

AJ Institute of Engineering and Technology Mangaluru.



VTU Question Papers

BE I & II Semester

Physics & Chemistry Cycle

2022 SCHEME

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AJ Institute of Engineering and Technology, Mangaluru.

NH-66, Kottara Chowki, Mangaluru – 575 006

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First Semester B.E./B.Tech. Degree Examination, June/July 2025 Mathematics – I for CSE Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. VTU Formula Hand Book is permitted.
 3. M : Marks, L: Bloom's level, C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	With usual notation prove that $\tan \phi = r \frac{d\theta}{dr}$	06	L2	CO1
	b.	Find the angle between the curves $r = \frac{a\theta}{1+\theta}$; $r = \frac{a}{1+\theta^2}$	07	L2	CO1
	c.	Find the radius of curvature for the curve $y^2 = \frac{a^2(a-x)}{x}$ where the curve meets the x-axis.	07	L2	CO1
OR					
Q.2	a.	Show that the curves $r = a(1 + \cos \theta)$ and $r = a(1 - \cos \theta)$ cuts each other orthogonally.	08	L2	CO1
	b.	Find the pedal equation of the curve $\frac{\ell}{r} = 1 + e \cos \theta$	07	L2	CO1
	c.	Using modern mathematical tool write a programme code to plot the curve $r = 2(\cos 2\theta)$	05	L2	CO5
Module – 2					
Q.3	a.	Expand $\log(\sec x)$ upto the term containing x^4 using Maclaurin's series.	06	L2	CO2
	b.	If $z = e^{ax+by} f(ax-by)$ prove that $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y} = 2abz$	07	L2	CO2
	c.	Find the extreme value of the function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$	07	L2	CO2
OR					
Q.4	a.	Evaluate $\lim_{x \rightarrow 0} \left[\frac{a^x + b^x + c^x + d^x}{4} \right]^{1/x}$	08	L3	CO2
	b.	If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$	07	L2	CO2
	c.	Using modern mathematical tool write a programme / code to show that $u_{xx} + u_{yy} = 0$. Given $u = e^x[x \cos y - y \sin y]$	05	L3	CO5
Module – 3					
Q.5	a.	Solve $x \frac{dy}{dx} + y = x^3 y^6$	06	L3	CO3
	b.	Find the orthogonal trajectories of $y^2 = 4ax$ where a is parameter.	07	L2	CO3
	c.	Solve $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$	07	L3	CO3

OR

Q.6	a.	Solve $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$	06	L3	CO3
	b.	Find the orthogonal trajectory of the cardioid $r = a(1 - \cos \theta)$.	07	L2	CO3
	c.	Find the general solution of the equation $(px - y)(py^2 + x) = a^2p$ by reducing into Clairaut's form taking the substitution $X = x^2, Y = y^2$.	07	L2	CO3

Module - 4

Q.7	a.	Find the least positive values of x such that i) $71 \equiv x \pmod{8}$ ii) $67 + x \equiv 1 \pmod{4}$ iii) $89 \equiv (7 + 3) \pmod{5}$	06	L2	CO4
	b.	Find the solutions of the linear congruence $14x \equiv 12 \pmod{18}$	07	L2	CO4
	c.	Encode STOP using RSA algorithm with key (2537, 13) using the prime numbers 43 and 59.	07	L3	CO4

OR

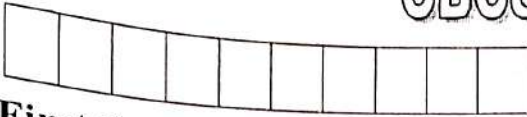
Q.8	a.	(i) Find the last digit of 7^{2013} (ii) Find the last digit of 13^{37}	06	L2	CO4
	b.	Solve the system of linear congruence $x \equiv 2 \pmod{3}; x \equiv 3 \pmod{5}; x \equiv 2 \pmod{7}$, using Remainder theorem.	07	L3	CO4
	c.	Show that $2^{340} \equiv 1 \pmod{31}$ by Fermat's little theorem.	07	L2	CO4

Module - 5

Q.9	a.	Find the rank of the matrix $\begin{bmatrix} 1 & 3 & -1 & 2 \\ 0 & 11 & -5 & 3 \\ 2 & -5 & 3 & 1 \\ 4 & 1 & 1 & 5 \end{bmatrix}$	06	L2	CO4
	b.	Solve the system of equations by using Gauss-Jordan method. $2x + y + 3z = 1; 4x + 4y + 7z = 1; 2x + 5y + 9z = 3$	07	L3	CO4
	c.	Using power method find the largest eigen value and the corresponding eigen vector of the matrix $A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ by taking $[1 \ 0 \ 0]^T$ as the initial eigen vector upto two decimal places (Perform 5 iterations).	07	L2	CO4

OR

Q.10	a.	Solve the following system of equations by Gauss-Seidel method. $7x + 52y + 13z = 104; 3x + 8y + 29z = 71; 83x + 11y - 4z = 95$ (Carry out 4 iterations).	08	L3	CO4
	b.	For what values of a and b the system of equations $x + y + z = 6; x + 2y + 3z = 12; x + 2y + az = b$ has (i) no solution (ii) a unique solution and (iii) infinite number of solutions.	07	L2	CO4
	c.	Using modern mathematical tool write a programme / code to find the largest eigen value of $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$	05	L3	CO5



First Semester B.E./B.Tech. Degree Examination, June/July 2025 Mathematics-I for EEE Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M: Marks, L: Bloom's level, C: Course outcomes.
3. VTU Formula Hand Book is permitted*

