BL5	2
	b	Find the area included between the curves $x^2 = 8y$ and $y^2 = 8x$	6	CO3	BL3	5
	c	Change the order of double integral and evaluate $\int_0^2 \int_{\sqrt{2x}}^2 \frac{y^2}{\sqrt{y^4-4x^2}} dx dy$	8	CO2	BL4,5	3
5	a	Solve $(3x^2y^4 + 2xy)dx + (2x^3y^3 - x^2)dy = 0$	6	CO1	BL5	1
	b	Evaluate $\iint_R xy(x+y) dx dy$ where R is the region bounded between the curves $x^2 = y$ and $x = y$	6	CO2	BL3	3
	c	Given $\frac{dy}{dx} = 1 + xy$; $y(0) = 2$. Find $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method.	8	CO1	BL4	1
6	a	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}} dx \cdot \int_0^{\frac{1}{2}} \sqrt{3y-9y^2} dy$	6	CO2	BL5	SL
	b	Evaluate $\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{1}{(a^2 + x^2 + y^2)^{\frac{3}{2}}} dx dy$ by changing to polar	6	CO2	BL3	3



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END SEMESTER/ ~~R2~~ EXAMINATION MAY 2025/JUNE 2025

		coordinates				
	c	Solve $\frac{dy}{dx} + x^3 \sin^2 y + x \sin 2y = x^3$	8	CO1	BL4	1
7	a	Evaluate $\iiint_V xyz(x^2 + y^2 + z^2) dx dy dz$ over the first octant of the sphere $x^2 + y^2 + z^2 = 16$	6	CO2	BL5	4
	b	Given that $\frac{dy}{dx} - 2y = 3e^x$ with $y(0) = 1$. Find $y(0.1)$, $y(0.2)$ using Taylor's series method	6	CO1	BL4	1
	c	Solve $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 20y = (x^2 + 1)^2$	8	CO1	BL3	2



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END-SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

Program: First Year Engineering (Civil)

Sem II

Duration: 3 Hours

Course Code: BS-BTC201

Maximum Points: 100

Course Name: Integral Calculus and Differential Equations

Semester: II

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23/6/25

	Questions	Points	CO	BL	Module
1	a Solve $(D^2 + 7D + 12)y = e^{-2x} \cosh x$	6	CO1	BL3	2
	b Evaluate $\int_0^2 \int_0^{x^2} x(x^2 + y^2) dx dy$	6	CO2	BL5	3
	c Evaluate $\iiint_V (x + y + z) dx dy dz$ over the volume of the tetrahedron bounded by the planes $x = 0, y = 0, z = 0$ and $x + y + z = 1$	8	CO3	BL4	4
2	a Find the volume bounded by the cylinder $x^2 = y, y^2 = x$ and the planes $z = 0, z = 3$.	6	CO3	BL3	5
	b Change the order of double integral $\int_0^a \int_{\sqrt{a^2 - x^2}}^{x+3a} f(x, y) dx dy$	6	CO2	BL2	3
	c Solve $(D^2 + 4)y = \sec 2x$	8	CO1	BL4	2

**END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025**

3	a	Evaluate $\int_0^{\infty} \frac{e^{-x^3}}{\sqrt{x}} dx \cdot \int_0^{\infty} x^4 e^{-x^6} dx$	6	CO2	BL5	SL
	b	Solve $(1 + 2x\sqrt{x^2 - y^2}) dx - 2y\sqrt{x^2 - y^2} dy = 0$	6	CO1	BL4	1
	c	Evaluate $\iint_R e^{2x+3y} dx dy$, where R is the region of the triangle bounded by the straight lines $x = 0, y = 0, 2x + 3y = 1$	8	CO2	BL5	3
4	a	Solve $(D^2 + 9)y = x \cos x$	6	CO1	BL5	2
	b	Find the area included between the curves $x^2 = y$ and $x + y = 2$	6	CO3	BL3	5
	c	Change the order of double integral and evaluate $\int_0^1 \int_0^{\sqrt{1-y^2}} \frac{x}{(1+x^2)\sqrt{1-y^2-x^2}} dx dy$	8	CO2	BL4, 5	3
5	a	Solve $(x^4 + y^4) dx - xy^3 dy = 0$	6	CO1	BL5	1
	b	Evaluate $\iint_R xy(x+y) dx dy$ where R is the region bounded between the curves $x^2 = y$ and $x = y$	6	CO2	BL3	3
	c	Given $\frac{dy}{dx} = x^2 - y$; $y(0) = 1$. Find $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method.	8	CO1	BL4	1
6	a	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}} dx \cdot \int_0^{\frac{1}{3}} \sqrt{3y-9y^2} dy$	6	CO2	BL5	SL
	b	Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} e^{-(x^2+y^2)} dx dy$ by changing to polar coordinates	6	CO2	BL3	3



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

	c	Solve $\frac{dy}{dx} + \frac{2y}{x} + x^2 y^2 \cos x = 0$	8	CO1	BL4	1
7	a	Evaluate $\iiint_V \frac{1}{\sqrt{1-x^2-y^2-z^2}} dx dy dz$ over the first octant of the sphere $x^2 + y^2 + z^2 = 1$	6	CO2	BL5	4
	b	Given that $\frac{dy}{dx} = 1 - 2xy$ with $y(0) = 0$. Find $y(0.2)$, $y(0.4)$ using Taylor's series method	6	CO1	BL4	1
	c	Solve $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 20y = (x^2 + 1)^2$	8	CO1	BL3	2



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END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25

Total Marks: 100

CLASS/SEM : F.Y.B.Tech Civil Sem.-II

Duration: 3 Hrs

COURSE NAME : ENGINEERING PHYSICS

COURSE CODE: BSBTC202

- Answer any FIVE questions out of SEVEN.
- Diagrams have to be drawn wherever necessary. Assume suitable data (if necessary) and state your assumptions clearly.
- Figures to the right indicate Mark, Module no, Course Outcome and Bloom's Taxonomy level respectively.
- Marks will be given on the basis of what will be written in the paper irrespective of your intentions!

Good luck!

		Mark	MN	C O	BL
Q1.	(20 mark)				
a.	X rays are incident on Planes of a simple cubic crystal with a lattice spacing of 0.115nm. The first order reflection is observed at a Bragg angle of 43.5°. Calculate the wavelength of X rays.	5	1	1	3,5
b.	The distance between the middle layer of the hcp cell and top layer just above the first hcp cell is 0.75nm. What is the density of the unit cell?	5	3	3	3
c.	Calculate the numerical aperture and hence the critical angle for an optical fiber given that the refractive indices of the core and the cladding are 1.45 and 1.40.	5	5	5	3
d.	In an oscillator, the value of inductance and capacitance is 5mH and 12pF. Given: density of rod = 2.5 gm/cc, $Y=8 \times 10^{10}$ N/m ² find length of the rod and frequency.	5	4	4	3,5
Q2.	(20 mark)				
a.	Arrive at Schrodinger's time dependent equation.	8	2	2	2
b.	Calculate the power per unit area delivered by a laser pulse of energy 4×10^{-3} Joule and the pulse length in time as 10^{-9} s, when the pulse is focused on a target to a very small radius 1.5×10^{-5} m.	6	5	5	3,5
c.	Draw (100) and (110) set of planes of FCC structure and hence explain its interplanar spacing and planar atomic densities.	6	3	3	3
Q3.	(20 mark)				
a.	Derive expression for Numerical Aperture in Optical fibers.	8	5	5	3
b.	What is the ΔE between the $n=4$ and $n=5$ states for an F2 molecule trapped within a one-dimension well of length 3.0 cm? At what value of n does the energy of the molecule reach $\frac{1}{2}k_B T$ at 450 K?	6	1	1	4

c.	In determining the thickness of a steel plate by an ultrasonic beam, the difference between the first two adjacent harmonic frequencies was found to be 50 kHz. If the velocity of sound in steel is 5000 m/s, calculate the thickness of the steel plate.	6	4	4	3
Q4.	(20 mark)				
a.	Explain Diamond structure in detail mentioning clearly average number of atoms in the unit cell, Coordination number, Nearest neighbouring distance, Atomic Packing Factor.	8	3	3	1, 3
b.	Calculate the uncertainty in the position of a particle moving at a speed of 5.8×10^5 m/s and has an uncertainty in its velocity of 2.66×10^5 m/s. The mass of the particle is 2.16×10^{-28} kg.	6	1	1	2
c.	Calculate the numerical aperture and the angle of acceptance of an optical fiber having fractional RI of 0.05 and core refractive index of 1.48.	6	5	5	3,5
Q5.	(20 mark)				
a.	Explain construction and working of a He-Ne laser in detail.	8	5	5	1,2
b.	If a He-Ne laser output falls on a BCC (100) crystal plane with lattice constant 4640nm, find the order of diffraction from these planes if the diffraction angle is 23° .	6	3&5	3	3
c.	Imagine an electron inside an infinite potential well of width $10\text{\AA}$ in an energy state corresponding to the wavelength output of an Nd:YAG laser. Calculate the order of the excited state corresponding to this energy.	6	2&5	2	3,4
Q6.	(20 mark)				
a.	Explain the principle of working of a magnetostriction oscillator in detail with a neat and labeled diagram.	8	4	4	3
b.	A small 0.40-kg cart is moving back and forth along an air track between two bumpers located 2.0 m apart. We assume no friction; collisions with the bumpers are perfectly elastic so that between the bumpers, the car maintains a constant speed of 0.50 m/s. Treating the cart as a quantum particle, estimate the value of the principal quantum number that corresponds to its classical energy.	6	2	5	3
c.	Explain (with both mathematical and Physical reasoning) Heisenberg's Uncertainty Principle using single slit diffraction experiment.	6	1	1	3
Q7.	(20 mark)				
a.	Derive the Energy Eigen values and Eigen functions for a particle moving in an infinite height and of width L. Also sketch the probability function for the states $n=1$ and 2.	8	2	2	3
b.	Draw a diagram which clearly mentions important axes of a quartz crystal. Further explain piezoelectric and inverse piezoelectric effects with a neat diagram.	6	4	4	3
c.	How many photons of green light of wavelength $5500\text{\AA}$ constitute 1.5J of energy?	6	1	1	3,5



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Good luck!

		Mark	MN	C O	BL
Q1.	(20 mark)				
a.	In a Coolidge tube, an electron loses 80% of its energy and produces a single X-ray photon of wavelength 0.03nm. Determine the accelerating voltage applied to the tube.	5	1	1	3,5
b.	Copper has FCC structure. If the interplanar spacing is $2.08\text{\AA}$ for set of (110) planes, find the density of copper. Given atomic weight is 63.54. Also find the planar atomic density for these planes.	5	3	3	3
c.	The refractive index of core is 1.5 and fractional RI between core and cladding is 0.018. Find velocity of light through the cladding of the optical fiber.	5	5	5	3
d.	An ultrasonic beam of frequency 75.6 kHz is sent down to the sea bed. The velocity of ultrasonic waves in the sea is 1520 m/s. If the time required for the wave to be received is 0.65 s, calculate depth of sea and wavelength of ultrasonic waves.	5	4	4	3,5
Q2.	(20 mark)				
a.	Formulate the Schrodinger's time independent wave equation from its time dependent form.	8	2	2	2
b.	A Ruby laser beam has a power of 50mW. It has an aperture diameter of 7.5mm. The beam is focused with a lens of focal length 2m. Calculate the areal spread and intensity of the image.	6	5	5	3,5
c.	Derive an expression for interplanar spacing between parallel planes in a general unit cell and reduce it to the cubic form.	6	3	3	3
Q3.	(20 mark)				
a.	Define Total internal reflection in optical fibres and hence derive an expression for critical angle.	8	5	5	3

b.	Imagine a person of mass 65kg as a quantum mechanical particle playing box cricket in a room of width 25 feet. Calculate the least energy and momentum that the person will have. Compare this with the energy required for an electron in the least energy state bound in an infinite potential of width $10\text{\AA}$.	6	1	1	4
c.	Find thicknesses of quartz plates used for producing frequencies 50 kHz and 1.2 MHz each having density 8.9 gm/cc and Young's modulus $20.8 \times 10^{10} \text{ N/m}^2$. Comment on the results.	6	4	4	4
Q4.	(20 mark)				
a.	Explain HCP structure in detail mentioning clearly average number of atoms in the unit cell, Coordination number, Nearest neighbouring distance, Atomic Packing Factor.	8	3	3	1, 3
b.	The uncertainty in the location of a particle is equal to its de Broglie wavelength. Calculate the uncertainty in momentum. Assume the wavelength to be output of an Nd:YAG laser.	6	1	1	2
c.	Explain working of a three level pumping scheme in LASERS.	6	5	5	3, 5
Q5.	(20 mark)				
a.	Explain construction and working of a Ruby laser in detail.	8	5	5	1, 2
b.	Molybdenum has a BCC structure. Its density is $10.2 \times 10^3 \text{ kg/m}^3$ and its atomic weight is 95.94. Determine radius of molybdenum atom.	6	3	3	3
c.	A proton is confined in an infinite square well of width 15 fm. (The nuclear potential that binds protons and neutrons in the nucleus of an atom is often approximated by an infinite square well potential). Calculate the energy and wavelength of the photon emitted when the proton undergoes a transition from the first excited state to the ground state.	6	2	2	4
Q6.	(20 mark)				
a.	Explain the principle of working of a piezoelectric oscillator in detail with a neat and labeled diagram.	8	4	4	3
b.	Estimate the probability of finding a particle at $x=L/8$ and $x=L/2$ for a particle in a box of length $10\text{\AA}$ for the energy state $n=4$.	6	2	5	3
c.	Explain de-Broglie hypothesis using Davisson-Germer experiment.	6	1	1	3
Q7.	(20 mark)				
a.	Derive the Energy Eigen values and Eigen functions for a particle moving in an infinite height and of width L. Also sketch the probability function for the states $n=3$, and $n=4$.	8	2	2	3
b.	Explain different axes and different cuts of a quartz crystal using a diagram. Using these diagrams, explain piezoelectric and inverse piezoelectric effects.	6	4	4	3
c.	Using Heisenberg Uncertainty principle, prove that an electron can never be a nucleon.	6	1	1	3



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ENDSEM/RE - EXAMINATION MAY/JUNE 2025

Program: B.Tech. in Civil Engineering

Duration: 3 hrs.

Course Code: ES-BTC201

Maximum Points: 100.

Course Name: Engineering Graphics

Semester: II

Reg. No.									
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Important Notes:

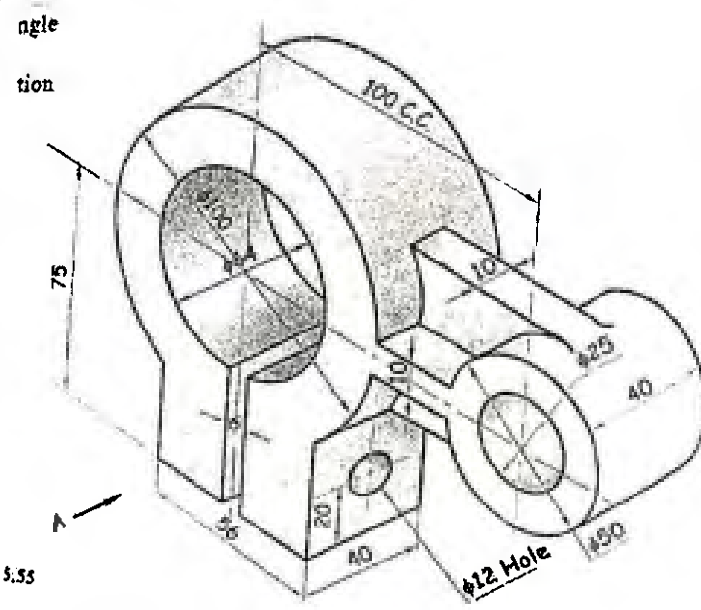
1. Attempt any five out of seven questions.
2. Create a new folder and rename it to <Reg. No._EG_ENDSEM>
3. Create separate .dwg file for each question and save in the above created folder only. File name should be <Q1_Reg. no._ES>.
4. At the end of exam, your folder with autocad will be uploaded by the authorized person. Students, before leaving the exam seat, should confirm that his/her folder is uploaded by the authorized person and question paper is submitted back to the Invigilator
5. Assume suitable data only if necessary.
6. Save your Work in AutoCad Regularly.

Invigilator Name & Sign: _____

Computer No.: _____

Q. No.			Points	CO	BL	MO
Q.1	a.	Draw a Helical path of pitch equal to 100 mm on a cylinder of diameter 80 mm.	10	1,2	3	1
	b.	A hexagonal lamina of side 40 mm is resting in the H.P. on one of its corners. The diagonal through that corner makes an angle 45° with the H.P. Draw the projections of the lamina.	10	1,3	3	3
Q.2	a.	A line PQ, having length 50 mm has its end point P, 10 mm above H.P. and 20 mm in front of V.P. The line is parallel to H.P. and inclined to V.P. at 45°. Draw the projections of line PQ.	10	1,3	3	2
	b.	Draw an ellipse having major axis 120 mm and minor axis 80 mm long by the concentric circle method. Also draw a normal and tangent on point M on ellipse 25 mm above its center.	10	1,2	3	1



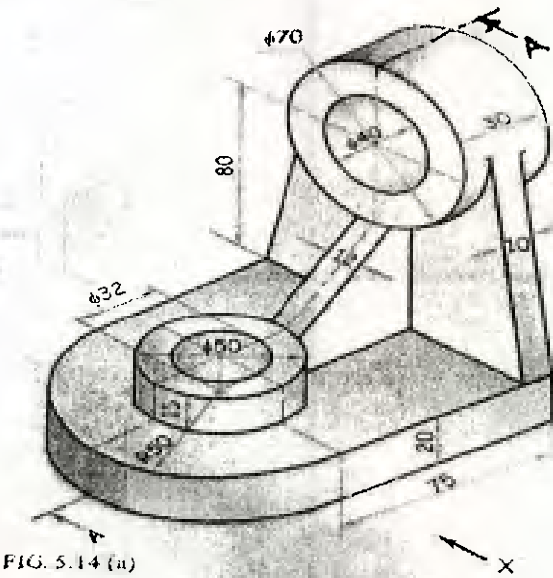
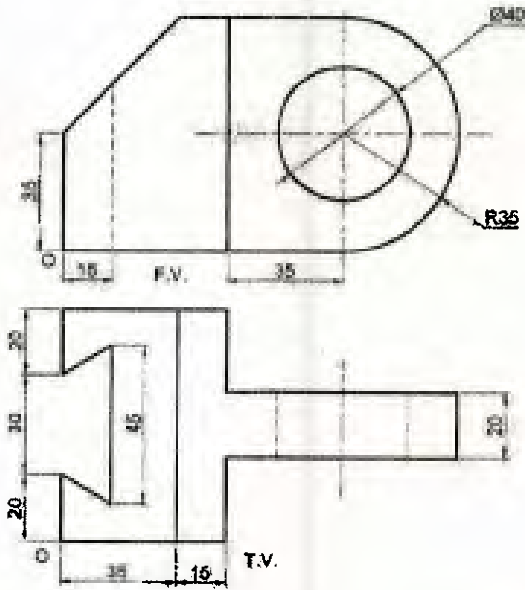
Q.3	a.	A square pyramid of 40 mm edge of base and 60 mm axis, has one of the side of base in the H.P. The axis of a solid is inclined to the H.P. and the V.P. at an angle 30° and 45° respectively. Draw its projections considering its apex is nearer to the V.P.	10	1,3	3	4
	b.	A rectangular plane ABCD having length 60 mm and breadth 30 mm has its surface inclined to the H.P. at an angle 60° and perpendicular to the V.P. such that the shorter side AB of the rectangle plane is 10 mm above the H.P. and longer side AD of rectangle is 20 mm in front of V.P. Draw the projections of the plane.	10	1,3	3	2
Q.4	a.	For the given figure below, draw the following orthographic views: a. Front View b. Top View c. Right Hand Side View	20	2,4	3	5
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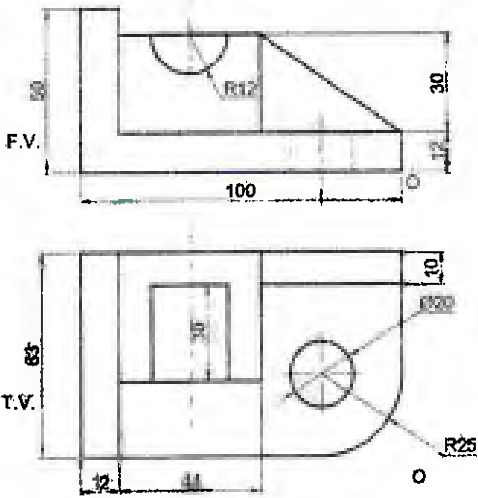
Q.5	For the given figure below, draw the following views: a) Sectional Front View along axis A-A b) Top View c) Left Hand Side View  FIG. 5.14 (a)	20 10 05 05	2,4	3	5
Q.6	a. Draw the Isometric view for the given orthographic views below: 	15	2,4	3	5



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Q.6	b.	A line CD, having length 50 mm, is parallel to V.P. and perpendicular to H.P. Line is 20 mm in front of V.P. and point D is 10 mm above H.P. Draw the projections of line CD.	05	1,3	03	02
Q.7	a.	Given in the figure is F.V. and T.V. Draw the following views: i. Front View ii. Top View iii. Missing RHS View. 	10	2,4	03	05
	b.	A square prism with side of base 40 mm and axis height 60 mm is resting on the H.P. on one of its base corner such that its axis is inclined at 30° to the H.P. and 45° to the V.P. Draw its projections.	10	1,3	03	04

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ENDSEM/RE - EXAMINATION MAY/JUNE 2025

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Course Code: ES-BTC201

Maximum Points: 100.