		Module - 1	M	L	C
Q.1	a.	With usual notation prove that $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4} \left(\frac{dr}{d\theta} \right)^2$	6	L2	CO1
	b.	Find the angle between the curves $r = a(1 - \cos\theta)$ and $r = 2a \cos\theta$.	7	L2	CO1
	c.	Find the radius of curvature of the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at the point where it cuts the line $y = x$.	7	L2	CO1
OR					
Q.2	a.	Derive an expression for the radius of curvature for a Cartesian curve.	8	L2	CO1
	b.	Find the pedal equation of the curve $r^n = a^n \cdot \sec\theta$.	7	L2	CO1
	c.	Using modern mathematical tool write a programme code to plot sine and cosine curve.	5	L3	CO5
Module - 2					
Q.3	a.	Expand $\sqrt{1 + \sin 2x}$ by Maclaurin's series upto the term containing x^4 .	6	L2	CO1
	b.	If $u = f\left(\frac{y-x}{xy}, \frac{z-x}{zx}\right)$ then find the value of $x^2 \frac{\partial u}{\partial x} + y^2 \frac{\partial u}{\partial y} + z^2 \frac{\partial u}{\partial z}$.	7	L2	CO1
	c.	Find the maximum and minimum value of the function $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$.	7	L3	CO2
OR					
Q.4	a.	If $u = x + 3y^2 - z^3$, $v = 4x^2yz$, $w = 2z^2 - xy$ then find $J = \frac{\partial(u, v, w)}{\partial(x, y, z)}$ at $(1, -1, 0)$	8	L3	CO2
	b.	Evaluate $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x + c^x}{3} \right)^{\frac{1}{x}}$.	7	L2	CO2
	c.	Using modern mathematical tool, write a programs/code. Show that $u_{xx} + u_{yy} = 0$, given $u = e^x [x \cos y - y \sin y]$	5	L3	CO5

Module - 3

Q.5	a.	Solve $\frac{dy}{dx} + y \cdot \tan x = y^3 \sec x$.	6	L2	CO3
	b.	Find the orthogonal trajectories of the family of curves $\frac{x^2}{a^2} + \frac{y^2}{b^2 + \lambda} = 1$ Where λ is the parameter?	7	L3	CO3
	c.	Solve $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$.	7	L2	CO3

OR

Q.6	a.	Solve $(xy + y^2 + y)dx + (x^2 + 3xy + 2x) dy = 0$.	6	L2	CO3
	b.	An inductance of 2 henries and resistance of 20 ohms are connected in series with an emf E Volts. If the current is zero when $t = 0$, find the current at the end of 0.01 secs if $E = 100$ volts.	7	L3	CO3
	c.	Find the general and singular solution of the Clairaut's equation. $(y - px)(p - 1) = p$.	7	L2	CO3

Module - 4

Q.7	a.	Evaluate $\int_{-1}^{+1} \int_0^z \int_{x-z}^{x+z} (x + y + z) dy dx dz$.	6	L2	CO4
	b.	Prove that $\beta(m, n) = \frac{\sqrt{m} \cdot \sqrt{n}}{\sqrt{m+n}}$.	7	L2	CO4
	c.	Change the order of integration and evaluate $\int_0^a \int_y^a \frac{x}{x^2 + y^2} dx dy$.	7	L2	CO4

OR

Q.8	a.	Evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$ by changing into polar coordinates.	6	L2	CO4
	b.	Using double integration find the area bounded between the circle $x^2 + y^2 = a^2$ and the line $x + y = a$.	7	L2	CO4
	c.	Prove that $\int_0^{\frac{\pi}{2}} \sqrt{\sin \theta} d\theta \times \int_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{\sin \theta}} = \pi$.	7	L2	CO4

Module - 5

Q.9	a.	Find the Rank of the matrix $A = \begin{pmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{pmatrix}$	6	L2	CO4
	b.	Solve by Gauss - Jordan method $2x + y + 4z = 12, 8x - 3y + 2z = 20, 4x + 11y - z = 33$.	7	L3	CO4



	c.	Using Rayleigh's power method find the dominant eigen value and the corresponding eigen vector of $A = \begin{pmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{pmatrix}$ by taking $(1, 0, 0)^T$ as the initial eigen vector. Carry out 5 iterations.	7	L3	CO4
OR					
Q.10	a.	Solve the following system of equations by Gauss – Seidal method $5x + 2y + z = 12$ $x + 4y + 2z = 15$ $x + 2y + 5z = 20.$ Carry out 3 iterations with $(1, 0, 3)$ as initial approximation.	8	L3	CO4
	b.	Solve the following system of equations by Gauss – elimination method. $x + y + z = 9$ $2x + y - z = 0$ $2x + 5y + 7z = 52$	7	L3	CO4
	c.	Using modern mathematical tool, write programme to test the consistency of the equation $x + 2y - z = 1$ $2x + y + 4z = 2$ $3x + 3y + 4z = 1.$	5	L3	CO5



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BMATM101

First Semester B.E./B.Tech. Degree Examination, June/July 2025 Mathematics - I for ME Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.
3. VTU Mathematics formula Handbook is permitted.*

Module - 1			M	L	C
Q.1	a.	Derive an expression for Angle between radius vector and tangent.	6	L2	CO1
	b.	Find the pedal equation for the curve $r^2 = a^2 \sec 2\theta$.	7	L2	CO1
	c.	Find the radius of curvature of the curve $x^3 + y^3 = 2a^3$ at the point (a, a).	7	L3	CO1
OR					
Q.2	a.	With usual notation prove that $\rho = \frac{(1 + y_1^2)^{3/2}}{y_2}$	7	L2	CO1
	b.	Prove that the pair of polar curves intersect orthogonally $r^n = a \cos n\theta$, $r^n = b^n \sin n\theta$.	8	L2	CO1
	c.	Using modern mathematical tool, write a programme code to plot sine and cosine curves.	5	L3	CO5
Module - 2					
Q.3	a.	Expand $\cos x$ by Maclaurin's series upto the containing x^4 .	6	L2	CO2
	b.	If $u = \tan^{-1} \left(\frac{y}{x} \right)$ where $x = e^t - e^{-t}$ and $y = e^t + e^{-t}$, find $\left(\frac{du}{dt} \right)$.	7	L2	CO2
	c.	Show that $f(x, y) = x^3 + y^3 - 3xy + 1$ is minimum at the point (1, 1).	7	L3	CO2
OR					
Q.4	a.	Evaluate $\lim_{x \rightarrow 0} \left(\frac{\sin x}{x} \right)^{1/x^2}$	8	L2	CO2
	b.	If $U = x + y + z$, $V = y - z$, $W = z$, find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$.	7	L2	CO2
	c.	Using modern mathematical tool, write a program to prove $u_{xx} + u_{yy} = 0$. If $u = e^x [x \cos y - y \sin y]$.	5	L3	CO5