Course Name: Engineering Graphics

Semester: II

Reg. No.

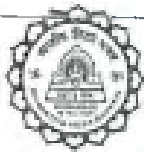
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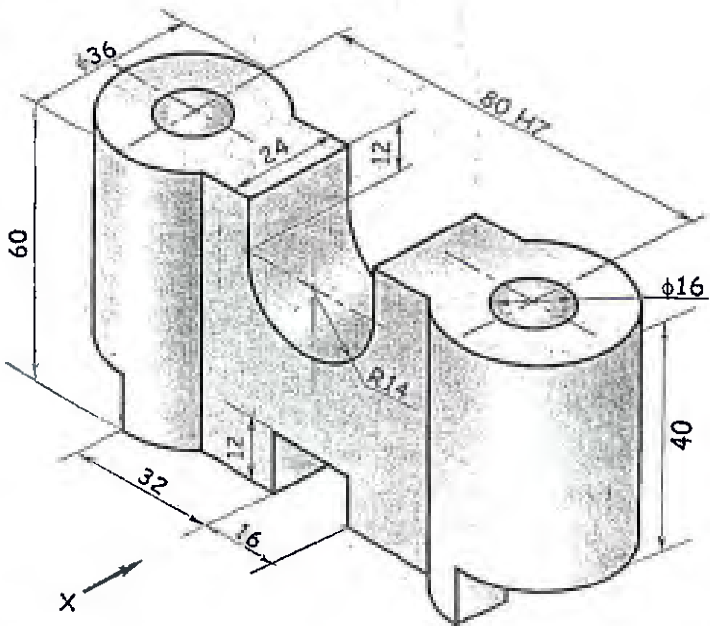
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5. Assume suitable data only if necessary.
6. **Save your Work** in AutoCad Regularly.

Invigilator Name & sig:-

Computer No:-

Q. No.			Points	CO	BL	MO
Q.1	a.	Draw a parabola having base length 100 mm and axis height 70 mm by the rectangle method. Also draw a normal and tangent on any point M on parabola.	10	1,2	3	1
	b.	A pentagonal lamina of side 40 mm is resting in the V.P. on one of its corners. The diagonal through that corner makes an angle 45° with the V.P. Draw the projections of the lamina.	10	1,3	3	3
Q.2	a.	A line 70 mm long is inclined at an angle 30° to the H.P. and 45° to the V.P. Its end point A is 10 mm above H.P. and 20 mm in front of V.P. Draw the projections of line AB. Assume line to be completely in first quadrant.	10	1,3	3	2
	b.	Draw a Helical path of pitch equal to 80 mm on a cylinder of diameter 50 mm.	10	1,2	3	1

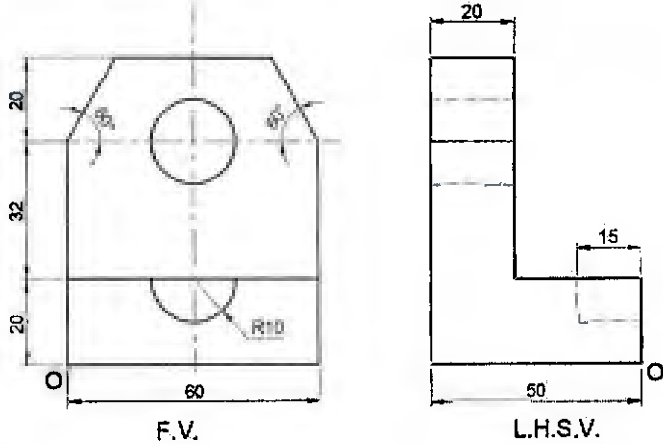


Q.3	a.	A square prism of 40 mm edge of base and 60 mm axis, has one of the corners of base in the H.P. The axis of a solid is inclined to the H.P. and the V.P. at an angle 30° and 45° respectively. Draw its projections.	10	1,3	3	4
	b.	A rectangular lamina ABCD having length 50 mm and breadth 30 mm has its surface inclined to the H.P. at an angle 45° and perpendicular to the V.P. such that the shorter side AB of the rectangle plane is 20 mm above the H.P. and longer side AD of rectangle is 20 mm in front of V.P. Draw the projections of the plane.	10	1,3	3	2
Q.4	a.	For the given figure below, draw the following orthographic views: i. Front View ii. Top View iii. Right Hand Side View	20	2,4	3	5
		 FIG. 4.38	07 07 06			

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Q.6	b.	A line AB, having length 50 mm, is parallel to H.P. and perpendicular to V.P. Line is 20 mm in front of V.P. and point B is 10 mm above H.P. Draw the projections of line AB.	05	1,3	03	02
Q.7	a.	Given in the figure is F.V. and LHS View. Draw the following views: i. Front View ii. LHS View iii. Missing Top View.  F.V. L.H.S.V.	10	2,4	03	05
	b.	A square pyramid of 40 mm edge of base and 60 mm axis, has one of the side of base in the H.P. The axis of a solid is inclined to the H.P. and the V.P. at an angle 30° and 45° respectively. Draw its projections considering its apex is nearer to the V.P.	10	1,3	03	04



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End-Semester /Re-Examination (R23)

May/ June 2025

Program: UG F. Y. Civil *sem II*
Course Code: ES-BTC202
Course Name: Engineering Mechanics - II

Duration: 3 Hours
Maximum Points: 100
Semester: II

Notes:

- Solve **any five** main questions
- Start a new question on a new page and group all sub-questions together.
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained**, and **Bloom's Taxonomy Level**

Q. No.		Points	CO	BL
1	a	5	1	2
	b	5	3	3
	c	10	2	3

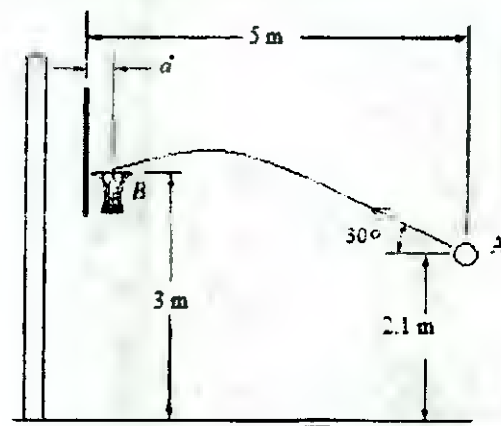


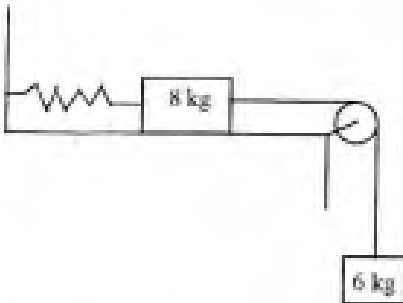
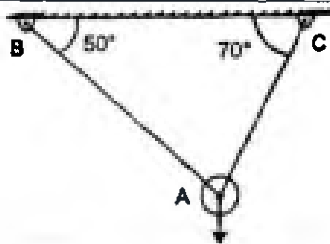
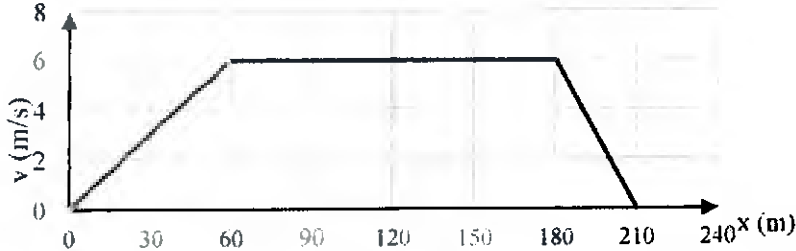
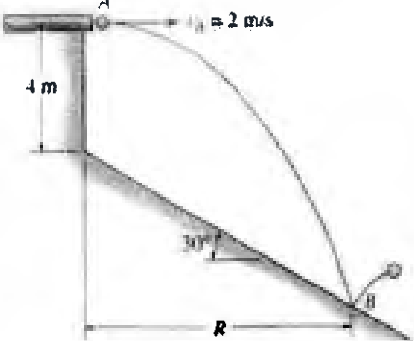
Figure 1



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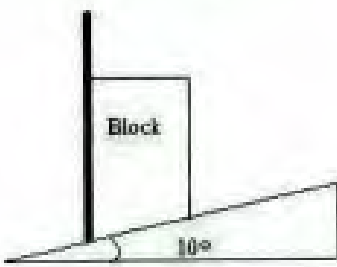
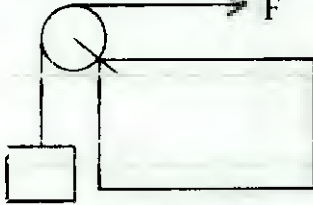
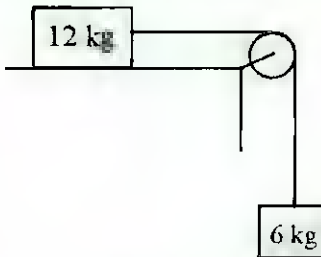
2	a	The system shown in Figure 2 is initially at rest. If the spring has a constant of 150 N/m and is initially undeformed, determine the velocity of the two blocks after displacement of 0.4 m. Assume friction between block and surface as 0.26 and pulley to be frictionless.  Figure 2	10	3	3
	b	A ball weighing 60 N is held as shown in Figure 3 by massless wires AB and AC. Determine the tension in wire AB. Determine the tension in wire AC immediately after wire AB is cut.  Figure 3	10	3	3
3	a	A 6 m long ladder weighing 900 N is resting against a smooth vertical wall at an angle of 20° with the vertical. When a man weighing 500 N stands on the ladder at a distance of 2 m from the foot of the ladder, the ladder is about to slide. Calculate the coefficient of friction between the ladder and the floor.	10	1	3
	b	The velocity-position graph of a particle is shown in Figure 4. Calculate its acceleration at 25 m, 90 m, and 190 m.	10	2	3
 Figure 4					
4	a	A ball of mass 500 g is ejected from point A with a horizontal velocity of 2 m/s. If coefficient of restitution is 0.6, find the distance R where the ball strikes the smooth inclined plane and the speed with which it bounces from the plane.  Figure 5	10	2	3



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	b	A body of mass 1.5 kN is resting on a 10° wedge on a horizontal floor and leaning against a vertical rough wall. The body is to be raised by applying horizontal force P. Determine the minimum value of P if coefficient of friction between all contact surfaces is 0.3.		10	1	3
Figure 6						
5	a	A ball is projected vertically upwards in the air at a velocity of 25 m/s. After 2 seconds, another ball is projected vertically upwards and it crosses the first ball at 17 m from the ground surface. Determine the velocity of projection of the second ball.	10	2	3	
	b	A car is moving at a constant velocity of 100 kmph when its engine is suddenly switched off. If the coefficient of friction between the road and tyres is 0.7, calculate the distance it covers before stopping. If in a different scenario, if there is ice on the road and coefficient of friction is 0.08, calculate the speed of the car if it has to come to a stop in 40 m. Assume the car weighs 10 kN.	10	3	3	
6	a	A cable supporting a 600 kg block is wound around a steel pulley by one and a quarter turns and supported by force F as shown in Figure 7. Calculate the ratio of force required to lift the block to the force required to keep the block from falling if the coefficient of static friction between the cable and pulley is 0.4.		10	1	3
Figure 7						
	b	A bullet with 20 g mass is fired with a velocity of 700 m/s into a 5 kg block of wood which is stationary. If the coefficient of kinetic friction between the block and floor is 0.3, determine how far the block will move and the percentage loss of initial energy lost in friction.	10	3	3	
7	a	A particle moving along the path given by $\frac{x^2}{16} - y^2 = 39$. If the x-component of velocity is 8 m/s and remains constant, determine the magnitude of velocity and acceleration of the particle when it is at (32,5)	10	2	3	
	b	Determine the acceleration of the blocks shown in Figure 8 if the coefficient of kinetic friction is 0.26 for all surfaces		10	3	3
Figure 8						



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End Semester /Re-Examination (R23)

May/ June 2025

Program: UG F. Y. Civil *sem II*
Course Code: ES-BTC202
Course Name: Engineering Mechanics - II

Duration: 3 Hours
Maximum Points: 100
Semester: II

Notes:

- Solve **any five** main questions
- Start a new question on a new page and group all sub-questions together.
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained**, and **Bloom's Taxonomy Level**

Q. No.			Points	CO	BL
1	a	Discuss in detail elastic, semi-elastic and plastic collision. Illustrate with neat sketches.	5	3	2
	b	A block of weight 3 kN is kept on a rough surface inclined at 25° and coefficient of friction of 0.39. Calculate the minimum force P when applied parallel to the inclined surface, will keep the block in equilibrium.	5	1	3
	c	Based on observations, the speed of a jogger can be approximated by $v = (1 - 0.06x)^{0.3}$ where x is in km and v in kmph. Calculate the distance the jogger can cover in 1 hour (assuming he starts from rest). Also determine the time required to cover 9 km.	10	2	3
2	a	A block shown in Figure 1 has a velocity of 5 m/s as it passes point A and velocity of 2 m/s as it passes point B on the surface inclined at 30° . Point A and B are 10 m apart. Calculate the kinetic friction between the block and incline.	10	3	3
	b	A cannon is nested by three springs each of stiffness 2×10^7 N/m. the gun fires a 500 kg shell with a muzzle velocity of 1000 m/s. Calculate the total recoil and maximum force developed in each spring if the gun has a mass of 75,000 kg.	10	3	3

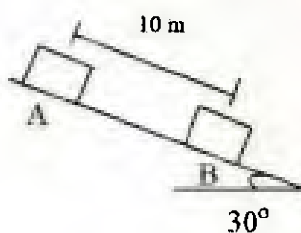
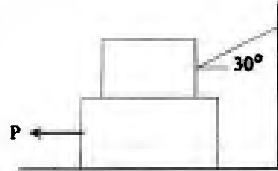
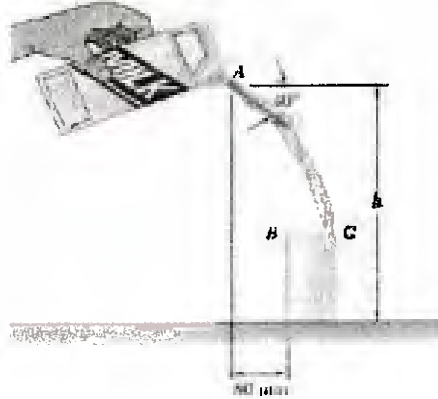
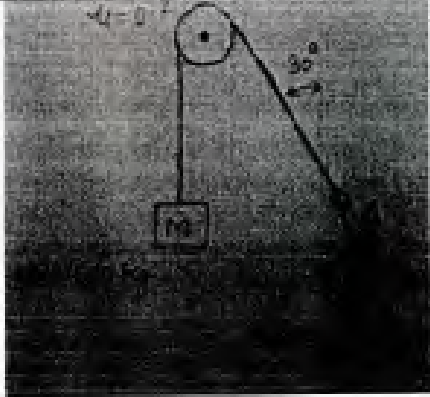
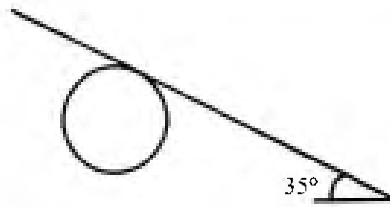


Figure 1



Figure 2



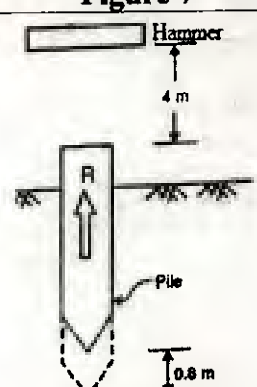
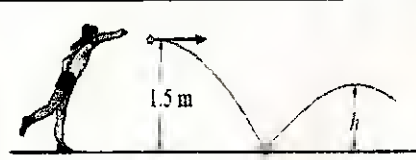
3	a	Find the force P required to pull block B towards the left if coefficient of friction for all contact surfaces is 0.3. Mass of A is 20 kg and B is 60 kg.		10	1	3
	b	Milk is poured into a glass of height 140 mm and inside diameter of 66 mm. If initial velocity of milk is 1.2 m/s at an angle of 40° to horizontal, determine the range of values of height for which milk will enter the glass. Horizontal distance between point A and B is 80 mm as shown in Figure 4.		10	2	3
4	a	A boy of 60 kg mass and a girl of 45 kg mass dive off a boat of mass 200 kg with a velocity of 3 m/s relative to the boat. Considering the boat to be initially at rest, determine the velocity of the boat if the girl dives first followed by the boy. What is the difference in velocity of the boat if the boy dives first followed by the girl?		10	2, 3	3
	b	A labourer wants to hold a mass of 400 kg suspended through a rope and pulley. If the weight of the man is 600 N and μ between man and ground is 0.3 and between rope and pulley is 0.2, determine the required number of turns of rope to be wound around the pulley to hold the mass.		10	1	3
5	a	A ball of mass 300 g strikes an inclined smooth surface with a velocity of 3 m/s in the vertical direction as shown in Figure 6. Calculate the velocity of the rebound if coefficient of restitution is 0.8.		10	2	3



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	b	Determine the range of values of P to keep the system as shown in Figure 1 in equilibrium if the pulley is frictionless and coefficient of friction between blocks and surface is 0.4.		10	3	3
6	a	A pile driving hammer of mass 400 kg falls through a height of 4 m on a pile of mass 500 kg. If it drives the pile 0.7m into the ground, find the average resistance of the ground to penetration. Assume the impact between hammer and pile to be perfectly plastic. See Figure 8.		10	1	3
	b	A particle moving in the x-y plane has acceleration components $a_x = -3 \text{ m/s}^2$ and $a_y = -16t \text{ m/s}^2$. If initial velocity of the particle is 50 m/s directed at 35° to horizontal, determine radius of curvature of the particle's path at time $t = 3$ seconds.		10	3	3
7	a	A car of mass 2200 kg is travelling with a constant speed along a track as shown. The radii of curvature at A and B are 10 m and 19 m, respectively. If the car should remain in contact with the road at all time, find the maximum speed permitted and the normal reaction from the road at point B.		10	2	3
	b	A girl throws a ball horizontally at 2.5 m/s from a height of 1.5 m. If the coefficient of restitution is 0.8, determine the velocity of the ball after rebound at point A and maximum height h that the ball will reach.		10	3	3



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End Semester Examination
May 2025 (Set I)
SYNOPTIC SEMESTER II

Max. Marks: 100

Class: C/M/E

Name of the Course: Communication Skills

Duration: 3 Hours

Program: FY B.Tech

Course Code: AE BTE 201

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining Six. Total 05 questions
3. Draw neat diagrams
4. Answers to all the sub questions should be attempted and grouped together.