Module - 3

Q.5	a.	Solve : $\frac{dy}{dx} + \frac{y}{x} = y^2x$.	6	L2	CO3
	b.	Solve $(5x^4 + 3x^2y^2 - 2xy^3) dx + (2x^3y - 3x^2y^2 - 5y^4) dy = 0$.	7	L2	CO3
	c.	Solve $yp^2 + (x-y)p - x = 0$.	7	L2	CO3

OR

Q.6	a.	Obtain the General and Singular solution of the equation $p = \log(px - y)$.	6	L2	CO3
	b.	Define Newton's law of cooling. A body in air at 25°C cools from 100°C to 75°C in 1 minute. Find the temperature of the body at the end of 3 minutes.	7	L3	CO3
	c.	Solve the equation $(px - y)(py + x) = 2p$ by reducing into Clairaut's form taking the substitution $X = x^2, Y = y^2$.	7	L2	CO3

Module - 4

Q.7	a.	Solve : $y''' + 6y'' + 11y' + 6y = 0$.	6	L2	CO3
	b.	Solve : $y'' + 2y' + y = 2x + x^2$.	7	L2	CO3
	c.	Solve : $y'' + 4y = 4 \sec^2 2x$ by the method of variation of parameter.	7	L2	CO3

OR

Q.8	a.	Solve : $(6D^2 + 17D + 12)y = e^{-x}$.	6	L2	CO3
	b.	Solve : $x^2 y'' + xy' + 9y = \sin(3 \log x)$.	7	L2	CO3
	c.	Solve : $(1+x)^2 y'' + (1+x)y' + y = 2 \cos[\log(1+x)]$.	7	L2	CO3

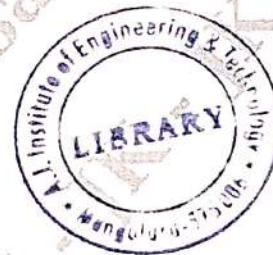
Module - 5

Q.9	a.	Find the rank of the matrix $\begin{bmatrix} 0 & 2 & 3 & 4 \\ 2 & 3 & 5 & 4 \\ 4 & 8 & 13 & 12 \end{bmatrix}$	6	L2	CO4
	b.	Solve the system of equations $x + y + z = 9$; $x - 2y + 3z = 8$; $2x + y - z = 3$ by Gauss Elimination method.	7	L3	CO4
	c.	Solve the following system of equations by Gauss - Seidal method : $10x + y + z = 12$; $x + 10y + z = 12$; $x + y + 10z = 12$ for 4 Iterations.	7	L3	CO4

OR



Q.10	<p>a. Test for consistency and solve : $x - 4y + 7z = 14$, $3x + 8y - 2z = 13$; $7x - 8y + 26z = 5$.</p>	7	L2	CO4
	<p>b. Find the largest eigen value and corresponding eigen vector of matrix $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ by power method, by taking initial eigen vector $(1, 1, 1)^T$ carryout upto 5 Iteration.</p>	8	L3	CO4
	<p>c. Using modern mathematical tool write a programme to solve the system of equations $5x - y - z = -3$; $x - 5y + z = -9$; $2x + y - 4z = 15$ by Gauss Siedal method.</p>	5	L3	CO5



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BMATC101

First Semester B.E/B.Tech. Degree Examination, June/July 2025

Mathematics – I for Civil Engineering Stream

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. M : Marks , L: Bloom's level , C: Course outcomes.
 3. VTU Formula Hand Book is permitted.



		Module – 1	M	L	C
1	a.	With usual notation, prove that $\tan \phi = \frac{r}{\left(\frac{d_r}{d_\theta}\right)}$.	7	L3	CO1
	b.	Find the pedal equation for the curve $r^m = a^m \sec m\theta$.	7	L1	CO1
	c.	Find the radius of curvature for the curve $y = 4 \sin x - \sin 2x$ at $x = \pi/2$.	6	L1	CO1
OR					
2	a.	Find the angle between the curves $r = a \log \theta$ and $r = \frac{a}{\log \theta}$.	7	L1	CO1
	b.	Derive an expression for radius of curvature for polar curve $r = f(\theta)$.	7	L1	CO1
	c.	Using modern mathematical tool, write a programme to plot the sine and cosine curves.	6	L3	CO5
Module – 2					
3	a.	Obtain the Maclaurin's series expansion of $y(x) = \sqrt{1 + \sin 2x}$.	7	L3	CO2
	b.	Find $\frac{df}{dt}$ by using partial differentiation, given that $f = x^3 + y^3 + z^3$, when $x = e^{-t}$, $y = e^{-t}$ and $z = e^{-t} \cos t$.	7	L2	CO2
	c.	If $u = x + 3y^2 - z^2$, $v = 4x^2yz$, $w = 2z^2 - xy$, find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ at $(1, -1, 0)$.	6	L2	CO2
OR					
4	a.	Evaluate : i) $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x + c^x}{3} \right)^{1/x}$ ii) $\lim_{x \rightarrow \pi/4} (\tan x)^{\tan 2x}$.	7	L1	CO2
	b.	Find the extreme values of the function : $x^3 + y^3 - 3x - 12y + 20 = 0$.	7	L2	CO2
	c.	Use modern mathematical tool, write a programme to show that $u_{xx} + u_{yy} = 0$, given $u = e^x \{ x \cos y - y \sin y \}$	6	L3	CO5
Module – 3					
5	a.	Solve $x \frac{dy}{dx} + y = x^3 y^6$.	7	L3	CO3
	b.	Solve that the family of parabolas $y^2 = 4a(x + a)$ are self orthogonal.	7	L3	CO3
	c.	Solve $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$.	6	L2	CO3
OR					
6	a.	Solve $(y \log y) dx + (x - \log y) dy = 0$.	7	L3	CO3
	b.	A body originally at 80°C cools down to 60°C in 20 minutes in the surrounding temperature 40°C . Find the temperature of the body after 40 minutes.	7	L2	CO3
	c.	Find the general and singular solutions of $p = \log(px - y)$.	6	L2	CO3