16/07/25

Sr.No	Questions	Poin ts	C O	BL
Q.1	Write 150 words short notes on any Two. (10 marks each)	20	0	01
A.	1. Explain Informal means of communication and types of Grapevine. 03+ 07 types: Grapevine: Types: Single strand, Gossip wheel, Probability, Cluster Explain in detail . 2. Semantic and cultural barriers to communication. 05 each • Different languages • Living nature of language • Words with multiple meanings Eg. Ring, Cat, Fast, Head, Spirit, Mark, Charge • Words with similar spellings and different meanings and pronouncing. Eg. Minute, Wind, read, live, wound, tear, row, sewer • Homophones Eg. Cite Site, see sea, addition edition, capitol capital, flower flour. • Descriptive adjectives. Eg. Beautiful, Far, hot, lazy, attractive • Technical jargons: mouse, suspect, helicopter view, boil the ocean, get our ducks in a row, blue sky thinking, sun setting • Poor communication Skills or expression • Verbal mannerisms • Emotionally loaded words • Connotations vs. Denotations • Ambiguity	1, 0 2 0 3, 0 4		
	Cultural Barriers: Concept of Space (Proxemics)			

	• Concept of time; (Chronemics) • Circular/ linear • Time orientation/ past, present, future • Time is money • Punctuality and Scheduling • Work time/ Personal time • Values • Paralanguage 3. Difference between Hearing and Listening and types of listening. Active, Passive, Appreciative, Critical, Empathatic, Informational. 4. Clarity and Conciseness, Courtesy and consideration in business letter • Clarity in a business letter implies that the message be crystal clear • In a business letter clarity of thought and clarity of expressions should be there. • Clarity of thought is a mental process and clarity of expression relates to the use of language as a vehicle to express that thought. Avoid sentences and words that give confused thinking and ambiguous situation. Conciseness. • Do not waste words • Transmit maximum information by using minimum words • Avoid redundant phrases and repetition • Use familiar words • Use concrete expressions • Only relevant facts • Prefer active constructions Courtesy and Consideration • Courtesy consists in using polite phrases and also being considerate towards your reader. • It is the quality that helps us to refuse a customers' request, or perform a favor and at the same time keep a friend; to refuse a customer's request for credit without killing all hope of future business. • To be courteous is to be polite, obliging, friendly and respectful in manner and in action. • It is a tangible asset at all times and in all circumstances. • It is the lubricant that keeps the complicated machinery of all good relations functioning smoothly. • Consideration can be brought in by thinking more of the reader. • Put yourself in his place. • Show audience benefit.			
Q.2 . A.	"Communication is a two-way process". Explain in this the elements of communication process. Describe the role of feedback in effective communication Definition 02	12	0 2	02

	Diagram 04 Elements: 06 Sender, Receiver, message, Medium, Channel, Feedback. Elaborate each.			
Q.2 .B.	Give one word substitute for the following: 01 marks each. • Garrulous, Loquacious, verbose, voluble – A person who talks too much. • Oligarchy – A government ruled by a few people. • Philanthropist – A person who loves mankind. • Panacea – A remedy for all diseases. • Cosmologist – One who studies the universe. • Stoic – A person who is indifferent to pleasure or pain. • Ambiguous – A statement open to more than one interpretation. • Claustrophobia – An extreme fear of confined spaces	08	0 1	01
Q.3 .A.	In capacity of your college librarian, Draft an enquiry to Delhi Bureau of Text Books an autonomous organization of govt. of N.C.T Delhi, 25/2 Institutional Area, Pankha Road, Janakpuri, New Delhi, -110058 for enquiring about engineering books in bulk related to your branch. Use Complete Block Format. Format 04, Content 08 Left aligned. Names of relevant books, quantity, Introduction of the institute, Terms and conditions, Date for receiving reply.	12	0 3	03
Q.3 .B.	Change the following 'We' attitude sentences to 'You' attitude sentences: 1. We are happy to hear that our letter of 20 April provided you with sufficient information. Thank you for writing to us. 2. I want to express my sincere thanks for the good words. Thank you for your kind words. 3. We offer five different saving schemes in which customers can invest their savings You will be happy to invest in five different saving schemes. 4. We are open 24 hours to serve our customers. You will be served 24X7	08	03	03
Q.4 .A	Write a letter to West Coast Paper Mills Ltd, 17, Central Bazar, Ramdaspath, Nagpur, informing them about the damaged bond papers 20 reams that you ordered for the college magazine printing that has reached you in damaged	12	03	03

	condition and due to which you could not print the college Magazine on time. Ask for a suitable compensation for the damage. (Use Modified Block Form) Format 04, Content 08 Introduction, Courtesy and the problem Explain the situation and the inconvenience Suggestion how the situation should be rectified, what compensation are you seeking Goodwill sentence to maintain correspondence in future.			
Q.4. B	Explain the role of Kinesics and its forms in non-verbal communication. Importance of Body language formal and informal with examples. 06 Forms of Body language: Appearance, facial expression, Eyes, gestures, posture, clothing. Explain each briefly.	08	0 3	02
Q.5	Describe the channels of organisational communication with the help of diagram.	12	0 4	01
. A	Explain the merits and demerits of formal communication. <pre> graph TD BO[Business organisation] --> IC[Internal communication] BO --> EC[External communication] IC --> FC[Formal communication] IC --> Informal[Informal communication] FC --> Vertical[Vertical] FC --> Horizontal[Horizontal] Vertical --> Downward[Downward] Vertical --> Upward[Upward] Horizontal --> Consensual[Consensual] Horizontal --> Diagonal[Diagonal] Informal --> Grapevine[Grapevine] EC --> Inward[Inward] EC --> Outward[Outward] </pre> Formal channel or official channel refers to the flow of messages along the routes prescribed in the organisation structure. Formal channels are deliberately designed and represent authority responsibility relationships between different positions in the organisation Advantages: ▶ Orderly and authentic flow of communication ▶ Covers all systems of an organisation ▶ Information gets filtered at every level so managers are not bogged down by overload of info. ▶ Satisfies managerial positions helps in exercising control. ▶ Helps to consolidate (unite) the organisation. Disadvantages: ▶ Inhibits the free flow as message passes through the prescribed routes. ▶ It is slow and rigid			

	▶ Time consuming ▶ Expensive as messages are generally in writing ▶ Tendency of filtering of messages Distortions can't be ruled out.			
Q.5 .B.	Draw the Modified block form with all eight basic parts of a letter. 1 mark for every part of letter, Neat diagram, proper lines left.	08	0 3	01
Q.6 .A	Draft a Sales letter to promote Sardar Patel college of Engineering to aspiring Engineers. (Use Semi-Block Form) ALDA principle, 04 paragraphs, Format 04, Content 06	10	0 3	06
Q.6 B.	Describe horizontal communication merits and demerits and its importance in teamwork. Objectives and advantages: ▶ To give specific instructions and Directives about the job entrusted ▶ To explain the policies and procedures, programs of the organisation to the employees ▶ To educate and train the employees to improve their knowledge and skills ▶ To explain the subordinates the rationale of their jobs ▶ To inform about their performance and achievements ▶ To strengthen the authoritarian structure of the organisation. ▶ Advantages: Managers should be adequately informed ▶ Managers should be clear how much to communicate ▶ Use right channels ▶ Decentralize the power ▶ Information should be passed on to the correct person Limitations: ▶ Delay ▶ Too much or too less information ▶ Filtering ▶ Distortion ▶ Built in resistance	08	0 4	02
Q.7 A	Read the Passage and Answer the questions. In the realm of computer science, algorithms play a pivotal role in problem-solving processes. An algorithm is a systematic, step-by-step procedure that provides a solution to a defined problem. While often expressed in programming languages, algorithms can also be represented in pseudo-code or flowcharts, allowing for easier understanding and implementation. Data structures, on the other hand, are specialized formats for organizing and storing data, enabling efficient access and modification. Common data structures	12	0 2	03

include arrays, linked lists, trees, and graphs. Each structure has its strengths and weaknesses, making it suitable for specific types of tasks. For instance, an array allows for fast access to elements using index numbers, while a linked list facilitates dynamic memory allocation.

The efficiency of an algorithm is typically evaluated using time complexity and space complexity, which measure the amount of time and memory an algorithm consumes as a function of the input size. Understanding these concepts is crucial for developing optimized software solutions that can handle large datasets effectively.

By mastering algorithms and data structures, software engineers can create efficient, scalable applications that meet the demands of today's technology-driven world.

Answer The Questions given below:

1. What is an algorithm? (02)

Ans. An algorithm is a systematic, step-by-step procedure that provides a solution to a defined problem.

2. Name three common data structures mentioned in the passage.(02)

Ans. Three common data structures mentioned are arrays, linked lists, and trees.

3. What are time complexity and space complexity used for? (02)

Ans: Time complexity and space complexity are used to evaluate the efficiency of an algorithm regarding the time and memory it consumes based on the input size.

4. Why is it important for software engineers to understand algorithms and data structures? (02)

Ans: . It is important for software engineers to understand algorithms and data structures to create *efficient, scalable applications that can handle large datasets effectively.*

5. Pivotal: In the context of the passage, what does "pivotal" mean? 01

- a) Unimportant
- b) Essential
- c) Random
- d) Secondary

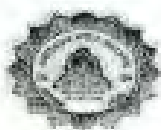
6. Systematic: Which best describes a systematic procedure? 01

- a) Random and unpredictable
- b) Organized and methodical
- c) Inconsistent and haphazard
- d) Complex and intricate

7. Pseudo-code: What is likely a characteristic of pseudo-code?01

- a) A formal programming language
- b) A precise set of instructions for a computer
- c) A simplified representation of code for readability
- d) A technical term for algorithms

	8. Specialized: What does "specialized" mean in the context of data structures? 01 a) Simple and basic b) <i>Unique and tailored for a particular purpose</i> c) General and applicable to many tasks d) Redundant and unnecessary			
Q7. B.	"There can never be perfect communication". Comment by explaining the levels at which communication barriers occur. Barriers at the senders level, receivers level, transmission level and feedback reaction level.	08	0 2	02



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Re-Exam ~~Final Semester Examination~~
June ~~May~~ 2025 (SET II)
SEMESTER II

Max. Marks: 100

Class: C/M/E

Name of the Course: Communication Skills

Instructions:

Duration: 3 Hours

Program: FY B.Tech

Course Code: AE BTE 201

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining Six. Total 05 questions
3. Draw neat diagrams
4. Answers to all the sub questions should be attempted and grouped together.

Sr.No	Questions	Points	CO	BL
Q.1. A.	Write 150 words short notes on any Two. (10 marks each) 1. Explain audio signals used as non-verbal communication 2. SQ3R technique to reading 3. Hints for drafting an enquiry letter 4. Physical Barriers to communication	20	01,02 03,04	01
Q.2. A.	"Communication is a two-way process". Explain in this the elements of communication process. Describe the role of feedback in effective communication.	12	02	02
Q.2.B.	Give synonyms for the following words: 1. Prosperity 2. Fragile 3. Abundant 4. Hostile 5. Reliable 6. Scarce 7. Optimistic 8. Diligent	08	01	01
Q.3. A.	You are an engineering student interested in a summer internship at Tata Motors. Write an enquiry letter requesting details about the application process, duration, and eligibility. (Use Modified Block form).	12	03	03
Q.3. B.	Write short notes on: 1. Emphasize the positive in business letters 2. Your attitude in business correspondence.	08	03	03

Q.4. A	You are a student staying in the college hostel. Write a letter to the warden complaining about irregular water supply and unhygienic conditions. (Use complete block format).	12	03	03
Q.4. B	Explain any four socio-psychological barriers to communication.	08	03	02
Q.5. A	Describe downward communication and its merits and limitations in an organization.	12	04	01
Q.5.B.	Draw the Complete block form with all eight basic parts of a letter.	08	03	01
Q.6. A	Draft a Sales letter to promote sales of a new model of electric small cars. (Use Semi-Block Form)	10	03	06
Q.6. B.	Explain the AIDA principles of sales letter with examples.	08	04	02
Q.7. A	Read the Passage and Answer the questions. In the realm of computer science, algorithms play a pivotal role in problem-solving processes. An algorithm is a systematic, step-by-step procedure that provides a solution to a defined problem. While often expressed in programming languages, algorithms can also be represented in pseudo-code or flowcharts, allowing for easier understanding and implementation. Data structures, on the other hand, are specialized formats for organizing and storing data, enabling efficient access and modification. Common data structures include arrays, linked lists, trees, and graphs. Each structure has its strengths and weaknesses, making it suitable for specific types of tasks. For instance, an array allows for fast access to elements using index numbers, while a linked list facilitates dynamic memory allocation. The efficiency of an algorithm is typically evaluated using time complexity and space complexity, which measure the amount of time and memory an algorithm consumes as a function of the input size. Understanding these concepts is crucial for developing optimized software solutions that can handle large datasets effectively. By mastering algorithms and data structures, software engineers can create efficient, scalable applications that meet the demands of today's technology-driven world. <u>Answer The Questions given below:</u> 1. What is an algorithm? (02) 2. Name three common data structures mentioned in the passage.(02) 3. What are time complexity and space complexity used for? (02) 4. Why is it important for software engineers to understand	12	02	03

	algorithms and data structures? (02) 5. Pivotal: In the context of the passage, what does "pivotal" mean? 01 a) Unimportant b) Essential c) Random d) Secondary 6. Systematic: Which best describes a systematic procedure? 01 a) Random and unpredictable b) Organized and methodical c) Inconsistent and haphazard d) Complex and intricate 7. Pseudo-code: What is likely a characteristic of pseudo-code? 01 a) A formal programming language b) A precise set of instructions for a computer c) A simplified representation of code for readability d) A technical term for algorithms 8. Specialized: What does "specialized" mean in the context of data structures? 01 a) Simple and basic b) Unique and tailored for a particular purpose c) General and applicable to many tasks d) Redundant and unnecessary			
Q7.B.	Why written communication is indispensable to a business organization? Explain the merits and demerits of written communication.	08	02	02



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END SEM/RE-EXAM EXAMINATION MAY/JUNE-2025

Program: B.Tech. Civil Engineering *Sem II*

Duration: 3 Hour

Course Code: PC-BTC201

Maximum Points: 100

Course Name: **Building Materials and Construction**

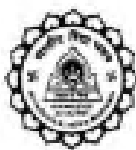
Semester: **II**

Notes:

1. Attempt *any FIVE questions out of SEVEN* questions
2. Answers to all sub questions should be grouped together
3. Draw neat diagrams wherever required
4. Assume suitable data if necessary and state the clearly.

30/6/25

Q.No.	Questions	Points	CO	BL	Module No.
1	a) Differentiate between dry process and wet process of cement manufacturing.	05	1	3	01
	b) What are the essential qualities of good timber?	06	3	1	07
	c. Write a short note on testing of concrete	04	2	2	01
	d. What are the causes of dampness inside the building?	05	3	1	07
2	a). What are the requirement of good building stone?	05	01	1	01
	b). Explain with neat sketch components of Cavity wall.	06	04	2	03
	c. Explain in brief different methods available for geotechnical investigation in construction.	05	03	3	02
	d. Compare Functional and structural requirement of building.	04	01	2	02
3	a. Explain with neat sketch of Flying shore and their applications.	06	02	3	08
	b. What are the qualities of good concrete?	06	03	2	01
	c. Describe in brief Testing of lime as per BIS.	04	03	2	01
	d. Discuss factors causing deterioration of stone	04	01	1	02
4	a. What are requirements of good foundation?	06	02	3	2
	b. differentiate load bearing and non-load bearing wall.	04	01	1	4
	c. Explain in detail with neat components of arch, their function and their application in construction.	06	04	1	5
	d. Explain in brief stabilized mud block.	04	01	3	3
5.	a. Discuss in detail different type of defects presents in Timber.	10	02	3	2
	b. What are the fundamental principles of construction of stone masonry?	06	04	1	3
	c. What are the qualities of good Lintel?	04	03	2	4



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END SEM/RE-EXAM EXAMINATION MAY/JUNE-2025

6	a) Explain different types of materials used in partition wall.	08	3	1	3
	b) Explain with raw neat sketch structure of timber.	06	4	2	1
	c. What are the qualities of good staircase?	06	3	2	6
7	Write short notes on (any five)	20			
	i. Special mortar	4	1	1	1
	ii. Types of paints	4	3	3	7
	iii. Laminates and Fiberboard	4	2	1	1
	iv. Steel formwork	4	3	2	8
	v. Classification of Brick	4	2	1	3
	vi. M-Sand	4	2	2	1
	vii. Segregation and Bleeding	4	2	3	1
	viii. Underpinning	4	4	3	8



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END SEMESTER/ ~~IE~~-EXAMINATION MAY 2025/~~JUNE 2025~~

Program: First Year Engineering (Mechanical) *Enu II*

Duration: 3 Hours

Course Code: BS-BTM201

Maximum Points: 100

Course Name: Integral Calculus and Differential Equations

Semester: II

Note:

1. Attempt Any Five Questions
2. Answers to the sub questions should be grouped together

14/5/25

	Questions	Points	CO	BL	Module
1	a Solve $(D^3 + 1)y = (e^{-x} + 1)^2$	6	CO1	BL3	2
	b Evaluate $\int_0^3 \int_0^{\sqrt{9-y^2}} \sqrt{9-x^2-y^2} dx dy$	6	CO2	BL5	3
	c Evaluate $\iiint_V \frac{1}{(1+x+y+z)^3} dx dy dz$ over the volume of the tetrahedron bounded by the planes $x=0, y=0, z=0$ and $x+y+z=1$	8	CO3	BL4	4
2	a Find the volume bounded by the cylinder $x^2 = y, y^2 = x$ and the planes $z=0, x+y+z=2$.	6	CO3	BL3	5
	b Change the order of double integral $\int_0^a \int_{\sqrt{a^2-x^2}}^{x+3a} f(x,y) dx dy$	6	CO2	BL2	3
	c Solve $(D^2 + 9)y = \tan 3x$	8	CO1	BL4	2



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

3	a	Evaluate $\int_0^{\infty} x e^{-x^8} dx \cdot \int_0^{\infty} x^2 e^{-x^4} dx$	6	CO2	BL5	SL
	b	Solve $(x\sqrt{x^2+y^2}-y)dx + (y\sqrt{x^2+y^2}-x)dy = 0$	6	CO1	BL4	1
	c	Evaluate $\iint_R \frac{1}{\sqrt{1-x^2-y^2}} dx dy$, where R is the region of ellipse $2x^2+y^2=1$ in the first quadrant.	8	CO2	BL5	3
4	a	Solve $(D^2+3D+2)y = e^{-x} \sin\left(\frac{x}{2}\right)$	6	CO1	BL5	2
	b	Find the area included between the curves $x^2=8y$ and $y^2=8x$	6	CO3	BL3	5
	c	Change the order of double integral and evaluate $\int_0^2 \int_{\sqrt{2x}}^2 \frac{y^2}{\sqrt{y^4-4x^2}} dx dy$	8	CO2	BL4 5	3
5	a	Solve $(3x^2y^4+2xy)dx + (2x^3y^3-x^2)dy = 0$	6	CO1	BL5	1
	b	Evaluate $\iint_R xy(x+y) dx dy$ where R is the region bounded between the curves $x^2=y$ and $x=y$	6	CO2	BL3	3
	c	Given $\frac{dy}{dx} = 1+xy$; $y(0)=2$. Find $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method.	8	CO1	BL4	1
6	a	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}} dx \cdot \int_0^{\frac{1}{3}} \sqrt{3y-9y^2} dy$	6	CO2	BL5	SL
	b	Evaluate $\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{1}{(a^2+x^2+y^2)^{\frac{3}{2}}} dx dy$ by changing to polar	6	CO2	BL3	3



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

		coordinates				
	c	Solve $\frac{dy}{dx} + x^3 \sin^2 y + x \sin 2y = x^3$	8	CO1	BL4	1
7	a	Evaluate $\iiint_V xyz(x^2 + y^2 + z^2) dx dy dz$ over the first octant of the sphere $x^2 + y^2 + z^2 = 16$	6	CO2	BL5	4
	b	Given that $\frac{dy}{dx} - 2y = 3e^x$ with $y(0) = 1$. Find $y(0.1)$, $y(0.2)$ using Taylor's series method	6	CO1	BL4	1
	c	Solve $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 20y = (x^2 + 1)^2$	8	CO1	BL3	2



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

Program: First Year Engineering (Mechanical)

Duration: 3 Hours

Course Code: BS-BTM201

Maximum Points: 100

Course Name: Integral Calculus and Differential Equations

Semester: II

Note:

1. Attempt Any Five Questions
2. Answers to the sub questions should be grouped together

		Questions	Points	CO	BL	Module
1	a	Solve $(D^2 + 7D + 12)y = e^{-2x} \cosh x$	6	CO1	BL3	2
	b	Evaluate $\int_0^2 \int_0^{x^2} x(x^2 + y^2) dx dy$	6	CO2	BL5	3
	c	Evaluate $\iiint_V (x + y + z) dx dy dz$ over the volume of the tetrahedron bounded by the planes $x = 0, y = 0, z = 0$ and $x + y + z = 1$	8	CO3	BL4	4
2	a	Find the volume bounded by the cylinder $x^2 = y, y^2 = x$ and the planes $z = 0, z = 3$.	6	CO3	BL3	5
	b	Change the order of double integral $\int_0^a \int_{\sqrt{a^2-x^2}}^{x+3a} f(x, y) dx dy$	6	CO2	BL2	3
	c	Solve $(D^2 + 4)y = \sec 2x$	8	CO1	BL4	2



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

3	a	Evaluate $\int_0^{\infty} \frac{e^{-x^2}}{\sqrt{x}} dx \cdot \int_0^{\infty} x^4 e^{-x^6} dx$	6	CO2	BL5	SL
	b	Solve $(1 + 2x\sqrt{x^2 - y^2}) dx - 2y\sqrt{x^2 - y^2} dy = 0$	6	CO1	BL4	1
	c	Evaluate $\iint_R e^{2x+3y} dx dy$, where R is the region of the triangle bounded by the straight lines $x = 0, y = 0, 2x + 3y = 1$	8	CO2	BL5	3
4	a	Solve $(D^2 + 9)y = x \cos x$	6	CO1	BL5	2
	b	Find the area included between the curves $x^2 = y$ and $x + y = 2$	6	CO3	BL3	5
	c	Change the order of double integral and evaluate $\int_0^1 \int_0^{\sqrt{1-y^2}} \frac{x}{(1+x^2)\sqrt{1-y^2-x^2}} dx dy$	8	CO2	BL4, 5	3
5	a	Solve $(x^4 + y^4) dx - xy^3 dy = 0$	6	CO1	BL5	1
	b	Evaluate $\iint_R xy(x+y) dx dy$ where R is the region bounded between the curves $x^2 = y$ and $x = y$	6	CO2	BL3	3
	c	Given $\frac{dy}{dx} = x^2 - y$; $y(0) = 1$. Find $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method.	8	CO1	BL4	1
6	a	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}} dx \cdot \int_0^{\frac{1}{3}} \sqrt{3y-9y^2} dy$	6	CO2	BL5	SL
	b	Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} e^{-(x^2+y^2)} dx dy$ by changing to polar coordinates	6	CO2	BL3	3



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	c	Solve $\frac{dy}{dx} + \frac{2y}{x} + x^2 y^2 \cos x = 0$	8	CO1	BL4	1
7	a	Evaluate $\iiint_V \frac{1}{\sqrt{1-x^2-y^2-z^2}} dx dy dz$ over the first octant of the sphere $x^2 + y^2 + z^2 = 1$	6	CO2	BL5	4
	b	Given that $\frac{dy}{dx} = 1 - 2xy$ with $y(0) = 0$. Find $y(0.2)$, $y(0.4)$ using Taylor's series method	6	CO1	BL4	1
	c	Solve $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 20y = (x^2 + 1)^2$	8	CO1	BL3	2



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End Semester Examination / *Reexam*
May 2025 (Set I)

SEMESTER II



Max. Marks: 100

Class: C/M/E

Name of the Course: Communication Skills

Duration: 3 Hours

Program: FY B.Tech

Course Code: AE BTE 201

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining Six. Total 05 questions
3. Draw neat diagrams
4. Answers to all the sub questions should be attempted and grouped together.

Sr.No	Questions	Points	CO	BL
Q.1. A.	Write 150 words short notes on any Two. (10 marks each) 1. Explain Informal means of communication and types of Grapevine 2. Semantic and cultural barriers to communication. 3. Difference between Hearing and Listening and types of listening. 4. Clarity and Conciseness, Courtesy and consideration in business letter	20	01,02 03,04	01
Q.2. A.	"Communication is a two-way process". Explain in this the elements of communication process. Describe the role of feedback in effective communication	12	02	02
Q.2.B.	Give one word substitute for the following: 1. A person who talks too much. 2. A government ruled by a few people 3. A person who loves mankind 4. A remedy for all diseases 5. One who studies the universe 6. A person who is indifferent to pleasure or pain 7. A statement open to more than one interpretation 8. An extreme fear of confined spaces	08	01	01

Q.3. A.	In capacity of your college librarian, Draft an enquiry to Delhi Bureau of Text Books an autonomous organization of govt. of N.C.T Delhi, 25/2 Institutional Area, Pankha Road, Janakpuri, New Delhi, -110058 for enquiring about engineering books in bulk related to your branch. Use Complete Block Format.	12	03	03
Q.3. B.	Change the following 'We' attitude sentences to 'You' attitude sentences: 1. We are happy to hear that our letter of 20 April provided you with sufficient information. 2. I want to express my sincere thanks for the good words. 3. We offer five different saving schemes in which customers can invest their savings 4. We are open 24 hours to serve our customers.	08	03	03
Q.4. A	Write a letter to West Coast Paper Mills Ltd, 17, Central Bazar, Ramdaspath, Nagpur, informing them about the damaged bond papers 20 reams that you ordered for the college magazine printing that has reached you in damaged condition and due to which you could not print the college Magazine on time. Ask for a suitable compensation for the damage. (Use Modified Block Form)	12	03	03
Q.4. B	Explain the role of Kinesics and its forms in non-verbal communication.	08	03	02
Q.5. A	Describe the channels of organisational communication with the help of diagram. Explain the merits and demerits of formal communication.	12	04	01
Q.5.B.	Draw the Modified block form with all eight basic parts of a letter.	08	03	01
Q.6. A	Draft a Sales letter to promote Sardar Patel college of Engineering to aspiring Engineers. (Use Semi-Block Form)	10	03	06
Q.6. B.	Describe horizontal communication merits and demerits and its importance in teamwork.	08	04	02
Q.7. A	Read the Passage and Answer the questions. In the realm of computer science, algorithms play a pivotal role in problem-solving processes. An algorithm is a systematic, step-by-step procedure that provides a solution to a defined problem. While often expressed in programming languages, algorithms can also be represented in pseudo-code or flowcharts, allowing for easier understanding and implementation. Data structures, on the other hand, are specialized formats for organizing and storing data, enabling efficient access and modification. Common data structures include arrays, linked lists, trees, and graphs. Each structure has its strengths and weaknesses, making it suitable for specific types of tasks. For instance, an array allows for fast access to elements using index numbers, while a linked list facilitates dynamic memory	12	02	03

allocation.

The efficiency of an algorithm is typically evaluated using time complexity and space complexity, which measure the amount of time and memory an algorithm consumes as a function of the input size. Understanding these concepts is crucial for developing optimized software solutions that can handle large datasets effectively.

By mastering algorithms and data structures, software engineers can create efficient, scalable applications that meet the demands of today's technology-driven world.

Answer The Questions given below:

1. What is an algorithm? (02)
2. Name three common data structures mentioned in the passage.(02)
3. What are time complexity and space complexity used for? (02)
4. Why is it important for software engineers to understand algorithms and data structures? (02)
5. Pivotal: In the context of the passage, what does "pivotal" mean? 01
 - a) Unimportant
 - b) Essential
 - c) Random
 - d) Secondary
6. Systematic: Which best describes a systematic procedure? 01
 - a) Random and unpredictable
 - b) Organized and methodical
 - c) Inconsistent and haphazard
 - d) Complex and intricate
7. Pseudo-code: What is likely a characteristic of pseudo-code?01
 - a) A formal programming language
 - b) A precise set of instructions for a computer
 - c) A simplified representation of code for readability
 - d) A technical term for algorithms
8. Specialized: What does "specialized" mean in the context of data structures? 01
 - a) Simple and basic
 - b) Unique and tailored for a particular purpose
 - c) General and applicable to many tasks
 - d) Redundant and unnecessary

Q7.B.	"There can never be perfect communication". Comment by explaining the levels at which communication barriers occur.	08	02	02
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Re-~~Final~~ Semester Examination
June ~~May~~ 2025 (SET II)
SEMESTER II

Max. Marks: 100

Class: C/M/E

Name of the Course: Communication Skills

Instructions:

Duration: 3 Hours

Program: FY B.Tech

Course Code: AE BTE 201

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining Six. Total 05 questions
3. Draw neat diagrams
4. Answers to all the sub questions should be attempted and grouped together.

m/b/m

Sr.No	Questions	Points	CO	BL
Q.1. A.	Write 150 words short notes on any Two. (10 marks each) 1. Explain audio signals used as non-verbal communication 2. SQ3R technique to reading 3. Hints for drafting an enquiry letter 4. Physical Barriers to communication	20	01,02 03,04	01
Q.2. A.	"Communication is a two-way process". Explain in this the elements of communication process. Describe the role of feedback in effective communication.	12	02	02
Q.2.B.	Give synonyms for the following words; 1. Prosperity 2. Fragile 3. Abundant 4. Hostile 5. Reliable 6. Scarce 7. Optimistic 8. Diligent	08	01	01
Q.3. A.	You are an engineering student interested in a summer internship at Tata Motors. Write an enquiry letter requesting details about the application process, duration, and eligibility. (Use Modified Block form).	12	03	03
Q.3. B.	Write short notes on: 1. Emphasize the positive in business letters 2. Your attitude in business correspondence.	08	03	03

Q.4. A	You are a student staying in the college hostel. Write a letter to the warden complaining about irregular water supply and unhygienic conditions. (Use complete block format).	12	03	03
Q.4. B	Explain any four socio-psychological barriers to communication.	08	03	02
Q.5. A	Describe downward communication and its merits and limitations in an organization.	12	04	01
Q.5. B	Draw the Complete block form with all eight basic parts of a letter.	08	03	01
Q.6. A	Draft a Sales letter to promote sales of a new model of electric small cars. (Use Semi-Block Form)	10	03	06
Q.6. B	Explain the AIDA principles of sales letter with examples.	08	04	02
Q.7. A	Read the Passage and Answer the questions. In the realm of computer science, algorithms play a pivotal role in problem-solving processes. An algorithm is a systematic, step-by-step procedure that provides a solution to a defined problem. While often expressed in programming languages, algorithms can also be represented in pseudo-code or flowcharts, allowing for easier understanding and implementation. Data structures, on the other hand, are specialized formats for organizing and storing data, enabling efficient access and modification. Common data structures include arrays, linked lists, trees, and graphs. Each structure has its strengths and weaknesses, making it suitable for specific types of tasks. For instance, an array allows for fast access to elements using index numbers, while a linked list facilitates dynamic memory allocation. The efficiency of an algorithm is typically evaluated using time complexity and space complexity, which measure the amount of time and memory an algorithm consumes as a function of the input size. Understanding these concepts is crucial for developing optimized software solutions that can handle large datasets effectively. By mastering algorithms and data structures, software engineers can create efficient, scalable applications that meet the demands of today's technology-driven world. <u>Answer The Questions given below:</u> 1. What is an algorithm? (02) 2. Name three common data structures mentioned in the passage.(02) 3. What are time complexity and space complexity used for? (02) 4. Why is it important for software engineers to understand	12	02	03

	algorithms and data structures? (02) 5. Pivotal: In the context of the passage, what does "pivotal" mean? 01 a) Unimportant b) Essential c) Random d) Secondary 6. Systematic: Which best describes a systematic procedure? 01 a) Random and unpredictable b) Organized and methodical c) Inconsistent and haphazard d) Complex and intricate 7. Pseudo-code: What is likely a characteristic of pseudo-code? 01 a) A formal programming language b) A precise set of instructions for a computer c) A simplified representation of code for readability d) A technical term for algorithms 8. Specialized: What does "specialized" mean in the context of data structures? 01 a) Simple and basic b) Unique and tailored for a particular purpose c) General and applicable to many tasks d) Redundant and unnecessary			
Q7.B.	Why written communication is indispensable to a business organization? Explain the merits and demerits of written communication.	08	02	02

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**END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25**Program: F.Y. B.Tech Mechanical *Sanu II*

Duration: 180 Min

Course Code: BS-BTM-102

Maximum Points: 100

Course Name: Engineering Chemistry

Semester: II

Instructions:

- 1 Question No (Q6) is compulsory
 - 2 Attempt any 4 from Q1, Q2, Q3, Q4, Q5
 - 3 Write the chemical reactions wherever necessary
- 20/5/25*

Q.No.	Questions	Points	CO	BL	Mod. No.
Q1					
a	Explain differential aeration corrosion with suitable example	5	1	2	1
b	Write the difference between electrochemical and galvanic series	5	1	1	1
c	Describe dry corrosion with a suitable chemical reaction, diagram, and explain its mechanism	10	1	2	1
Q2					
a	Write difference between anodic and cathodic coating	5	1	1	2
b	Explain the sacrificial anode cathodic protection method for the protection of metal from the corrosion process	5	1	2	2
c	Explain the different methods used for metallic coating and discuss their advantages.	10	1	2	2
Q3					
a	Explain test involved in a proximate analysis of coal sample with its significance	5	2	2	3
b	Write short note on octane value of petrol fuel	5	2	1	3
c	Explain determination carbon and hydrogen content ultimate analysis with its significance	10	2,4	2	3
Q4					
a	Write a short note on the acid value of lubricant with its significance	5	4,3	1	4

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**END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25**

b	Define a lubricant. Explain the concepts of pour point and cloud point, and discuss their significance in the selection and use of lubricants	5	4	1	4
c	Explain the different types of liquid lubricants and discuss how various types of modifiers are used to prepare blended oils. Additionally, describe the chemical synthesis of polymethacrylate, which is used as a viscosity modifier in lubricating oils.	10	4,3	3	5
Q5					
a	Explain the phenomenon of knocking in internal combustion engines and describe the methods used to reduce it in petrol.	5	1,2	3	3
b	Write difference between anodic and cathodic inhibitors	5	1	1	
c	Write factor related to metal and environment affecting rate of the corrosion process	10	1	1	1
Q6					
a	A Coal sample contain following composition by weight C=82%, H=5%, O=3%, S=3%, N=5% and Ash=2% calculate gross and net calorific value	5	2,	4	3
b	A coal sample subjected to ultimate analysis. 4.5g of coal on combustion in bomb calorimeter gave 1.5g BaSO ₄ . Calculate percentage of sulphur content in sample	5	2	4	3
c	4.0 gram of coal was heated in Kjeldahls flask and NH ₃ evolved was absorbed in 50ml of 0.5N H ₂ SO ₄ . After absorption, the excess of acid required 15 mL of 0.5N of KOH for neutralization. Find out the percentage of nitrogen content in a coal sample (value of blank titration =50mL)	5	2	4	3
d	5.0 gram of vegetable oil was mixed with 50 mL 0.5N KOH solution and heated for 1 hour. The mixture required 30.2mL of 0.5 N HCl. The blank titration reading was 49.8mL. find out the saponification value of an oil sample	5	4	4	4



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~~END SEMESTER~~ RE-EXAM EXAMINATION ~~MAY~~ JUNE 2024-25

Program: F.Y. B.Tech Mechanical

Duration: 180 Min

Course Code: BS-BTM-102

Maximum Points: 100

Course Name: Engineering Chemistry

Semester: II

Instructions:

- 1 Question No (Q6) is compulsory
- 2 Attempt any 4 from Q1, Q2, Q3, Q4, Q5
- 3 Write the chemical reactions wherever necessary

25/6/25

Q.No.	Questions	Points	CO	BL	Mod. No.
Q1					
a	Explain stress corrosion with suitable example	5	1	2	1
b	Write the difference between wet and dry corrosion	5	1	1	1
c	Describe wet corrosion with a suitable chemical reaction, diagram, and explain its mechanism	10	1	2	1
Q2					
a	Write difference between anodic and cathodic inhibitors	5	1	1	2
b	Discuss methods of modifying the environment to reduce metal corrosion	5	1	2	2
c	Provide a detailed explanation of organic and inorganic coatings used for corrosion protection of metals.	10	1	2	2
Q3					
a	What is calorific value? Explain gross and net calorific values along with their formulas.	5	2	2	3
b	Write short note on cetane value of petrol fuel	5	2	1	3
c	Explain determination nitrogen content using ultimate analysis with its significance	10	2,4	2	3
Q4					
a	Write a short note on the saponification value of lubricant with its significance	5	4,3	1	4



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END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25

b	Define a lubricant. Explain the concepts of viscosity and viscosity Index, and discuss their significance in the selection and use of lubricants	5	4	1	4
c	Explain the different types of solid, semi-solid, and liquid lubricants. Also, discuss the role of various modifiers in the preparation of blended oils.	10	4,3	3	5
Q5					
a	Discuss the causes and effects of pitting corrosion in metals	5	1,2	3	1
b	Describe the anodic current method used to protect metals from corrosion	5	1	1	2
c	Write short note crude petroleum and its composition. Explain cracking of crude petroleum and difference between thermal and catalytic cracking	10	1	1	3
Q6					
a	A Coal sample contain following composition by weight C=85%, H=5%,O=2%, S=2%,N=3% and Ash=2% calculate gross and net calorific value	5	2,	4	3
b	A coal sample subjected to ultimate analysis. 4.8g of coal on combustion in bomb calorimeter gave 1.2g BaSO ₄ . Calculate percentage of sulphur content in sample	5	2	4	3
c	4.5 gram of coal was heated in Kjeldahls flask and NH ₃ evolved was absorbed in 50ml of 0.5N H ₂ SO ₄ . After absorption, the excess of acid required 16 mL of 0.5N of KOH for neutralization. Find out the percentage of nitrogen content in a coal sample (value of blank titration =50mL)	5	2	4	3
d	4.6 gram of vegetable oil was mixed with 50 mL 0.5N KOH solution and heated for 1 hour. The mixture required 31 mL of 0.5 N HCl. The blank titration reading was 49.7mL. find out the saponification value of an oil sample	5	3	4	4

**END SEM/~~RE-EXAM~~ EXAMINATION MAY/~~JUNE~~ 2024-25**

Program: Mechanical Engg

P. V. S. P. (M) S. S.

Duration: 3 hours

Course Code: ES-BTM201

Maximum Points: 100

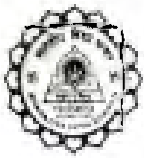
Course Name: Basic Electrical and Electronics EnggSemester: II

Notes:

Question no. 1 is compulsory; solve 4 questions from remaining questions.

W. S. S.

Q.No.	Questions	Points	CO	BL	Module No.
Q1)	A. Derive R.M.S. output current of full-wave rectifier.	6	3	3	4
	B. List the measurands of given energy types: Mechanical, Electrical, Radiant, Magnetic, thermal, Chemical	6	4	2	5
	C. Draw the phasor diagram for a given AC Voltage applied to Pure Resistor, Pure Inductor, Pure Capacitor, R-L load	8	1	2	2
Q2)	A. Derive the emf equation of a transformer. Explain the losses that takes place in a transformer	5 5	2	3	3
	B. Explain the working principle of a transformer with a neat diagram.	10	2	3	3
Q3)	A. A series circuit consumes 2000 W at 0.5 leading power factor, when connected to 230 V, 50 Hz ac supply. Calculate (a) current, (b) kVA, and (c) kVAR.	8	1	3	2
	B. The three equal impedances of each of $10\angle 60^\circ \text{ohm}$, are connected in star across a three-phase, 400 V, 50 Hz supply. Calculate the (a) line voltage and phase voltage, (b) power factor and active power consumed. (c) If the same three impedances are connected in delta to the same source of supply, what is the active power consumed?	12	1	3	2
Q4)	A. A balanced delta-connected load of impedance $(8 - j6) \text{ ohms per phase}$ is connected to a three-phase, 230 V, 50 Hz supply. Calculate (a) power factor, (b) line current (c) reactive power.	12	1	3	2



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END SEM/~~RE-EXAM~~ EXAMINATION MAY/~~JUNE~~ 2024-25

	B. Draw phasor diagram of three phase star connected R-L load, showing phase voltages, line voltages, phase and line currents by considering R phase as reference phase.	8	1	3	2
Q5)	A. Why single-phase induction motors are not self-starting? Explain split phase capacitor start motor with neat circuit and phasor diagram.	12	2	3	3
	B. Discuss the principle of operation of three phase induction motor.	8	2	3	4
Q6)	A. Draw input voltage (1 mark each), output voltage (2 marks each) and output current (2 marks each) waveforms of half-wave and full wave rectifier with resistive load. Draw circuit diagram of half-wave and full wave rectifiers with resistive load (1 mark each).	12	3	3	4
	B. Explain Zener diode as a voltage regulator.	8	3	3	4
Q7)	A. Derive the relation between line current and phase current, line voltage and phase voltage, in three phase circuit when load is connected in Star configuration.	12	1	3	2
	B. Compare active and passive sensors with examples	8	4	2	5



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PSE - June 2025 Examination (23-24)



Program: FY Mech *Sem II*

Duration: 3 hours

Course Code: ES-BTM201

Maximum Points: 100

Course Name: Basic electrical and Electronics Engg.