Module - 4

7	a.	Solve $(D^3 - 7D^2 + 14D - 8)y = 0$.	7	L2	CO3
	b.	Solve $(D^2 + 1)y = \operatorname{cosec} x \cdot \cot x$ by the method of variation of parameters.	7	L3	CO3
	c.	Solve $x^2 y'' + 4xy' + 2y = x^2$.	6	L3	CO3

OR

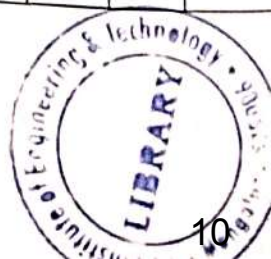
8	a.	Solve $[(D^2 + 6D + 9)D^2]y = 0$.	7	L2	CO3
	b.	Solve $(D^3 + 4D)y = \sin 2x$.	7	L3	CO3
	c.	Solve $(1 + x)^2 y'' + (1 + x)y' + y = 2 \sin [\log(1 + x)]$.	6	L3	CO3

Module - 5

9	a.	Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ -2 & -3 & 1 & 2 \\ -3 & -4 & 5 & 8 \\ 1 & 3 & 10 & 14 \end{bmatrix}$.	7	L1	CO4
	b.	Solve the system of equations : $x + 0y + 2z = 2$ $0x + y + z = 3$ $2x + y + 0z = 1$ By Gauss elimination method.	7	L3	CO4
	c.	Using Rayleigh's power method, find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & 1 & 3 \end{bmatrix}$, taking $x^{(0)} = [1, 1, 1]^T$.	6	L3	CO4

OR

10	a.	Apply Gauss-Seidel method to solve the equations : $10x + 2y + z = 9$ $2x + 20y - 2z = -44$ $-2x + 3y + 10z = 22$.	7	L2	CO4
	b.	Find for what values of α and β , so that the equations : $x + y + z = 6$ $x + 2y + 3z = 10$ $x + 2y + \alpha z = \beta$ have : i) no solution ii) many solutions iii) unique solution.	7	L2	CO4
	c.	Using modern mathematical tools, write a programme to test consistency of the equations : $x + 2y - z = 1$ $2x + y + 4z = 2$ $3x + 3y + 4z = 1$.	6	L3	CO5



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First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Applied Chemistry for CSE Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	What are electrochemical sensors? Explain its application in the measurement of dissolved oxygen.	07	L2	CO1
	b.	Describe the construction, working and applications of lithium ion battery.	07	L2	CO1
	c.	Explain the working principle of conductometric sensors.	06	L2	CO1
OR					
Q.2	a.	Describe the application of electrochemical gas sensors for SO _x and NO _x .	07	L2	CO1
	b.	Describe the construction, working and applications of sodium ion battery.	07	L2	CO1
	c.	Explain the working principle of optical sensors.	06	L2	CO1
Module – 2					
Q.3	a.	What are memory devices? Explain the classification of electronic memory devices with an example.	07	L2	CO2
	b.	Mention any four properties and applications of LCD.	07	L2	CO2
	c.	Mention any four properties and applications of QLED.	06	L2	CO2
OR					
Q.4	a.	What are nano materials? Explain any four properties of polythiophenes (P ₃ HT) suitable for optoelectronic devices.	07	L2	CO2
	b.	Mention any four properties and applications of OLED.	07	L2	CO2
	c.	What are photoactive and electroactive materials.	06	L2	CO3
Module – 3					
Q.5	a.	What is corrosion? Explain the electrochemical theory of corrosion with respect to iron.	07	L2	CO3
	b.	What is a cathodic protection? Explain sacrificial anodic method.	07	L2	CO3
	c.	What are concentration cells? Explain with an example.	06	L2	CO3



OR

Q.6	a.	What are reference electrodes? Explain the construction, working and applications of calomel electrode.	07	L2	CO3
	b.	Draw the nature of conductometric graph for the estimation of weak acid versus strong base and explain the nature of graph.	07	L2	CO3
	c.	Calculate the cell potential of the following concentration cell and comment on the spontaneity of the reaction $Cu Cu^{2+} (0.01 M) Cu^{2+} (0.015 M) Cu$	06	L2	CO3

Module – 4

Q.7	a.	What is number average and weight average molecular weight of polymer?	07	L2	CO4
	b.	What are conducting polymers? Explain the mechanism of conduction in polyacetylene.	07	L2	CO4
	c.	Explain the construction and working of photovoltaic cells.	06	L2	CO4

OR

Q.8	a.	Explain the preparation, properties and commercial applications of Kevlar.	07	L2	CO4
	b.	Explain the generation of energy (green hydrogen) by electrolysis of water and its advantages.	06	L2	CO4
	c.	Polymer sample contains six molecules having molecular weight of 1000 mol/kg. Five molecules having molecular weight of 2000 mol/kg and four molecules having molecular weight of 3000 mol/kg. Calculate number average and weight average molecular weight of polymer.	07	L3	CO4

Module – 5

Q.9	a.	Explain the characteristics and need of e-waste management.	07	L2	CO5
	b.	Explain the extraction of gold from e-waste.	07	L2	CO5
	c.	Explain the role of stake holders in environmental management of e-waste.	06	L2	CO5

OR

Q.10	a.	What is e-waste? Mention the sources and composition of e-waste.	07	L2	CO5
	b.	Explain any two different techniques used to recycling and recovery of e-waste.	07	L2	CO5
	c.	Mention any three toxic materials used in the manufacturing electronic products and electrical products and mention their health hazards.	06	L2	CO5



CBCS SCHEME

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BCHEM102/202

First/Second Semester B.E/B.Tech. Degree Examination, June/July 2025

Applied Chemistry for ME Stream

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. M : Marks , L: Bloom's level , C: Course outcomes.
 3. VTU Formula Handbook is permitted.