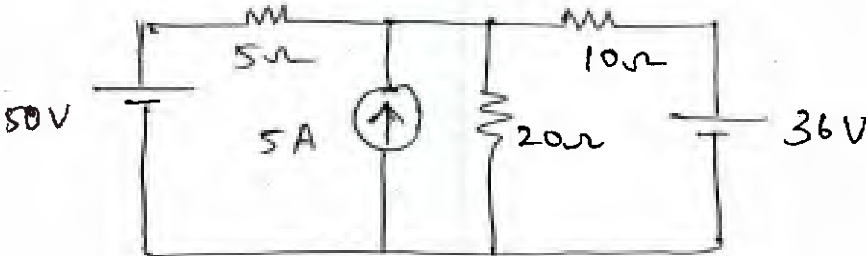
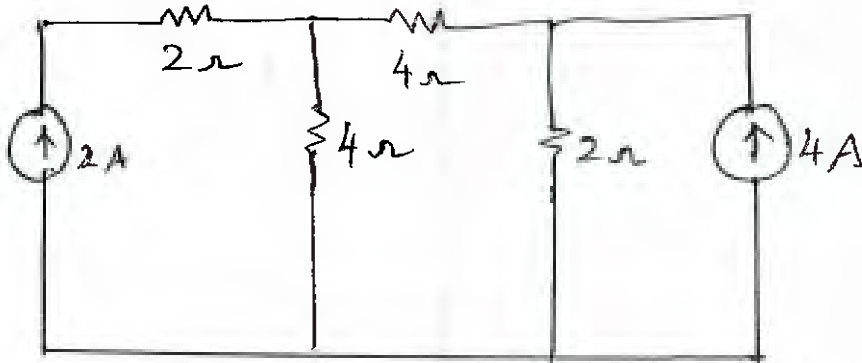
Semester: II

Attempt any FIVE questions out of SEVEN questions.

Answers to all sub questions should be grouped together.

Figures to the right indicate full marks.

26/6/25

Q.No	Questions	Points	CO	BL
Q1.(a)	State Superposition theorem, Maximum power transfer theorem.	5	1	1,4
b)	Explain the working principle of a transformer with a neat diagram.	5	2	4
c)	Draw and explain the block diagram of a DC power supply.	5	3	4
d)	Explain the working principle of transducers and list any 4 of them.	5	4	1,4
2a)	Find the current I through 5 ohm resistor by Superposition theorem. 	10	1	3
b)	Find the node voltages V_1, V_2 	10	1	3

Q3a)	A resistor of 7Ω is connected in series with a 31.8mH inductor. This circuit is connected to a 230V , 50 supply. Find a) impedance b) current c) power factor d) phase angle e) power consumed.	10	1	3
3b)	Write the relation between line current and phase current, line voltage and phase voltage, in three phase circuit when load is connected in star and Delta configuration. Draw the circuit diagrams for star and delta connected system showing all line and phase voltages and currents.	10	1	3
4a)	Three similar coils, each of resistance 20 ohm and inductance 0.5 H are connected in star to a 400 V , 50Hz , 3-phase supply. Determine the line current and total power consumed.	10	1	2
b)	A resistance of 20ohms and a pure coil of inductance 31.8mH are connected in parallel across 230V , 50Hz supply. Find line current and power consumed by the circuit	10	1	3
Q5.(a)	Derive the emf equation of a transformer. Explain the losses that takes place in a transformer.	10	2	3,4
b)	Explain the two types of single phase induction motors with neat diagrams.	10	2	4
Q6.(a)	Explain the working of npn transistor ? Mention the different configurations of transistor. Draw the circuit diagram of common emitter configuration of an npn transistor.	$5+2+3$	3	1,2
b)	i) Explain the working of a full wave bridge rectifier circuit with neat circuit diagrams along with the waveforms for the same. ii) Draw circuit diagram and the output waveforms if a capacitor is used as a filter for the above circuit and explain the working.	$6+4$	3	4
Q7a)	Explain the construction and working of LVDT with neat diagrams.	$7+7$	4	4
b)	List the differences between sensors and transducers.	6	4	2
			1	1,2



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~~END SEM~~ RE-EXAM EXAMINATION ~~MAY~~ JUNE 2024-25

Program: Mechanical Engg *Sem II*

Duration: 3 hours

Course Code: ES-BTM201

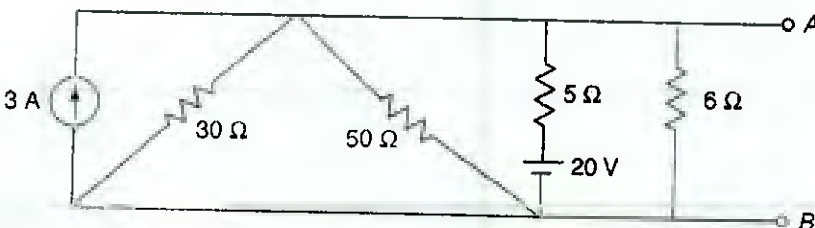
Maximum Points: 100

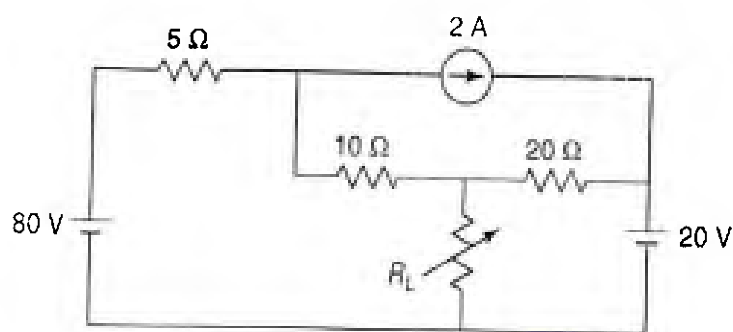
Course Name: Basic Electrical and Electronics Engg

Semester: II

Notes: _____

Question no. 1 is compulsory; solve 4 questions from remaining questions. *26/6/25*

Q.No.	Questions	Points	CO	BL	Module No.
Q1)	 A. Replace above circuit between A and B with a voltage source in series with a single resistance. B. Three equal impedances, each of $(8 + j10)$ ohms, are connected in star. This is further connected to a 440 V, 50 Hz, three-phase supply. Calculate (a) phase voltage, (b) phase angle. (c) phase current. (d) line current, (e) active power, and (f) reactive power. C. Compare sensors and transducers.	7 7 6	1 1 4	3 3 2	1 2 5
Q2)	A. Find the value of resistance R_L in given figure for maximum power transfer and calculate the maximum power.	12	1	3	1



- B. An inductive coil draws 10 A current and consumes 1 kW power from a 200 V, 50 Hz ac supply. Determine (a) impedance in Cartesian and polar forms, (b) power factor, and (c) reactive and apparent power

8

1

3

3

Q3)

- A. A 415 V, 50 Hz, three-phase voltage is applied to three star-connected identical impedances. Each impedance consists of a resistance of 15 ohm, a capacitance of 177 μ F and an inductance of 0.1 henry in series. Find the (a) power factor (2 marks) (b) phase current (1 mark), (c) line current (1 mark). (d) active power (2 marks), (e) reactive power (2 marks) and (f) total VA (2 marks). Draw a neat phasor diagram (4 marks).

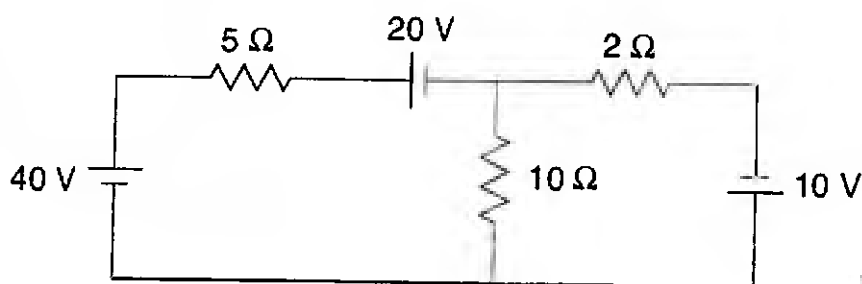
14

1

3

2

- B. Find the current through 2 ohm resistance by superposition theorem



6

1

3

2

Q4)

- A. Derive the emf equation of a transformer. Explain the losses that takes place in a transformer

12

2

3

3

- B. Explain the working principle of a transformer with a neat diagram.

8

2

3

3

Q5)

- A. Draw the circuit diagram showing experimental setup of common emitter configuration of bipolar junction transistor in common emitter configuration. Plot input and output characteristics for common emitter configuration.

12

3

3

3



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END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25

	B. Compare squirrel cage induction motor and wound rotor induction motor.	8	2	3	4
Q6)	A. Draw input voltage (1 mark each), output voltage (1 mark each) and output current (2 marks each) waveforms of half-wave and full wave rectifier with resistive load. Draw circuit diagram of half-wave and full wave rectifiers with resistive load (1 mark each).	10	3	3	4
	B. Derive the relation between line current and phase current, line voltage and phase voltage, in three phase circuit when load is connected in Delta configuration.	10	3	3	4
Q7)	A. Derive output average/DC voltage of half-wave and Full-wave rectifiers (3+4 marks). Derive RMS value of output current in both the rectifiers (3+4 marks).	14	3	2	3
	B. List the measurands of given energy types: Mechanical, Electrical, Radiant, Magnetic, thermal, Chemical	6	4	2	5



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END SEMESTER EXAMINATION MAY 2025

Program: Mechanical Engineering

Duration: 03 Hour

Course Code: PC BTM 201

Maximum Points: 100

Course Name: Manufacturing Processes

Semester: 2

Note: 1) Solve any five questions.

2) Write solution point-wise only.

26/5/25

Q.No	Questions	Pts	CO	Mod
Q1	Solve any four question (each question for 5 marks) A] Draw neat sketch of Universal milling machine tool? Label its all systems? B] Draw neat sketch of following lathe machine turning operation: a) Outer diameter step turning, b) Taper turning, c) Knurling operation? C] Draw neat sketch of Upright drilling machine tool? D] Write short note on material removal mechanism and abrasive grit life in grinding operation? E] Give 3 functions of GATING system in sand metal casting along with its sketch? F] Explain the metal inert gas welding process and its application?	20	1,2	1,2,3
Q2	Calculate total machining time to turn "H3 spring steel" solid cylindrical rod of diameter 225 mm X length 375 mm into finish component as shown in figure 2? Finish component has dimensions as shown in figure 02. For, straight O.D. turning and face turning - Cutting velocity is 10 m/min, feed is 0.15 mm/rev & depth of cut is 0.5 mm for both outer diameter (O.D) turning and face turning operation. For, taper O.D. turning - Cutting velocity is 25 m/min, feed is 0.2 mm/rev & depth of cut is 0.5 mm for outer diameter (O.D) turning. [Note - i) For calculating machining time of each next pass of outer diameter (O.D) turning, consider existing diameter of work piece at that instant for cutting speed (N_i rpm) calculations, ii) Work holding device will require 25 mm as grip length] [10M]	20	4	3

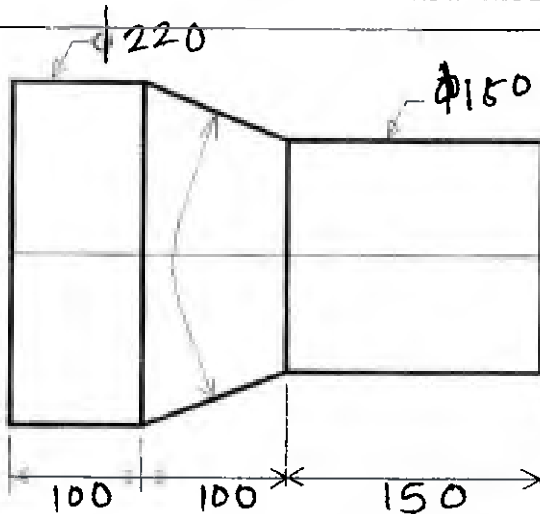
**END SEMESTER EXAMINATION MAY 2025**

Figure no. 01

	B] Draw a neat sketch of universal swivel vice? Give geometry of workpiece can be exclusively manufactured using combination of vertical milling machine and this type of vice? [5M] Draw neat sketch of taper shank two flute drill tool and label it (web thickness, lip angle, body clearance diameter) [5M]			
Q3	A] 1) Write a short note in detail on "Block diagram of CNC control system" using neat sketch? [10M] B] Give material removal mechanism and applications of Abrasive jet machining process? [5M] Draw neat schematic sketch of abrasive jet machining process set-up? [5M]	20	2	4
Q4	A] Using application and sketch, write short note on injection molding process? [10 M] B] Describe in detail continuous casting process with help of schematic sketch?	20	4	1, 2
Q5	A] Give Non-conventional grinding wheel compositional alpha numeric specifications? Explain each in details? [10M] B] Draw neat sketch and explain operation of external centerless grinding operation set up [10M]?	20	1,2	5
Q6	A] Explain with schematic sketch 'Friction stir welding processes and its applications? [6M] B] Write short note on resistance seam welding process and give its application using sketch? [6M] C] Give advantages and application of diffusion welding process along with its joining mechanism? [8M]	20	1,2	1,2



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PREVIOUS ~~END~~ SEMESTER EXAMINATION ^{JUNE} ~~MAY~~ 2025 (F23)

Program: Mechanical Engineering

Course Code: PC BTM 201

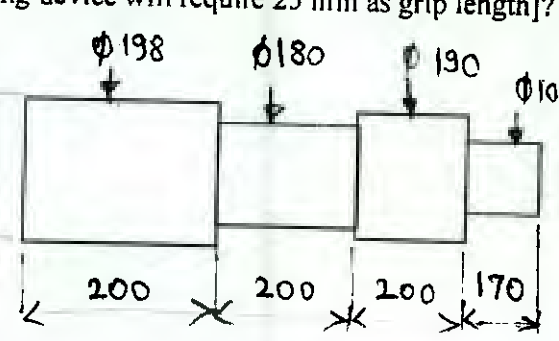
Course Name: Manufacturing Processes

Duration: 03 Hour

Maximum Points: 100

Semester: 2

- Note: 1) Solve any five questions.
2) Write solution point-wise only.

Q.No	Questions	Pts	CO	Mod
Q1	Solve any four question (each question for 5 marks) A] Draw neat sketch of 3Axis type milling machine tool? Give its application in terms of product geometry it can make? B] Draw neat, labelled sketch of Turret lathe machine tool? C] Draw well labelled neat sketch of Radial drilling machine tool? D] Write short note on physical and chemical characteristics to be considered while selection of grinding wheel, coolant? E] List down elements used to enhance the directional solidification in metal casting process and how? F] Explain the submerged arc welding process and its application?	20	1,2	1,2,3
Q2	A] Calculate total machining time to turn solid cylindrical rod of diameter 202 mm X length 802 mm into finish component as shown in below figure? For, <i>straight O.D. turning and face turning</i> - Cutting velocity is 15 m/min, feed is 0.15 mm/rev & depth of cut is 1 mm. For, <i>taper O.D. turning</i> - Cutting velocity is 30 m/min, feed is 0.3 mm/rev & depth of cut is 1 mm. [Note - i) For calculating machining time of each next pass of outer diameter (O.D) turning, consider existing diameter of work piece at that instant for cutting rotational speed (N_i rpm) calculations, ii) Work holding device will require 25 mm as grip length]? [10M] 	20	4	3



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PREVIOUS ~~END~~ SEMESTER EXAMINATION ~~MAY~~ ^{JUNE} 2025

	B] Draw neat labelled sketch of upmill and downmill operation? Give its significance? [5M] Draw neat sketch of taper shank two flute drill tool and label it (web thickness, lip angle, body clearance diameter) [5M]			
Q3	A] Justify how the following functions of CNC system allows more reliable machine tool operation; i) Machine tool control, ii) In process compensation, iii) improved programming [10M] B] Give material removal mechanism and applications of electro- discharge machining (EDM) process? [5M] Draw neat schematic sketch of EDM process set-up? [5M]	20	2	4
Q4	A] Using application and sketch, write short note on vacuum forming process? [10 M] B] Describe in brief "investment casting process" with help of schematic sketch?	20	4	1, 2
Q5	A] Give Conventional grinding wheel compositional alpha numeric specifications? Explain each in details? [10M] B] Draw neat sketch of horizontal spindle rotary table grinding machine tool and give its different mode of operations? [10M]	20	1,2	5
Q6	A] Explain with schematic sketch 'Friction stir welding processes and its applications? [6M] B] Write short note on resistance seam welding process and give its application using sketch? [6M] C] Give advantages and application of diffusion welding process along with its joining mechanism? [8M]	0	2	2

**END-SEMESTER EXAMINATION MAY-2025**

Re-

June

Program: Mechanical Engineering

Duration: 03 Hour

Course Code: PC BTM 201

Maximum Points: 100

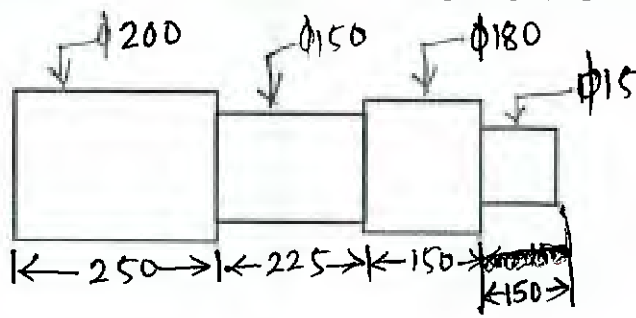
Course Name: Manufacturing Processes

Semester: 2

Note: 1) Solve any five questions.

2) Write solution point-wise only.

27/6/25

Q.No	Questions	Pts	CO	Mod
Q1	Solve any four question (each question for 5 marks) A] Draw neat sketch of RAM type milling machine tool? Give its application in terms of product geometry it can make? B] Draw neat labelled sketch of Tool room lathe machine tool? C] Draw well labelled neat sketch of Radial drilling machine tool? D] Write short note on physical and chemical characteristics to be considered while selection of grinding wheel, coolant? E] List down elements used to enhance the directional solidification in metal casting process and how? F] Explain the submerged arc welding process and its application?	20	1,2	1,2,3
Q2	A] Calculate total machining time to turn solid cylindrical rod of diameter 202 mm X length 802 mm into finish component as shown in below figure? For, <i>straight O.D. turning and face turning</i> - Cutting velocity is 15 m/min, feed is 0.15 mm/rev & depth of cut is 1 mm. For, <i>taper O.D. turning</i> - Cutting velocity is 30 m/min, feed is 0.3 mm/rev & depth of cut is 1 mm. [Note - i) For calculating machining time of each next pass of outer diameter (O.D) turning, consider existing diameter of work piece at that instant for cutting rotational speed (N_i rpm) calculations, ii) Work holding device will require 25 mm as grip length]? [10M] 	20	4	3



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END-SEMESTER EXAMINATION MAY 2025

	B] Draw neat labelled sketch of upmill and downmill operation? Give its significance? [5M] Draw neat sketch of taper shank two flute drill tool and label it (web thickness, lip angle, body clearance diameter) [5M]			
Q3	A] Justify how the following functions of CNC system allows more reliable machine tool operation; i) Machine tool control, ii) In progress compensation, iii) improved programming [10M] B] Give material removal mechanism and applications of electro- discharge machining (EDM) process? [5M] Draw neat schematic sketch of EDM process set-up? [5M]	20	2	4
Q4	A] Using application and sketch, write short note on vacuum forming process? [10 M] B] Describe in brief "investment casting process" with help of schematic sketch?	20	4	1, 2
Q5	A] Give Conventional grinding wheel compositional alpha numeric specifications? Explain each in details? [10M] B] Draw neat sketch of horizontal spindle rotary table grinding machine tool and give its different mode of operations? [10M]	20	1,2	5
Q6	B] Write short note on resistance seam welding process and give its application using sketch? [6M] C] Using application write short note on thermite welding using sketch [6M] C] Give advantages and application of diffusion welding process along with its joining mechanism? [8M]	20	1,2	1,2



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

	c	Solve $\frac{dy}{dx} + \frac{2y}{x} + x^2 y^2 \cos x = 0$	8	CO1	BL4	1
7	a	Evaluate $\iiint_V \frac{1}{\sqrt{1-x^2-y^2-z^2}} dx dy dz$ over the first octant of the sphere $x^2 + y^2 + z^2 = 1$	6	CO2	BL5	4
	b	Given that $\frac{dy}{dx} = 1 - 2xy$ with $y(0) = 0$. Find $y(0.2)$, $y(0.4)$ using Taylor's series method	6	CO1	BL4	1
	c	Solve $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 20y = (x^2 + 1)^2$	8	CO1	BL3	2



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END SEMESTER/ ~~RE~~-EXAMINATION MAY 2025/~~JUNE~~ 2025

Program: First Year Engineering (Electrical) *Sum II*

Duration: 3 Hours

Course Code: BS-BTE201

Maximum Points: 100

Course Name: Integral Calculus and Differential Equations

Semester: II

Note:

1. Attempt Any Five Questions
2. Answers to the sub questions should be grouped together

14/5/25

	Questions	Points	CO	BL	Module
1	a Solve $(D^3 + 1)y = (e^{-x} + 1)^2$	6	CO1	BL3	2
	b Evaluate $\int_0^3 \int_0^{\sqrt{9-y^2}} \sqrt{9-x^2-y^2} dx dy$	6	CO2	BL5	3
	c Evaluate $\iiint_V \frac{1}{(1+x+y+z)^3} dx dy dz$ over the volume of the tetrahedron bounded by the planes $x=0, y=0, z=0$ and $x+y+z=1$	8	CO3	BL4	4
2	a Find the volume bounded by the cylinder $x^2 = y, y^2 = x$ and the planes $z=0, x+y+z=2$.	6	CO3	BL3	5
	b Change the order of double integral $\int_0^a \int_{\sqrt{a^2-x^2}}^{x+3a} f(x,y) dx dy$	6	CO2	BL2	3
	c Solve $(D^2 + 9)y = \tan 3x$	8	CO1	BL4	2



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

3	a	Evaluate $\int_0^{\infty} x e^{-x^8} dx \cdot \int_0^{\infty} x^2 e^{-x^4} dx$	6	CO2	BL5	SL
	b	Solve $(x\sqrt{x^2+y^2}-y)dx + (y\sqrt{x^2+y^2}-x)dy = 0$	6	CO1	BL4	1
	c	Evaluate $\iint_R \frac{1}{\sqrt{1-x^2-y^2}} dx dy$, where R is the region of ellipse $2x^2+y^2=1$ in the first quadrant.	8	CO2	BL5	3
4	a	Solve $(D^2+3D+2)y = e^{-x} \sin\left(\frac{x}{2}\right)$	6	CO1	BL5	2
	b	Find the area included between the curves $x^2=8y$ and $y^2=8x$	6	CO3	BL3	5
	c	Change the order of double integral and evaluate $\int_0^2 \int_{\sqrt{2x}}^2 \frac{y^2}{\sqrt{y^4-4x^2}} dx dy$	8	CO2	BL4,5	3
5	a	Solve $(3x^2y^4+2xy)dx + (2x^3y^3-x^2)dy = 0$	6	CO1	BL5	1
	b	Evaluate $\iint_R xy(x+y) dx dy$ where R is the region bounded between the curves $x^2=y$ and $x=y$	6	CO2	BL3	3
	c	Given $\frac{dy}{dx} = 1+xy$; $y(0)=2$. Find $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method.	8	CO1	BL4	1
6	a	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}} dx \cdot \int_0^{\frac{1}{3}} \sqrt{3y-9y^2} dy$	6	CO2	BL5	SL
	b	Evaluate $\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{1}{(a^2+x^2+y^2)^{\frac{3}{2}}} dx dy$ by changing to polar	6	CO2	BL3	3



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

		coordinates				
	c	Solve $\frac{dy}{dx} + x^3 \sin^2 y + x \sin 2y = x^3$	8	CO1	BL4	1
7	a	Evaluate $\iiint_V xyz(x^2 + y^2 + z^2) dx dy dz$ over the first octant of the sphere $x^2 + y^2 + z^2 = 16$	6	CO2	BL5	4
	b	Given that $\frac{dy}{dx} - 2y = 3e^x$ with $y(0) = 1$. Find $y(0.1)$, $y(0.2)$ using Taylor's series method	6	CO1	BL4	1
	c	Solve $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 20y = (x^2 + 1)^2$	8	CO1	BL3	2



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END SEMESTER/ RE-EXAMINATION MAY 2025/JUNE 2025

Program: First Year Engineering (Electrical)

Duration: 3 Hours

Course Code: BS-BTE201

Maximum Points: 100

Course Name: Integral Calculus and Differential Equations

Semester: II

Note:

1. Attempt Any Five Questions
2. Answers to the sub questions should be grouped together

		Questions	Points	CO	BL	Module
1	a	Solve $(D^2 + 7D + 12)y = e^{-2x} \cosh x$	6	CO1	BL3	2
	b	Evaluate $\int_0^2 \int_0^{x^2} x(x^2 + y^2) dx dy$	6	CO2	BL5	3
	c	Evaluate $\iiint_V (x + y + z) dx dy dz$ over the volume of the tetrahedron bounded by the planes $x = 0, y = 0, z = 0$ and $x + y + z = 1$	8	CO3	BL4	4
2	a	Find the volume bounded by the cylinder $x^2 = y, y^2 = x$ and the planes $z = 0, z = 3$.	6	CO3	BL3	5
	b	Change the order of double integral $\int_0^a \int_{\sqrt{a^2-x^2}}^{x+3a} f(x, y) dx dy$	6	CO2	BL2	3
	c	Solve $(D^2 + 4)y = \sec 2x$	8	CO1	BL4	2



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3	a	Evaluate $\int_0^{\infty} \frac{e^{-x^3}}{\sqrt{x}} dx \cdot \int_0^{\infty} x^4 e^{-x^6} dx$	6	CO2	BL5	SL
	b	Solve $(1+2x\sqrt{x^2-y^2})dx - 2y\sqrt{x^2-y^2}dy = 0$	6	CO1	BL4	1
	c	Evaluate $\iint_R e^{2x+3y} dx dy$, where R is the region of the triangle bounded by the straight lines $x=0, y=0, 2x+3y=1$	8	CO2	BL5	3
4	a	Solve $(D^2+9)y = x \cos x$	6	CO1	BL5	2
	b	Find the area included between the curves $x^2 = y$ and $x+y=2$	6	CO3	BL3	5
	c	Change the order of double integral and evaluate $\int_0^1 \int_0^{\sqrt{1-y^2}} \frac{x}{(1+x^2)\sqrt{1-y^2-x^2}} dx dy$	8	CO2	BL4,5	3
5	a	Solve $(x^4+y^4)dx - xy^3dy = 0$	6	CO1	BL5	1
	b	Evaluate $\iint_R xy(x+y) dx dy$ where R is the region bounded between the curves $x^2 = y$ and $x = y$	6	CO2	BL3	3
	c	Given $\frac{dy}{dx} = x^2 - y$; $y(0) = 1$. Find $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method.	8	CO1	BL4	1
6	a	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}} dx \cdot \int_0^{\frac{1}{3}} \sqrt{3y-9y^2} dy$	6	CO2	BL5	SL
	b	Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} e^{-(x^2+y^2)} dx dy$ by changing to polar coordinates	6	CO2	BL3	3



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End Semester Examination / *Reexam*
May 2025 (Set I)
SEMESTER II



Max. Marks: 100

Class: C/M/E

Name of the Course: Communication Skills

Instructions:

Duration: 3 Hours

Program: FY B.Tech *G.M.E*

Course Code: AE BTE 201 *Sem II*

1. Question No 1 is compulsory.
 2. Attempt any four questions out of remaining Six. Total 05 questions
 3. Draw neat diagrams
 4. Answers to all the sub questions should be attempted and grouped together.
- 16/5/25*

Sr.No	Questions	Points	CO	BL
Q.1. A.	Write 150 words short notes on any Two. (10 marks each) 1. Explain Informal means of communication and types of Grapevine 2. Semantic and cultural barriers to communication. 3. Difference between Hearing and Listening and types of listening. 4. Clarity and Conciseness, Courtesy and consideration in business letter	20	01,02 03,04	01
Q.2. A.	"Communication is a two-way process". Explain in this the elements of communication process. Describe the role of feedback in effective communication	12	02	02
Q.2.B.	Give one word substitute for the following: 1. A person who talks too much. 2. A government ruled by a few people 3. A person who loves mankind 4. A remedy for all diseases 5. One who studies the universe 6. A person who is indifferent to pleasure or pain 7. A statement open to more than one interpretation 8. An extreme fear of confined spaces	08	01	01

Q.3. A.	In capacity of your college librarian, Draft an enquiry to Delhi Bureau of Text Books an autonomous organization of govt. of N.C.T Delhi, 25/2 Institutional Area, Pankha Road, Janakpuri, New Delhi, -110058 for enquiring about engineering books in bulk related to your branch. Use Complete Block Format.	12	03	03
Q.3. B.	Change the following 'We' attitude sentences to 'You' attitude sentences: 1. We are happy to hear that our letter of 20 April provided you with sufficient information. 2. I want to express my sincere thanks for the good words. 3. We offer five different saving schemes in which customers can invest their savings 4. We are open 24 hours to serve our customers.	08	03	03
Q.4. A	Write a letter to West Coast Paper Mills Ltd, 17, Central Bazar, Ramdaspath, Nagpur, informing them about the damaged bond papers 20 reams that you ordered for the college magazine printing that has reached you in damaged condition and due to which you could not print the college Magazine on time. Ask for a suitable compensation for the damage. (Use Modified Block Form)	12	03	03
Q.4. B	Explain the role of Kinesics and its forms in non-verbal communication.	08	03	02
Q.5. A	Describe the channels of organisational communication with the help of diagram. Explain the merits and demerits of formal communication.	12	04	01
Q.5.B.	Draw the Modified block form with all eight basic parts of a letter.	08	03	01
Q.6. A	Draft a Sales letter to promote Sardar Patel college of Engineering to aspiring Engineers. (Use Semi-Block Form)	10	03	06
Q.6. B.	Describe horizontal communication merits and demerits and its importance in teamwork.	08	04	02
Q.7. A	Read the Passage and Answer the questions. In the realm of computer science, algorithms play a pivotal role in problem-solving processes. An algorithm is a systematic, step-by-step procedure that provides a solution to a defined problem. While often expressed in programming languages, algorithms can also be represented in pseudo-code or flowcharts, allowing for easier understanding and implementation. Data structures, on the other hand, are specialized formats for organizing and storing data, enabling efficient access and modification. Common data structures include arrays, linked lists, trees, and graphs. Each structure has its strengths and weaknesses, making it suitable for specific types of tasks. For instance, an array allows for fast access to elements using index numbers, while a linked list facilitates dynamic memory	12	02	03

allocation.

The efficiency of an algorithm is typically evaluated using time complexity and space complexity, which measure the amount of time and memory an algorithm consumes as a function of the input size. Understanding these concepts is crucial for developing optimized software solutions that can handle large datasets effectively.

By mastering algorithms and data structures, software engineers can create efficient, scalable applications that meet the demands of today's technology-driven world.

Answer The Questions given below:

1. What is an algorithm? (02)
2. Name three common data structures mentioned in the passage.(02)
3. What are time complexity and space complexity used for? (02)
4. Why is it important for software engineers to understand algorithms and data structures? (02)
5. Pivotal: In the context of the passage, what does "pivotal" mean? 01
 - a) Unimportant
 - b) Essential
 - c) Random
 - d) Secondary
6. Systematic: Which best describes a systematic procedure? 01
 - a) Random and unpredictable
 - b) Organized and methodical
 - c) Inconsistent and haphazard
 - d) Complex and intricate
7. Pseudo-code: What is likely a characteristic of pseudo-code?01
 - a) A formal programming language
 - b) A precise set of instructions for a computer
 - c) A simplified representation of code for readability
 - d) A technical term for algorithms
8. Specialized: What does "specialized" mean in the context of data structures? 01
 - a) Simple and basic
 - b) Unique and tailored for a particular purpose
 - c) General and applicable to many tasks
 - d) Redundant and unnecessary

Q7.B.	"There can never be perfect communication". Comment by explaining the levels at which communication barriers occur.	08	02	02
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END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25

Total Marks: 100

CLASS/SEM : F Y.B.Tech Electrical Sem.-II

Duration: 3 Hrs

COURSE NAME : ENGINEERING PHYSICS

COURSE CODE: BSBTE202

- Answer any FIVE questions out of SEVEN.
- Diagrams have to be drawn wherever necessary. Assume suitable data (if necessary) and state your assumptions clearly.
- Figures to the right indicate Mark, Module no, Course Outcome and Bloom's Taxonomy level respectively.
- Marks will be given on the basis of what will be written in the paper irrespective of your intentions!

Good luck!

		Mark	MN	C O	BL
Q1.	(20 mark)				
a.	X rays are incident on Planes of a simple cubic crystal with a lattice spacing of 0.115nm. The first order reflection is observed at a Bragg angle of 43.5°. Calculate the wavelength of X rays.	5	1	1	3
b.	Find gradient of magnitude of the position vector and calculate curl of the result.	5	3	3	3
c.	Calculate the numerical aperture and hence the critical angle for an optical fiber given that the refractive indices of the core and the cladding are 1.45 and 1.40.	5	5	5	3
d.	In an oscillator, the value of inductance and capacitance is 5mH and 12pF. Given: density of rod = 2.5 gm/cc, $Y=8 \times 10^{10}$ N/m ² find length of the rod and frequency.	5	4	4	3,5
Q2.	(20 mark)				
a.	Arrive at Schrodinger's time dependent equation.	8	2	2	2
b.	Calculate the power per unit area delivered by a laser pulse of energy 4×10^{-3} Joule and the pulse length in time as 10^{-9} s, when the pulse is focused on a target to a very small radius 1.5×10^{-5} m.	6	5	5	3,5
c.	Derive differential form of Gauss' law from its integral form.	6	3	3	3
Q3.	(20 mark)				
a.	Derive expression for Numerical Aperture in Optical fibers.	8	5	5	3
b.	What is the ΔE between the $n=4$ and $n=5$ states for an F2 molecule trapped within a one-dimension well of length 3.0 cm? At what value of n does the energy of the molecule reach $\frac{1}{4}k_B T$ at 450 K?	6	1	1	3

c.	In determining the thickness of a steel plate by an ultrasonic beam, the difference between the first two adjacent harmonic frequencies was found to be 50 kHz. If the velocity of sound in steel is 5000 m/s, calculate the thickness of the steel plate.	6	4	4	3
Q4.	(20 mark)				
a.	State equations before and after Maxwell in medium. Also, derive electric wave equation in vacuum.	8	3	3	1, 3
b.	Calculate the uncertainty in the position of a particle moving at a speed of 5.8×10^5 m/s and has an uncertainty in its velocity of 2.66×10^5 m/s. The mass of the particle is 2.16×10^{-28} kg.	6	1&5	1 & 5	2,5
c.	Calculate the numerical aperture and the angle of acceptance of an optical fiber having fractional RI of 0.05 and core refractive index of 1.48.	6	5	5	3,5
Q5.	(20 mark)				
a.	Explain construction and working of a He-Ne laser in detail.	8	5	5	1,2
b.	State Coulomb's law. Find the electric field at a distance z above the midpoint of a straight line segment of length $2L$, which carries a uniform charge density λ .	6	3	3	3
c.	Imagine an electron inside an infinite potential well of width $10 \text{ \AA}$ in an energy state corresponding to the wavelength output of an Nd:YAG laser. Calculate the order of the excited state corresponding to this energy.	6	2&5	2	3,4
Q6.	(20 mark)				
a.	Explain the principle of working of a magnetostriction oscillator in detail with a neat and labeled diagram.	8	4	4	3
b.	A small 0.40-kg cart is moving back and forth along an air track between two bumpers located 2.0 m apart. We assume no friction; collisions with the bumpers are perfectly elastic so that between the bumpers, the car maintains a constant speed of 0.50 m/s. Treating the cart as a quantum particle, estimate the value of the principal quantum number that corresponds to its classical energy.	6	2	5	3
c.	Explain (with both mathematical and Physical reasoning) Heisenberg's Uncertainty Principle using single slit diffraction experiment.	6	1	1	3
Q7.	(20 mark)				
a.	Derive the Energy Eigen values and Eigen functions for a particle moving in an infinite height and of width L . Also sketch the probability function for the states $n=1$ and 2.	8	2	2	3
b.	Draw a diagram which clearly mentions important axes of a quartz crystal. Further explain piezoelectric and inverse piezoelectric effects with a neat diagram.	6	4	4	3
c.	How many photons of green light of wavelength $5500 \text{ \AA}$ constitute 1.5J of energy?	6	1	1	3,5



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~~END SEM/RE-EXAM~~ EXAMINATION MAY/JUNE 2024-25

Total Marks: 100

CLASS/SEM : F.Y.B.Tech Electrical Sem.-II

Duration: 3 Hrs

COURSE NAME : ENGINEERING PHYSICS

COURSE CODE: BSBTE202

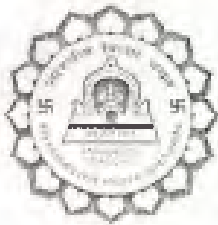
25/6/25

- Answer any FIVE questions out of SEVEN.
- Diagrams have to be drawn wherever necessary. Assume suitable data (if necessary) and state your assumptions clearly.
- Figures to the right indicate Mark, Module no, Course Outcome and Bloom's Taxonomy level respectively.
- Marks will be given on the basis of what will be written in the paper irrespective of your intentions!

Good luck!

		Mark	MN	C O	BL
Q1.	(20 mark)				
a.	In a Coolidge tube, an electron loses 80% of its energy and produces a single X-ray photon of wavelength 0.03nm. Determine the accelerating voltage applied to the tube.	5	1	1	3
b.	Check if the following function is an impossible electrostatic field or not. $v = xy^2\hat{i} + 3yz^2\hat{j} - 2x^2\hat{k}$	5	3	3	3
c.	The refractive index of core is 1.5 and fractional RI between core and cladding is 0.018. Find velocity of light through the cladding of the optical fiber.	5	5	5	3
d.	An ultrasonic beam of frequency 75.6 kHz is sent down to the sea bed. The velocity of ultrasonic waves in the sea is 1520 m/s. If the time required for the wave to be received is 0.65 s, calculate depth of sea and wavelength of ultrasonic waves.	5	4	4	3,5
Q2.	(20 mark)				
a.	Formulate the Schrodinger's time independent wave equation from its time dependent form.	8	2	2	2
b.	A Ruby laser beam has a power of 50mW. It has an aperture diameter of 7.5mm. The beam is focused with a lens of focal length 2m. Calculate the areal spread and intensity of the image.	6	5	5	3,5
c.	Derive integral form of Gauss' law.	6	3	3	3
Q3.	(20 mark)				
a.	Define Total internal reflection in optical fibres and hence derive an expression for critical angle.	8	5	5	3

b.	Imagine a person of mass 65 kg as a quantum mechanical particle playing box cricket in a room of width 25 feet. Calculate the least energy and momentum that the person will have. Compare this with the energy required for an electron in the least energy state bound in an infinite potential of width $10\text{\AA}$	6	1	1	3
c.	Find thicknesses of quartz plates used for producing frequencies 50 kHz and 1.2 MHz each having density 8.9 gm/cc and Young's modulus $20.8 \times 10^{10} \text{ N/m}^2$. Comment on the results.	6	4	4	3
Q4.	(20 mark)				
a.	State Maxwell's equations medium and vacuum. Also, derive the magnetic wave equation in vacuum and hence calculate the exact value of speed of light from the equation.	8	3	3	1, 3
b.	The uncertainty in the location of a particle is equal to its de Broglie wavelength. Calculate the uncertainty in momentum. Assume the wavelength to be output of an Nd:YAG laser.	6	1&5	1 & 5	2, 5
c.	Explain working of a three level pumping scheme in LASERS.	6	5	5	3, 5
Q5.	(20 mark)				
a.	Explain construction and working of a Ruby laser in detail.	8	5	5	1, 2
b.	Explain Spherical polar Coordinate system and hence derive the volume element. Evaluate volume of the sphere from the volume element.	6	3	3	3
c.	A proton is confined in an infinite square well of width 15 fm. (The nuclear potential that binds protons and neutrons in the nucleus of an atom is often approximated by an infinite square well potential). Calculate the energy and wavelength of the photon emitted when the proton undergoes a transition from the first excited state to the ground state.	6	2	2	4
Q6.	(20 mark)				
a.	Explain the principle of working of a piezoelectric oscillator in detail with a neat and labeled diagram.	8	4	4	3
b.	Estimate the probability of finding a particle at $x=L/8$ and $x=L/2$ for a particle in a box of length $10\text{\AA}$ for the energy state $n=4$.	6	2	5	3
c.	Explain de-Broglie hypothesis using Davisson-Germer experiment.	6	1	1	3
Q7.	(20 mark)				
a.	Derive the Energy Eigen values and Eigen functions for a particle moving in an infinite height and of width L. Also sketch the probability function for the states $n=3$, and $n=4$.	8	2	2	3
b.	Explain different axes and different cuts of a quartz crystal using a diagram. Using these diagrams, explain piezoelectric and inverse piezoelectric effects.	6	4	4	3
c.	Using Heisenberg Uncertainty principle, prove that an electron can never be a nucleon.	6	1	1	3