		Module - 1	M	L	C
1	a.	Define calorific value. Explain the determination of calorific value using Bomb calorimeter.	8	L2	CO1
	b.	What is Biodiesel? Outline the synthesis of Biodiesel and mention any two applications.	6	L2	CO1
	c.	Explain the construction, working and applications of PV cells.	6	L2	CO1
OR					
2	a.	Calculate the HCV and LCV of the sample of 1.3g of coal (C 90%, H ₂ 5% and ash 5%) was subjected to combustion in a bomb calorimeter. The mass of water taken was 2500g and the water equivalent of the calorimeter was 550 g. The rise in temperature was found to be 4.2°C. [Latent heat of steam = 2457 kJ/kg and specific heat of water = 4.187 kJ/kg/°C]	6	L3	CO1
	b.	Explain the production of Hydrogen by electrolysis of water.	6	L2	CO1
	c.	What are fuel cells? Outline the construction, working and applications of Methanol - Oxygen fuel cell.	8	L2	CO1
Module - 2					
3	a.	Illustrate the electrochemical theory of corrosion by taking Fe as example.	8	L2	CO2
	b.	Explain the following : i) Galvanization ii) Sacrificial anode method.	6	L2	CO2
	c.	Explain the electroplating of chromium by hard and decorative method.	6	L2	CO2
OR					
4	a.	Explain : i) Differential metal corrosion ii) Water line corrosion.	8	L2	CO2
	b.	What is CPR? A thick steel sheet of area 400 cm ² is exposed to air near the ocean. After a one year period it was found to experience a weight loss of 375 g due to corrosion. If the density of the brass is 7.9 g/cm ³ , calculate the corrosion penetration rate in mpy and mm/g [Given K = 534 in mpy, and 87.6 in mm/g].	8	L3	CO2
	c.	List any four technical importance of metal finishing.	4	L2	CO2
Module - 3					
5	a.	A polymer contains 250 molecules of molecular mass 2500, 200 molecules with 2,000 molecular mass and 150 molecules with molecular mass 1000, calculate the number average and weight average molecular mass.	6	L3	CO3
	b.	Explain the synthesis, properties and application of Kevlar fiber.	7	L2	CO3
	c.	Explain the synthesis, properties and applications of PMMA.	7	L2	CO3

OR

			6	L2	CO3
6	a.	Explain the synthesis, properties of polystyrene.	7	L2	CO3
	b.	Explain the synthesis, properties and applications of polyester.	7	L2	CO3
	c.	Explain the synthesis, properties and applications of Teflon.			

Module – 4

			6	L2	CO4
7	a.	Explain the lead-silver two component system with neat labeled diagram.	8	L2	CO4
	b.	Explain the principle, instrumentation and working of potentiometric sensor.	6	L2	CO4
	c.	Explain the determination of pH of beverage.			

OR

			6	L2	CO4
8	a.	Define the following terms : i) Phase ii) Components iii) Degree of freedom.			
	b.	Explain the principle, instrumentation and working of optical sensor (colorimetry).	8	L3	CO4
	c.	Explain the instrumentation and working of Glass electrode.	6	L2	CO4

Module – 5

9	a.	Define alloys. Explain the composition along with properties of brass.	6	L2	CO5
	b.	Explain the synthesis of co-precipitation method by suitable example.	6	L2	CO5
	c.	List the properties and engineering applications of carbon nanotubes.	8	L2	CO5

OR

10	a.	Explain the composition along with properties of Alnico.	6	L2	CO5
	b.	Explain the properties and application of Perovskite (CaTiO_3)	6	L2	CO5
	c.	Explain the synthesis of nanoparticles by Sol-Gel method.	8	L2	CO5

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Applied Chemistry for Civil Engineering Stream

Max. Marks: 100

Time: 3 hrs.

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. VTU Formula Hand Book is permitted.
 3. M : Marks , L: Bloom's level , C: Course outcomes.



		Module - 1	M	L	C
	a.	What are alloys? Write the properties and applications of stainless steel and duralumin.	07	L2	CO1
	b.	Explain the classification of refractories based on chemical composition.	06	L2	CO1
	c.	What is glass? Describe the preparation of soda lime glass.	07	L2	CO1
OR					
Q.2	a.	What is cement? Give the classification of cement.	07	L2	CO1
	b.	What are refractories? Mention the properties and applications of refractories.	06	L2	CO1
	c.	With a neat diagram explain the various steps involved in the manufacture of cement by wet process.	07	L2	CO1
Module - 2					
Q.3	a.	Describe the electrochemical corrosion of steel in concrete.	06	L2	CO2
	b.	Define PV cell. Explain the construction and working of photovoltaic cell.	07	L2	CO2
	c.	What is anodizing? Explain the anodizing of aluminium and mention its applications.	07	L2	CO2
OR					
Q.4	a.	With a neat diagram, explain the construction and working of Li-Ion battery. Mention its applications.	07	L2	CO2
	b.	What is corrosion? Explain the differential metal corrosion with an example.	06	L2	CO2
	c.	Explain the construction, working and applications of Methanol-Oxygen fuel cell.	07	L2	CO2
Module - 3					
Q.5	a.	What is desalination? With a neat diagram describe the desalination of water by electrodialysis method.	07	L2	CO3
	b.	What are nano materials? Explain the following size dependent properties of nano materials : (i) Surface area (ii) Catalytic property	06	L2	CO3
	c.	Define COD. In a COD test, 30.2 cm ³ and 14.5 cm ³ of 0.04 N FAS solutions are required for a blank and sample titration respectively. The volume of sample solution used is 25 cm ³ . Calculate the COD of the sample solution.	07	L3	CO3