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F-4

End Sem/Re-Exam May June 2025

Program: Electrical Engineering

Course code: PC-BTE201

Name of the Course: Electronic Circuits

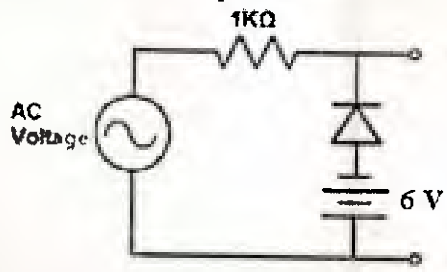
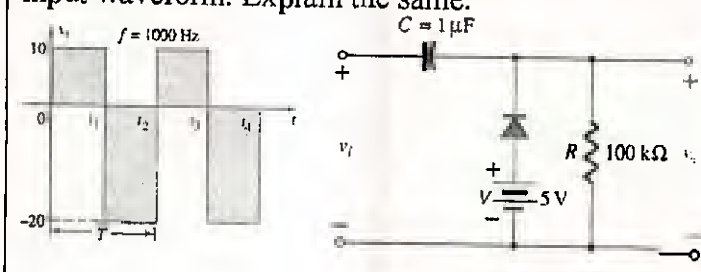
Duration: 3 Hour

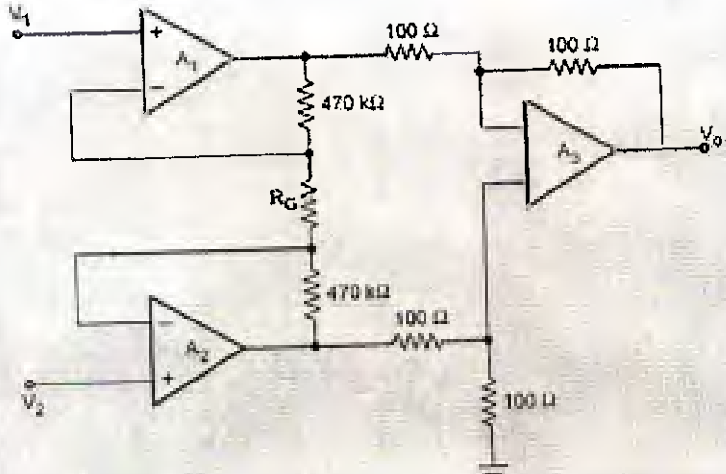
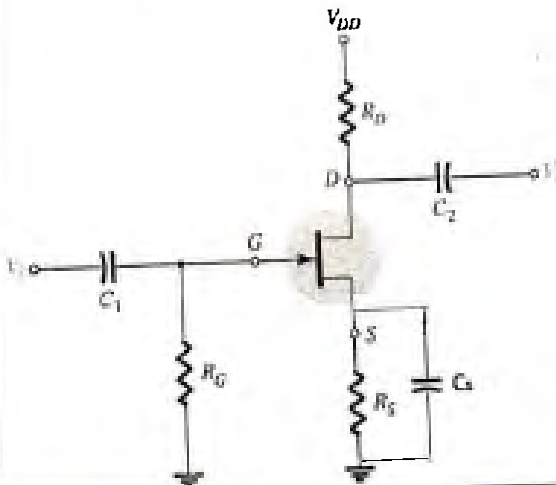
Maximum Marks: 100

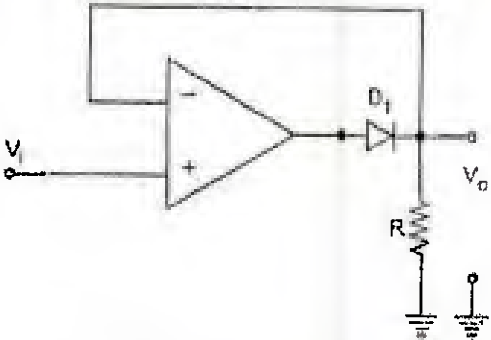
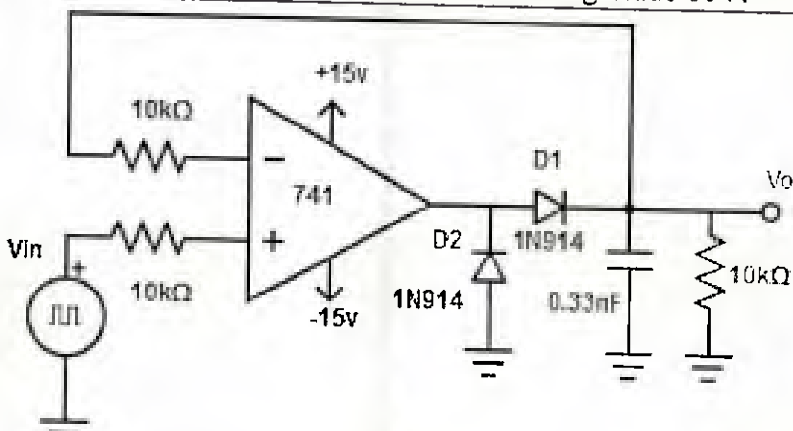
Semester: II

- Solve any five questions out of seven.
- Answers to all sub questions should be grouped together.
- Make suitable assumptions whenever necessary. State them clearly.
- Diagrams drawn to support your answer should be clearly visible.

22/7/25

Q. No.		Pts	CO	BL	Module
1	Draw the circuit diagram of a bridge rectifier. With respect to the input and output waveforms explain working of the circuit. The sine wave input is $120\sin 100\pi t$. The load resistance is $1.5\text{ K}\Omega$. Determine (i) The average value of output voltage (ii) ripple factor (iii) output ripple frequency (iv) Dc power o/p for rectifier (v) PIV (vi) If a capacitor of value $50\text{ }\mu\text{F}$ is added across the load in the above circuit, show the capacitor in your diagram. Calculate ripple factor. (vii) If in the above circuit $L = 10\text{ H}$ and one more capacitor of $50\text{ }\mu\text{F}$ is added to form CLC filter along with bridge rectifier, show the CLC filter in your diagram and calculate ripple factor. (viii) Compare results of ripple factors calculated and comment on the same.	20	1	5	1
2 A	Identify the circuit shown below. If ac input voltage $V_i = 10 \sin \omega t$ is applied, determine the output waveform. Explain the same. 	5	1	3	2
(ii)	Identify the circuit shown below. Draw the output waveform with respect to input waveform. Explain the same. 	5	1	3	2

B	State T/F. Justify. 'Use of current mirror circuit enhances performance of differential amplifier'.	7	3	1	5
(i)		3	3	3	6
(ii)	For the instrumentation amplifier shown in the fig. below, determine the value of R_G if the gain required is 1000. 				
3	Draw the circuit diagram. Determine base resistor, collector resistor for fixed bias circuit for a CE amplifier such that operating point is $V_{CE} = 8V$ and $I_C = 2 mA$. Given d.c. supply is of 15V and a silicon transistor with $\beta = 100$ and $V_{BE} = 0.6V$ is used.	6	2	3	3
(i)		14	2	2	3
(ii)	Draw BJT characteristics and hence explain how to calculate h_{fe} and h_{ie} parameters from BJT characteristics.				
4	With respect to neat construction diagram explain the statement 'MOSFET is also referred to as IGFET'.	6	2	1	4
(i)		14	2	3	4
(ii)	Draw DC and AC equivalent circuit. Determine V_{GSQ}, I_{DQ}, V_{DSQ}. Determine A_v, Z_i, Z_o for the circuit shown below. $R_G = 1M\Omega$, $R_D = 3.3k\Omega$, $R_S = 1k\Omega$. $I_{DSS} = 8mA$, $V_P = -6V$. $y_{os} = 40\mu S$. $V_{DD} = 20V$ 				

5 A	With the help of neat circuit diagrams explain the terms DIBO, DISO, SISO, SIBO with respect to differential amplifier.	10	3	3	5
5 B	Define CMRR. The following specifications are given for the dual input, balanced-output differential amplifier: $R_C = 5\text{ k}\Omega$, $R_S = 100\Omega$, $R_E = 50\text{ K}\Omega$, $+V_{CC} = 10\text{V}$, $-V_{EE} = -10\text{V}$, $h_{ie} = 2\text{ k}\Omega$, $h_{fe} = 50$. Draw the circuit diagram showing components values. Determine A_d , A_c . Determine CMRR in dB.	10	3	3	5
6A	Explain the following terms w.r.t. opamp IC 741	10	3	1	6
	(i) Slew rate				
	(ii) UGB				
	(iii) Input resistance				
	(iv) output resistance				
	(v) CMRR				
B	With the help of neat circuit diagram and waveforms explain how OPAMP works as a differentiator. How the circuit is modified for practical differentiator?	10	3	2	7
7 A	Identify the circuit. Draw i/p and o/p waveforms. Given input is $10\sin \omega t$	3	3	1	7
(i)					
(ii)	Identify the circuit given below. Explain its working with the help of suitable waveforms. V_{in} is square waveform with magnitude 10V.	7	3	2	7
					
B	Explain the OPAMP as a Schmitt Trigger. Draw corresponding waveforms. What is UTP and LTP?	10	3	2	7



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 (A Government Aided Autonomous Institute)
 Munshi Nagar, Andheri (West), Mumbai – 400058
End Sem/Re Exam May-June 2025



Program: Electrical Engineering

Course code: PC-BTE201

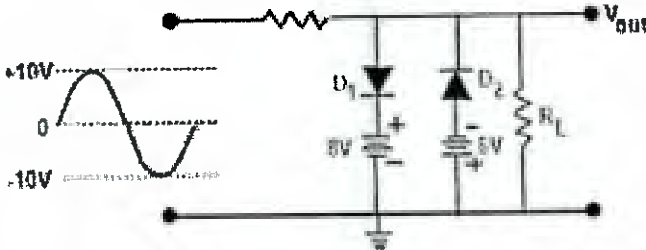
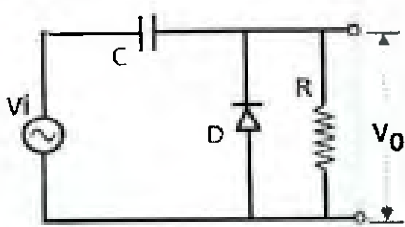
Name of the Course: Electronic Circuits

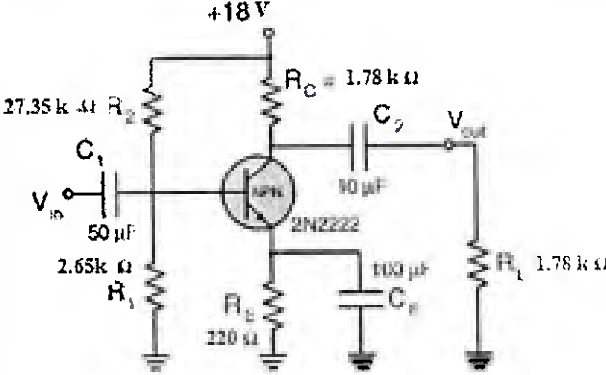
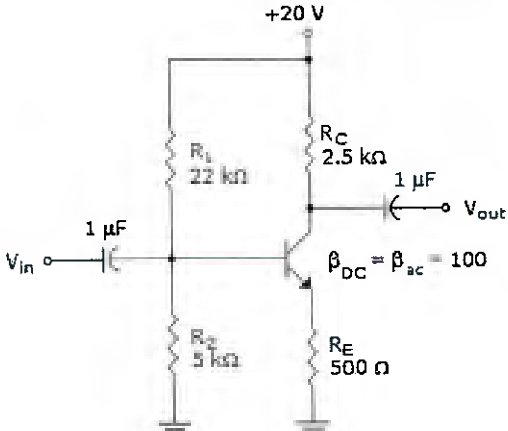
Duration: 3 Hour

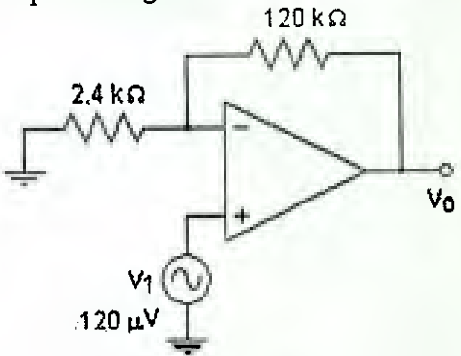
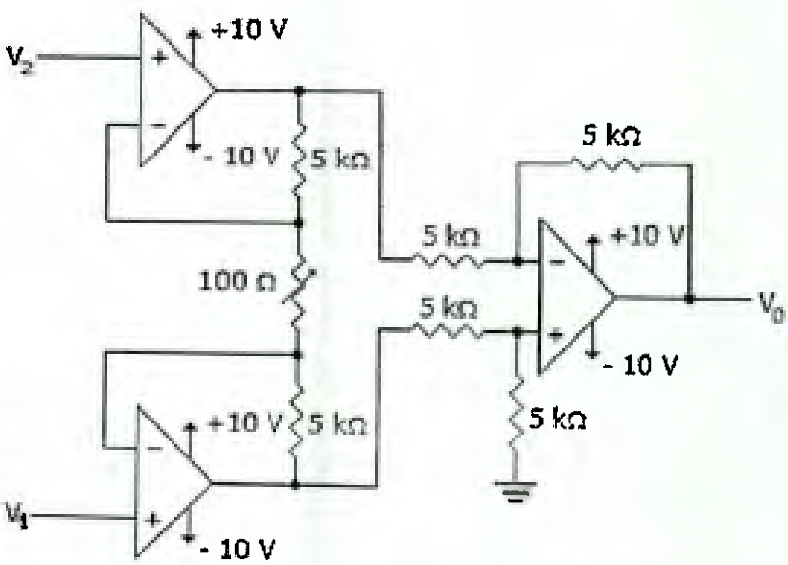
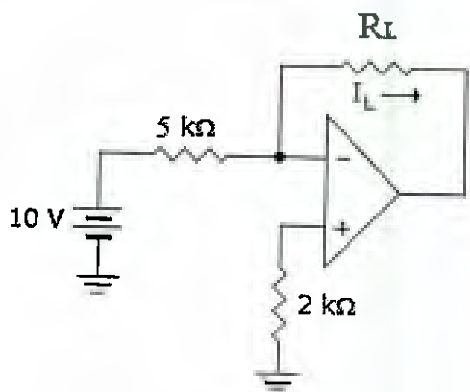
Maximum Marks: 100

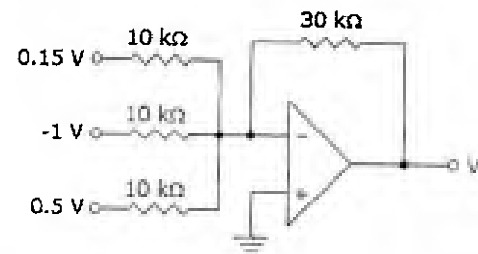
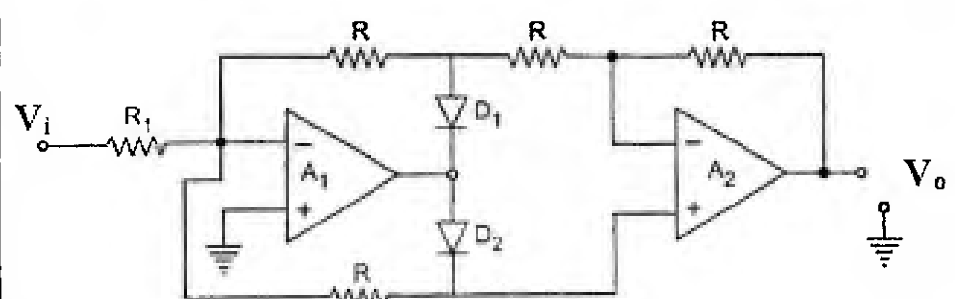
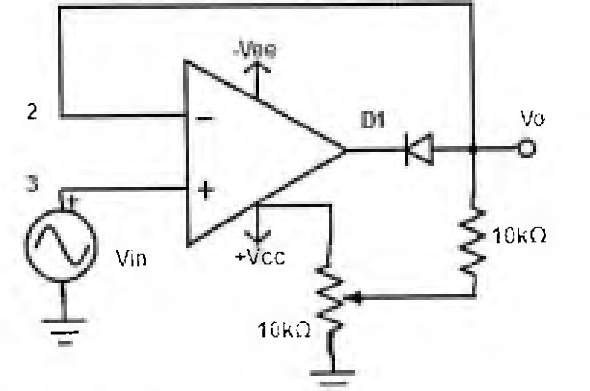
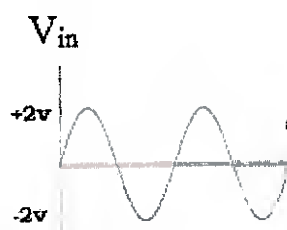
Semester: II

- Solve any five questions out of seven.
- Answers to all sub questions should be grouped together.
- Make suitable assumptions whenever necessary. State them clearly.
- Diagrams drawn to support your answer should be clearly visible.

Q.		Pts	CO	BL	Module
1	Draw the circuit diagram of a full wave rectifier circuit using center tapped transformer. With respect to the input and output waveforms explain working of the circuit. The sine wave input is $100\sin 300\pi t$ and transformer turns ratio is 1:1. The load resistance is $2\text{ K}\Omega$. Determine (i) The average value of output voltage (ii) ripple factor (iii) output ripple frequency (iv) Dc power o/p for FWR (v) PIV (vi) If a capacitor of value $20\text{ }\mu\text{F}$ is added across the load in the above circuit, show the capacitor in your diagram. Calculate ripple factor. (vii) If in the above circuit $L = 12\text{ H}$ and one more capacitor of $20\text{ }\mu\text{F}$ is added to form CLC filter along with bridge rectifier, show the CLC filter in your diagram and calculate ripple factor. (viii) Compare results of ripple factors calculated and comment on the same.	20	1	3	1
2A	Draw output waveform assuming ideal diode. Explain the same. (i) 	5	1	2	2
(ii)	Draw output waveform $V_i = 10\sin(\omega t)$. $C = 100\text{ }\mu\text{F}$, $R = 1\text{ M}\Omega$ 	5	1	2	2

B	A differential amplifier has a differential gain of 2000 and a common mode gain of 0.2. Determine the CMRR in dB.	5	3	3	5
(i)	State T/F. Justify. 'Rectifiers can be considered as clippers'	5	1	1	1
3	In the circuit arrangement with FET, V_{GG} is 2 V, $R_G = 1M\Omega$, $R_D = 2K\Omega$, $V_{DD} = 16$ V, $I_{DSS} = 10$ mA, $V_P = -8$ V. Draw the circuit diagram. Calculate V_{DSQ} . Which type of biasing is used? Explain the same.	8	2	3	4
(i)	Draw the construction di of MOSFET and hence explain how it is different than JFET.	4	2	2	4
(iii)	Draw and explain ac equivalent circuit of JFET. Explain the parameters.	8	2	2	4
4	Determine R_C , R_B , R_E , V_B , V_{CE} for the emitter bias circuit. Draw the circuit diagram. Given $V_C = 6$ V, $V_E = 2.4$ V, $\beta = 80$, $I_C = 2$ mA, $V_{CC} = 12$ V, $V_{BE} = 0.6$ V. Determine stability factor.	10	2	3	3
A					
B	Draw ac equivalent circuit. Determine Z_i , Z_o . Given $h_{fe} = 100$, $h_{ie} = 2$ k Ω .	6	2	3	3
(i)					
(ii)	Refer to this figure. Find the value of I_E .	4	2	3	3
					
5A	Define following terms with respect to differential amplifier and explain the statement 'Higher the value of CMRR Better is the differential amplifier'. (i) CMRR (ii) Differential gain (iii) Common mode gain	10	3	1	5

5 B (i)	Identify the circuit. Hence calculate the output voltage. 	2	3	3	6
(ii)	Identify the circuit. Hence calculate the output voltage for this circuit when $V_1 = 2.215 \text{ V}$ and $V_2 = 2.225 \text{ V}$. 	3	3	3	6
(iii)	Identify the circuit. Hence calculate I_L for (i) $R_L = 10 \text{ k}\Omega$ (ii) $R_L = 4 \text{ k}\Omega$. Comment on the result. 	5	3	3	6
6 A	Explain the statement with the help of proper circuit diagram and waveforms 'A zero-level detector is a comparator with a trip point referenced to zero'	10	3	2	7
B(i)	Opamp has open loop gain 20000 and bandwidth 10Hz. Determine U_{GB}.	5	3	3	7

(ii)	Refer to the given figure. Identify the circuit. Determine the output voltage, V_{OUT}. 	5	3	3	7
7A	Draw and explain block diagram of opamp.	10	3	3	6
B	Identify the circuit shown below. Explain its working with the help of neat waveforms, during positive half cycle of the input signal.	5	3	3	7
(i)					
(ii)	For the circuit shown below, draw the output waveform and explain the same. V_{in} is as shown. V_{ref} is derived from $+V_{CC}$ such that its value is $+1V$	5	3	3	7
	 				



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END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25

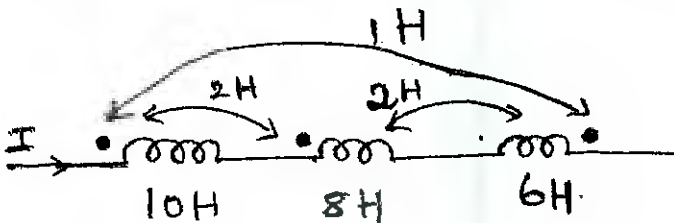
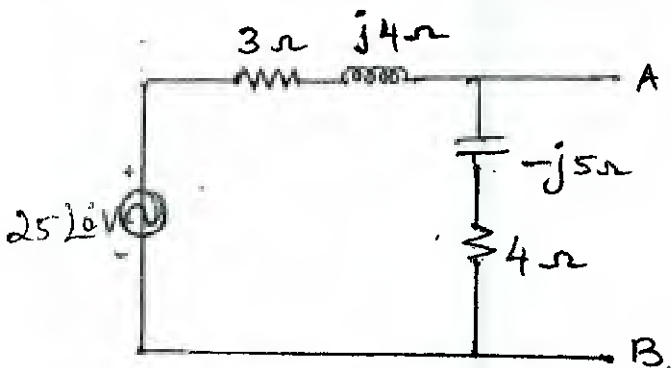
Program: FY-Electrical *Sem I*
Course Code: ES-BTE201
Course Name: Basic electrical Engineering II
Notes: Answer any 5 questions.

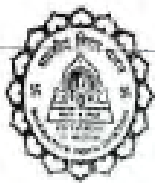
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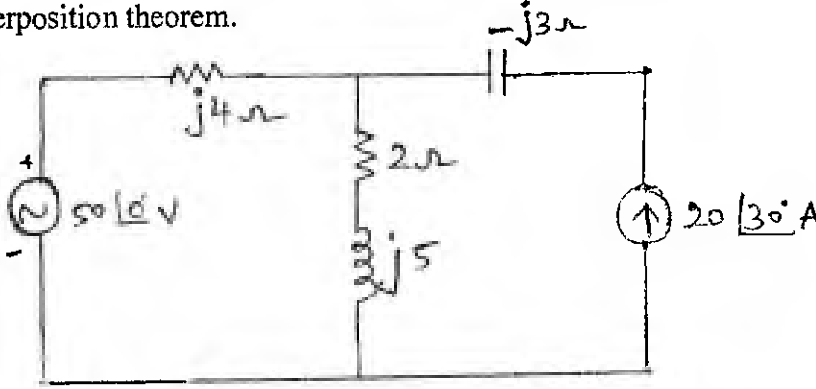
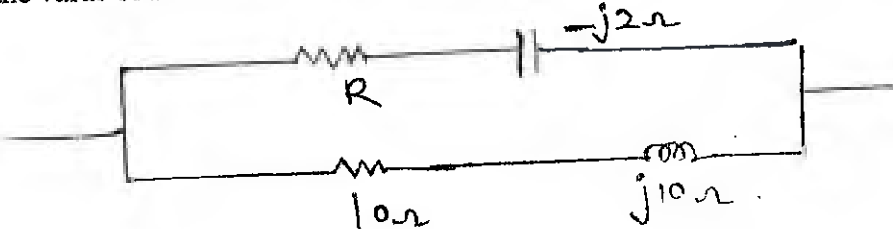
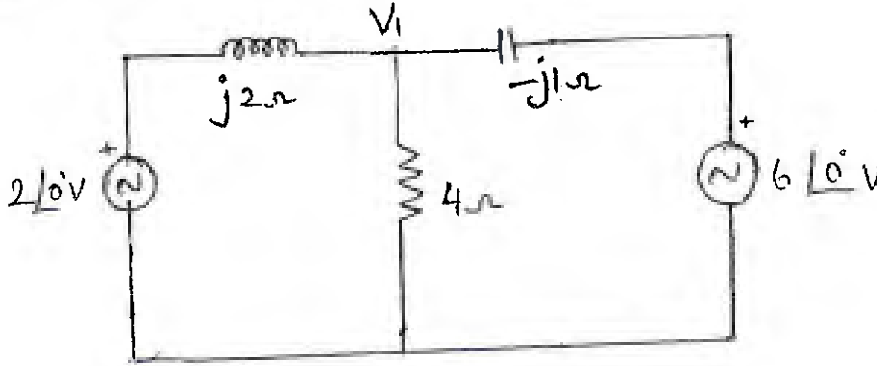
Maximum Points: 100

Semester: II

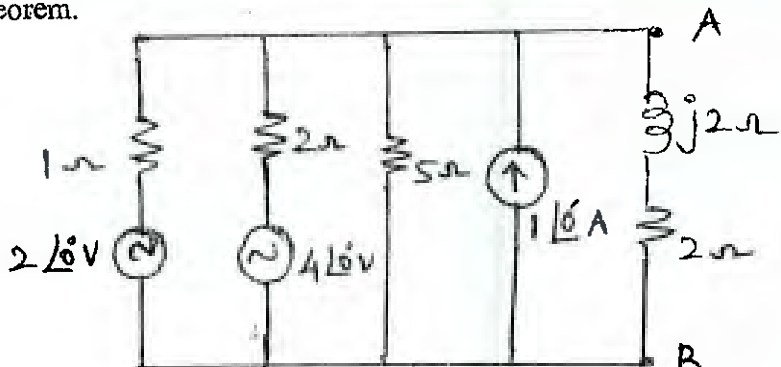
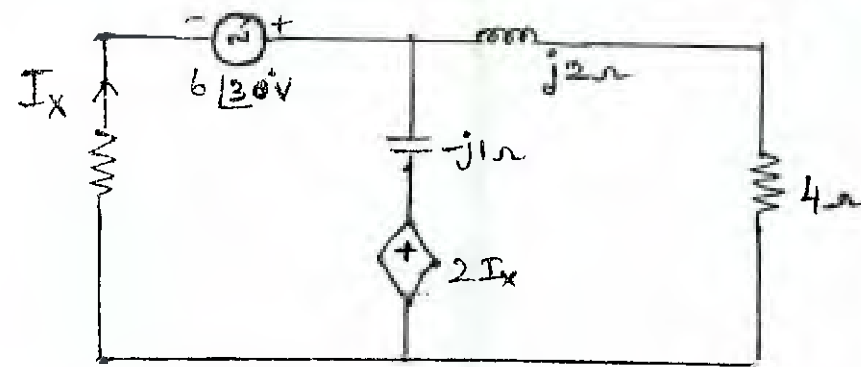
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Q.no.	Questions	marks	C O	B L	mo du le
1a.	For the given coupled circuit find the equivalent inductance. 	3	2	3	4
1b.	Obtain the Nortons equivalent between the terminals A and B. 	6	1	3	2
1c	An RLC series circuit with a resistance of 10ohms, inductance 0.2 H and a capacitance of 40μF is supplied with a 100V supply at variable frequency. Find the following with respect to the series resonant circuit,-- Resonant frequency, Quality factor, Power factor and Half power frequencies	6	1	3	3
1d	List the advantages of three phase over single phase system.	5	3	1	5

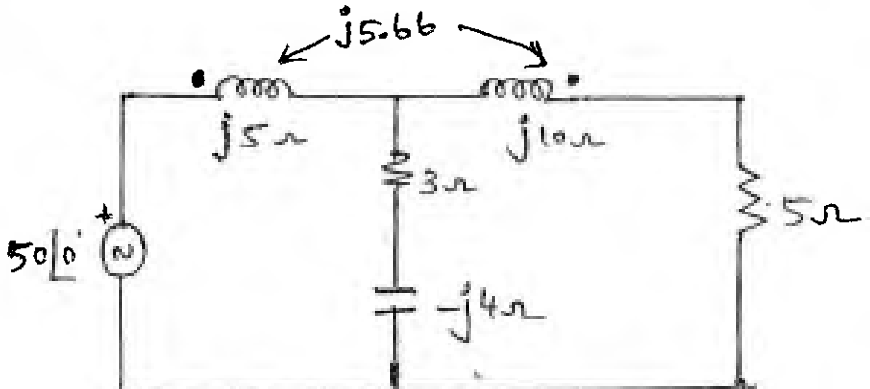
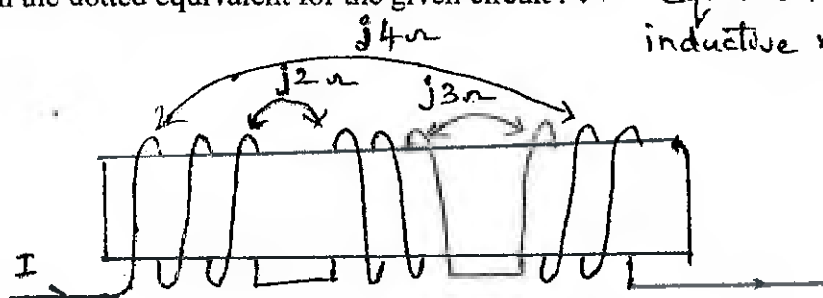
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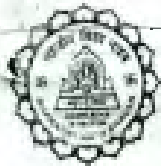
2a	Prove that the power in a balanced three phase star connected circuit can be deduced from reading of 2 wattmeters with neat circuit and phasor diagrams. Also prove that reactive power can be also measured by this method	10	3	3	5
b.	Find the voltage across the $2+j5$ ohm impedance for the given circuit using superposition theorem. 	10	1	3	1
3a.	Find the value of R in the circuit shown in figure to achieve resonance. 	5	1	3	3
b.	Using nodal analysis find the voltage V_1 . Verify the same by mesh analysis. 	10	1	3	1
c.	Draw and explain the graphical representation of resonance in a RLC Series circuit.	5	1	2	3

**END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25**

4a.	Find the current in the $2+j2\ \Omega$ impedance in the given network using Thevenins Theorem. 	12	1	3	2
4b.	Two coils with coefficient of coupling of 0.6, between them are connected in series so as to magnetize in a) same direction, b) opposite direction. The total inductance in the same direction is 1.5H and in the opposite direction is 0.5H. Find the self inductance of the coils.	4	2	3	4
4c.	A series circuit has $R=10\ \Omega$, $L=60\text{mH}$. At a frequency of 25Hz, the power factor of the circuit is 45 lead. At what frequency will the circuit be resonant.	4	3	3	3
5a.	Derive the relation between line current and phase current, line voltage and phase voltage in a star connected three phase system with neat circuit and phasor diagrams.	10	3	2	5
5b.	Find voltage across $4\ \Omega$ resistor for the given network. 	10	1	3	1
6a.	The Power input to a $3\Phi, 440\text{V}, 37.3\text{KW}$, induction motor whose efficiency and power factor are 88 and 0.82 respectively is measured by two wattmeter method. Find the readings of the two wattmeters and the full load line current drawn by the motor.	10	3	3	5

**END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25**

b	Find the voltage across the 5 ohm resistor. 	10	2	3	4
7a	Obtain the dotted equivalent for the given circuit . and equivalent inductive reactance. 	4	2	3	4
7b	Derive an expression for the Band width of a series resonant circuit and explain how it relates to the Q factor.	6	1	2	3
7c.	Three coils of resistance 4Ω and inductive reactance of 3Ω are connected in delta across 400 V ,50 Hz supply.Find i)current in each coil, ii) line current, ii) active power , iv) reactive and apparent power.	10	3	3	5



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Program: FY-Electrical

Duration: 3 hours

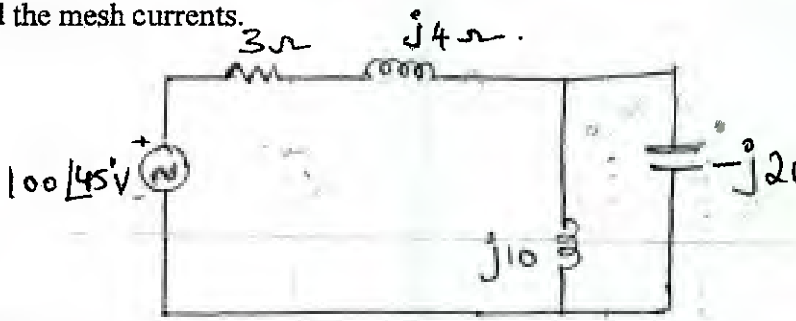
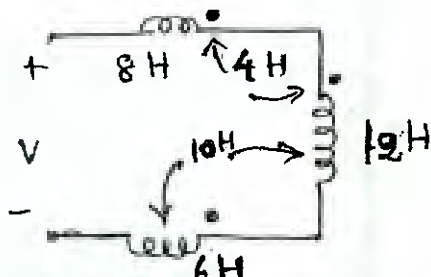
Course Code: ES-BTE201

Maximum Points: 100

Course Name: Basic electrical Engineering II

Semester: II

Notes: Answer any 5 questions.

Q.n o.	Questions	marks	C O	B L	mo dul e
1a.	An alternating voltage is connected to a circuit containing a resistor, inductor and capacitor in series. The supply frequency is gradually varied. Explain the observations with diagrams.	6	1	3	3
1b.	Find the mesh currents. 	6	1	3	1
1c.	For the given circuit find the equivalent inductance. 	4	2	3	4
1d.	Compare star and delta connected three phase systems.	4	3	1	5
2a.	How can power factor be determined in a three phase, 3 wire balanced circuit from the readings of the two Wattmeters. Explain with neat circuit and phasor diagrams.	10	3	2	5
b.	A delta connected balanced 3phase load is supplied from a 3phase, 400V supply. The line current is 20A and power taken by the load is 10KW. Find the impedance in each branch, the line current, and power factor. If the same load is connected in star find the power consumed.	10	3	3	5

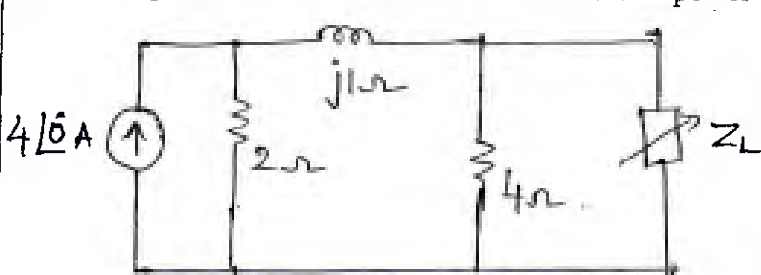
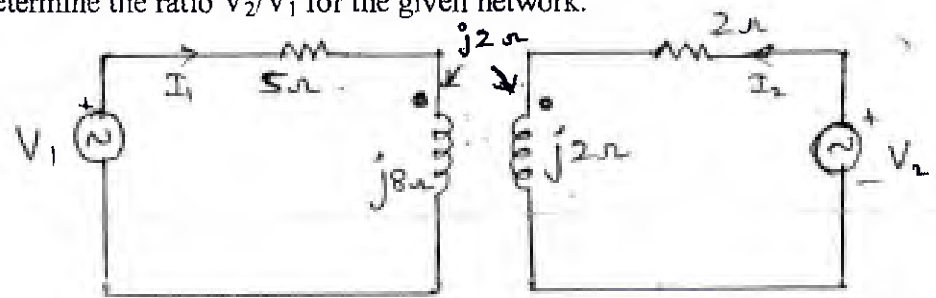
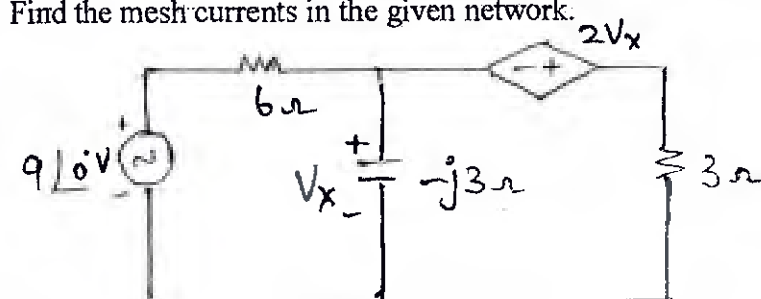
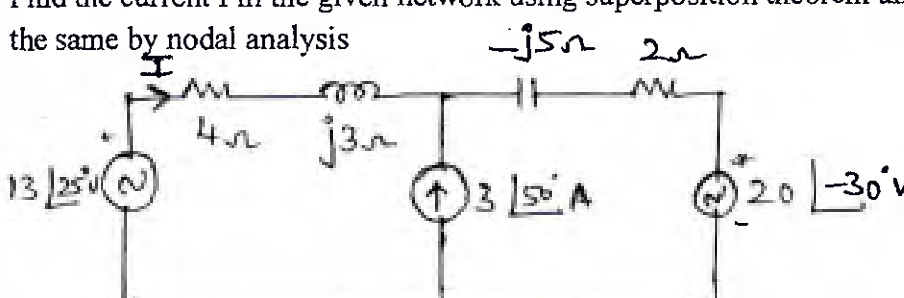


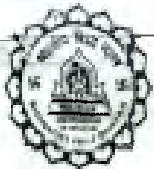
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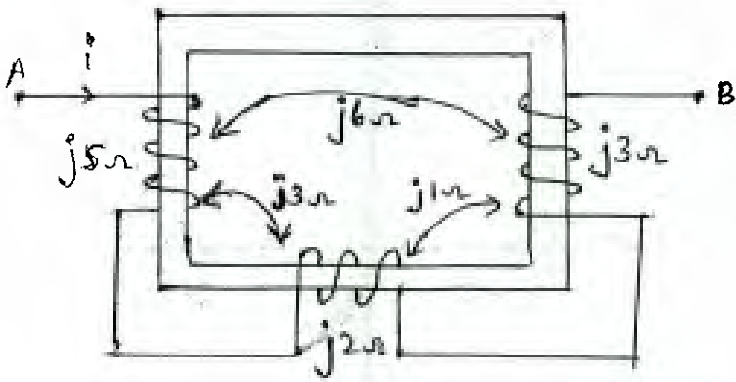
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END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25

3a.	Determine the load Z_L required to be connected in the given network for maximum power transfer. Determine the maximum power drawn. 	10	2	3	2
b.	Derive the relation between line current and phase current, line voltage and phase voltage in a Delta connected three phase system with neat circuit and phasor diagrams.	10	3	2	5
4a	Determine the ratio V_2/V_1 for the given network. 	10	2	3	4
4b	Find the mesh currents in the given network. 	10	1	3	1
5a.	Find the current I in the given network using superposition theorem and verify the same by nodal analysis 	15	1	4	2

**END SEM/RE-EXAM EXAMINATION MAY/JUNE 2024-25**

5b.	Obtain the dotted equivalent for the given circuit and equivalent inductive reactance. 	5	2	3	4
6a	A series resonant circuit has a impedance of $500\ \Omega$ at resonant frequency. Cut off frequencies are 10KHz and 100Hz.Determine i)Resonant frequency, ii) value of L and C, iii) quality factor at resonant frequency.	10	1	3	3
b	The readings of two wattmeters to measure the total power in a three phase star connected 400v system are 3000W and 5000W .Find the power factor and total power.	5	3	3	5
c	The combined inductances of two coils connected in series are 0.6H or 0.1H depending on the relative directions of currents in the two coils.If one of the coils has a self inductance of 0.2H,find the mutual inductance and coefficient of coupling	5	2	3	4
7a	Three similar coils. each coil has a $10\ \Omega$ resistance and an inductive reactance of $10\ \Omega$ are connected in a) Star b) delta to a three phase 400V,50 Hz supply. Find in each case the line current , phase current, line voltage and phase voltage. and readings on each of the two wattmeters connected to measure power. Draw circuit diagrams for the same.	12	3	3	5
7b	Derive the relation between Q factor ,Band width and resonant frequency. (for RLC series ckt)	8	1	2	3