OR					
Q.6	a.	Explain the synthesis of nano materials by Sol-Gel method.	07	L2	CO3
	b.	Write a note on : i) Carbon nano tubes ii) Graphenes	06	L2	CO3
	c.	100 ml of water requires 18 ml of 0.01 M EDTA on titration using EBT indicator. In another experiment 100 ml of the sample water was boiled and filtered required 9 ml of 0.01 M EDTA using EBT indicator. Calculate temporary, permanent and total hardness of sample water.	07	L3	CO3
Module – 4					
Q.7	a.	What is polymerization? Discuss the free radical mechanism of addition polymerization.	06	L2	CO4
	b.	Explain the synthesis, properties and applications of Chloro polyvinyl chloride.	07	L2	CO4
	c.	What are fibres? Describe the synthesis, properties and applications of Nylon fibers.	07	L2	CO4
OR					
Q.8	a.	What are adhesives? Discuss the synthesis, properties and applications of epoxy resin.	06	L2	CO4
	b.	Define biodegradable polymer. Discuss the steps involved in the preparation of poly lactic acid and mention the applications.	07	L2	CO4
	c.	A polymer sample contains 2 molecules of molecular mass 2000 g/mol, 4 molecules of molecular mass 3000 g/mol and 6 molecules of molecular mass 4000 g/mol. Calculate the number average and weight average molecular mass of polymer sample.	07	L3	CO4
Module – 5					
Q.9	a.	State phase rule. Explain the terms involved in the phase rule equation.	07	L2	CO5
	b.	What is conductometric sensor? Discuss the principle and instrumentation of conductometric sensor.	07	L2	CO5
	c.	What is pH sensor? Explain its application in the determination of a soil sample.	06	L2	CO5
OR					
Q.10	a.	With the help of a neat phase diagram, describe the Lead-Silver system.	06	L2	CO5
	b.	What is potentiometric sensor? Explain the principle and instrumentation of potentiometric sensor.	07	L2	CO5
	c.	Explain the principle, instrumentation and working of pH sensor.	07	L2	CO5



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First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025

Chemistry for EEE Stream

Max. Marks: 100

Time: 3 hrs.

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	Explain conductors, Insulators and semiconductors on the basis of band theory.	7	L1,2	CO1
	b.	Explain the production of single crystal Si by float zone (FZ) process.	6	L2	CO1
	c.	What are conducting polymers? Explain the mechanism of conduction in poly acetylene.	7	L2	CO1
OR					
Q.2	a.	What is electroless plating? Describe the electroless plating of copper.	7	L2	CO1
	b.	Define the following : i) Polymers ii) Number average molecular mass iii) Weight average molecular mass	6	L2	CO1
	c.	In a sample of polymers, 100 molecules have molecular mass 10^3 g/mole, 250 molecules have molecular mass 10^4 g/mole and 300 molecules have molecular mass 10^5 g/mole. Calculate number average and weight average molecular mass of polymer.	7	L3	CO1
Module - 2					
Q.3	a.	What are batteries? Explain primary, secondary and reserved batteries with example.	7	L2	CO2
	b.	Explain the construction and working of Na-ion battery. Mention its application.	6	L2	CO2
	c.	What are fuel cells? Explain the construction and working of methanol oxygen fuel cell.	7	L2	CO2
OR					
Q.4	a.	What are flow batteries? Explain the construction and working and applications of vanadium redox flow battery.	7	L2	CO2
	b.	What are photo-voltaic cells? Describe the construction and working of photo-voltaic cell. Mention its advantages and disadvantages.	7	L2	CO2
	c.	Explain the construction, working and application of Li-polymer electrolyte battery.	6	L2	CO2
Module - 3					
Q.5	a.	What is Metallic corrosion? Explain the electrochemical theory of corrosion taking iron as an example.	7	L2	CO4
	b.	What is Anodising? Describe the Anodising of Al. Mention its applications.	7	L2	CO4



	c.	A steel sheet of area 100 inch ² is exposed to air near ocean. After one year period it was found to experience a weight loss of 486g due to corrosion. Given the density of steel in 7.9g/cm ³ . Calculate CPR in i) mpy ii) mmpy.	6	L2	CO4
OR					
Q.6	a.	What is Cathodic Protection? Explain sacrificial anode method for the corrosion control.	6	L2	CO3
	b.	Identify and explain the type of corrosion taking place in the following cases: i) Bolt and nut made up of two different metal in contact with each other. ii) Presence of dust particles on the metal surface for a long time.	7	L2	CO3
	c.	What is e-waste? Explain the methods of e-waste disposal.	7	L2	CO3
Module – 4					
Q.7	a.	What are Nano materials? Explain any three size dependent properties of nano materials.	7	L2	CO4
	b.	Describe synthesis of nano materials by sol gel method with examples.	7	L2	CO4
	c.	Give the properties and applications of i) OLED ii) QLED.	6	L2	CO4
OR					
Q.8	a.	Write briefly about i) Nanofibres ii) Nano sensors.	7	L2	CO4
	b.	What are perovskite materials? Give the properties and applications of perovskite materials in optoelectronic devices.	6	L2	CO4
	c.	What are liquid crystals? Explain the classification of liquid crystals with suitable examples. Mention their applications.	7	L2	CO4
Module – 5					
Q.9	a.	What are reference electrodes? Explain construction, working and application of calomel electrode.	7	L2	CO5
	b.	Explain the working principle and application of conductometric sensors.	6	L2	CO5
	c.	What are concentration cells? Calculate the e.m.f of the following concentration cell at 25°C and write its reactions $\text{Ag} \text{Ag}^+_{(0.01\text{M})} \parallel \text{Ag}^+_{(0.1\text{M})} \text{Ag}$	7	L3	CO5
OR					
Q.10	a.	Explain the working principle and application of electro chemical sensors.	6	L3	CO5
	b.	What are ion selective electrodes? Explain the construction and application of glass electrode.	7	L2	CO5
	c.	What are potentiometric sensors? Explain the principle Instrumentation and application of potentiometric sensor in the estimation of Fe.	7	L3	CO5

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025

Applied Physics for CSE Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. VTU Formula Hand Book is permitted.
 3. M : Marks , L: Bloom's level , C: Course outcomes.*

		Module - 1	M	L	C
Q.1	a.	Discuss the three processes of interaction of radiation with matter along with relevant mathematical expressions and diagrams.	09	L2	CO1
	b.	Define attenuation and give expression for attenuation coefficient in an optical fiber. Explain the three major causes of attenuation.	07	L2	CO1
	c.	In a diffraction grating experiment, the laser light undergoes third order diffraction with diffraction angle 2.2° . The grating constant is $d = 5.05 \times 10^{-5}$ m. The distance between the grating and source is 0.8 m. Find the wavelength of laser.	04	L3	CO5
OR					
Q.2	a.	Define acceptance angle and numerical aperture. Hence, derive an expression for NA in terms of RIs of core, cladding and surrounding.	08	L2	CO1
	b.	Discuss the application of laser in bar-code scanner and laser printer with the help of relevant diagrams.	08	L2	CO1
	c.	Given the Numerical aperture 0.30 and RI of core 1.52, calculate the R.I of clad.	04	L3	CO1
Module - 2					
Q.3	a.	Derive the expression for deBroglie wavelength by analogy and explain Heisenberg uncertainty principle with relevant mathematical expressions.	08	L2	CO2
	b.	Discuss eigen wavefunction, probability function for a particle in an infinite potential well for the ground state and 1 st excited state with neat relevant diagram.	08	L2	CO2
	c.	Calculate the energy of first three states for an electron in a one dimensional potential well of width 0.2 nm.	04	L3	CO2
OR					
Q.4	a.	Set up Schrodinger's time-independent differential wave equation. Mention the expression for 3 dimensional version of the same.	08	L2	CO2
	b.	Write note on : i) Wave function ii) Max Born interpretation iii) Principle of complementarity	08	L2	CO2
	c.	The speed of an electron is measured to within an uncertainty of $3 \times 10^4 \text{ ms}^{-1}$ in one dimension. What is the minimum width required by the electron to be confined in an atom?	04	L3	CO2
Module - 3					
Q.5	a.	Discuss (i) Quantum NOT gate (ii) CNOT gate with matrix representation and their operation on the basis states.	08	L2	CO2

Q.5	b.	Define qubit and mention three properties. Explain the representation of qubit using Bloch sphere.	08	L2	CO2
	c.	Given $ \psi\rangle = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix}$ and $ \phi\rangle = \begin{bmatrix} \beta_1 \\ \beta_2 \end{bmatrix}$, prove that $\langle\psi \phi\rangle = \langle\phi \psi\rangle^*$.	04	L3	CO2

OR

Q.6	a.	Explain the operation of (i) Hadamard gate and (ii) Toffoli gate with matrix representation and truth table.	08	L2	CO2
	b.	Explain orthogonality and orthonormality with an example for each.	08	L2	CO2
	c.	Show that the matrix $A = \begin{bmatrix} i & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & i \end{bmatrix}$ is unitary.	04	L3	CO2

Module – 4

Q.7	a.	Mention 3 failures of CFET and the assumptions of QFET.	07	L2	CO2
	b.	Write short notes on (i) quantum tunnelling (ii) squid (iii) charge qubit (iv) Josephson junction.	08	L2	CO3
	c.	Calculate the probability of occupation of an energy level 0.02 eV above Fermi level at 300 K.	05	L3	CO3

OR

Q.8	a.	Define Fermi factor. Discuss the variation of Fermi factor with temperature and energy. Represent the same using graph.	08	L2	CO3
	b.	With relevant diagrams, explain Type-1 (Soft) and type-2(Hard) superconductors with two examples for each.	08	L2	CO3
	c.	Superconducting aluminium has critical temperature of 1.2 K at zero magnetic field. If the critical field is 0.01 Tesla at 0 K, find its critical field at 0.5 K.	04	L3	CO3

Module – 5

Q.9	a.	Illustrate odd rule and odd rule multipliers with suitable example for slow-in and slow-out.	08	L2	CO4
	b.	Mention the general pattern of Monte Carlo method and hence determine the value of π .	08	L2	CO4
	c.	Given the base distance 0.5 cm for the slow-in and given the last frame is 6 th , calculate the distance between the frames #3 and #4.	04	L3	CO4

OR

Q.10	a.	Distinguish between descriptive and inferential statistics.	08	L2	CO4
	b.	In the context of animation, describe the action of jump with measurable physical quantities and relations between them.	08	L2	CO4
	c.	The average number of internet failures in a household per week is 3. What is the probability of 4 internet failures happening next week assuming Poisson model?	04	L3	CO4

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025

Applied Physics for EEE Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. M : Marks , L: Bloom's level , C: Course outcomes.
 3. VTU Hand Book is permitted.*

Module – 1			M	L	C
Q.1	a.	State and explain Heisenberg's uncertainty principle show that the electron cannot exist inside the nuclear.	8	L2	CO1
	b.	Setup time independent Schrodinger wave equation for free particle in one dimension.	8	L2	CO1
	c.	Calculate the momentum of an electron and de-Broglie wavelength associated with it if its kinetic energy is 1.5 KeV.	4	L3	CO1
OR					
Q.2	a.	What is wave function? Give its physical significance and properties.	8	L2	CO1
	b.	Assuming the time independent Schrodinger's wave equation, discuss the solution for a particle in one dimensional potential well of infinite height and hence obtain the normalized wave function.	8	L2	CO1
	c.	Calculate the energy in eV for the first two permitted excited state of an electron in an infinite potential well of width 2Å.	4	L3	CO1
Module – 2					
Q.3	a.	What is Fermi's energy? Describe the dependence of Fermi factor on temperature and energy.	8	L2	CO2
	b.	Define internal field. Derive the Clausius – Mossotti equation.	8	L2	CO2
	c.	The Superconducting transition temperature of lead of 7.26 K. The initial field at 0 K is 64×10^3 Amp/m. Calculate the critical field at 5K.	4	L3	CO2
OR					
Q.4	a.	What is Polarization? Describe various types of polarization mechanisms.	8	L2	CO2
	b.	What is Superconductivity? Explain the types of superconductors.	8	L2	CO2
	c.	What is the polarization produced in sodium chloride by an electric field of 600 V/mm, given that its dielectric constant is 6 ?	4	L3	CO2
Module – 3					
Q.5	a.	Derive an expression for the radiant energy density under thermal equilibrium using Einstein's co-efficient.	8	L2	CO1
	b.	Define modes of propagation and V-number. Obtain the expression for the numerical aperture of an optical fiber.	8	L2	CO1

	c.	Find the ratio of population of the two energy states in a material that produces light of wavelength 6328 Å at 27°C.	4	L3	CO1
OR					
Q.6	a.	Explain the construction and working of carbon dioxide laser. Mention any two applications of it.	8	L2	CO1
	b.	What is Refractive index profile? Describe three types of optical fiber with one application for each type.	8	L2	CO1
	c.	Find the attenuation in an optical fiber of length 500 m when a light signal of power 100 mW emerges out of the fiber with a power 90 mW.	4	L3	CO1
Module – 4					
Q.7	a.	Describe the vector operator ∇ and explain the concepts of divergence, gradient and curl.	8	L2	CO3
	b.	What is displacement current? Derive an expression for displacement current.	8	L2	CO3
	c.	Determine the resonance frequency of an LCR series circuit with inductance = 0.5 henry, capacitance = 0.45, microfarad and resistance = 300Ω	4	L2	CO3
OR					
Q.8	a.	State and prove Gauss divergence theorem. Mention four Maxwell's equations in differential form for time varying fields.	8	L2	CO3
	b.	Derive the wave equation in terms of electric field using Maxwell's equation in free space.	8	L2	CO3
	c.	Find the wavelength of the semiconductor laser in diffraction grating experiment where the angle of diffraction for the first order is 0.75 degree. Given grating constant = $4.7 \times 10^{-5} \text{ m}^{-1}$.	4	L3	CO5
Module – 5					
Q.9	a.	Show that the Fermi level of an intrinsic semiconductor lies in the mid – part of the forbidden energy gap. Discuss the law of mass action.	8	L2	CO4
	b.	Derive an expression for electrical conductivity of an intrinsic semiconductor.	8	L2	CO4
	c.	The Hall co-efficient of a specimen of a doped silicon is found to be $3.66 \times 10^{-4} \text{ m}^3/\text{C}$. What is the type of charge carriers? Also calculate the carrier concentration.	4	L3	CO4
OR					
Q.10	a.	What is Hall effect? Obtain the expression for Hall voltage and express Hall voltage in terms of Hall coefficient.	8	L2	CO4
	b.	Explain construction and working of semiconductor diode laser with the help of energy Band diagram and mention any two applications of it.	8	L2	CO4
	c.	The resistivity of intrinsic germanium at 27°C is equal to 0.449 ohm-meter. Assuming electron and hole mobilities as 0.39 $\text{m}^2/\text{Volt-sec}$ and 0.19 $\text{m}^2/\text{Volt-sec}$ respectively. Calculate the intrinsic carrier density.	4	L3	CO4

CBCS SCHEME

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BPHYM102/202

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Applied Physics for ME Stream

Time: 3 hrs.

Max. Marks: 100

- Note:*
1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. M : Marks , L: Bloom's level , C: Course outcomes.
 3. VTU Hand Book is permitted.

Module – 1			M	L	C
Q.1	a.	Obtain a differential equation for a body undergoing forced oscillation and mention expression for amplitude and phase of oscillation. Discuss the three cases for variation of amplitude with frequency in forced oscillation.	10	L2	CO1
	b.	What are shock waves? Mention three properties and applications of shock waves.	6	L2	CO1
	c.	The distance between the two pressure sensors in a shock tube is 150 mm. The time taken by a shock wave to travel the distance is 0.3 ms. If the velocity of sound under the same condition is 340 m/s. Find the Mach number of the shock wave.	4	L3	CO1
OR					
Q.2	a.	Describe the construction and working of hand operated Reddy shock tube. Mention any two key features of Reddy shock tube.	10	L2	CO1
	b.	Discuss the conditions for resonance and explain the sharpness of resonance.	5	L2	CO1
	c.	A 20gm oscillator with natural frequency 10 rad/s is vibrating in damping medium. The damping force is proportional to the velocity of the vibration. If the damping coefficient is 0.17 how does the oscillation decay?	5	L3	CO1
Module – 2					
Q.3	a.	Define Young's modulus, Bulk modulus and rigidity modulus. Derive relation between Y, n and σ .	10	L2	CO2
	b.	Discuss the different types of beams and mention their engineering application.	6	L2	CO2
	c.	Calculate the extension produced in a wire of length 2 m and radius 0.13 cm due to a force of 15 N applied along its length (Given : Young's modulus of wire $Y = 2.1 \times 10^{11} \text{ N/m}^2$).	4	L3	CO2
OR					
Q.4	a.	Derive the expression for bending moment in terms of moment of inertia and hence arrive at the expression for bending moment for a beam for circular and rectangular cross section.	10	L2	CO2
	b.	Discuss fatigue failures.	5	L2	CO2
	c.	Calculate the Poisson's ratio for the material given that $Y = 12.25 \times 10^{10} \text{ N/m}^2$ and $n = 4.55 \times 10^{10} \text{ N/m}^2$.	5	L3	CO2



Module – 3

Q.5	a. Derive expression for thermo emf in terms of T_1 and T_2 .	8	L2	CO3
	b. Describe the construction and working of thermoelectric generator (TEG)	7	L2	CO3
	c. The thermo emf of a Cu-Fe thermocouple is $2160 \mu\text{V}$ when the cold junction is at 0°C and hot junction at 250°C . Calculate the constants a and b if the neutral temperature is 330°C .	5	L3	CO3

OR

Q.6	a. Discuss Seebeck effect, and Peltier effect with their coefficients.	8	L2	CO3
	b. Explain the construction and working of thermocouples. Mention their advantages.	7	L2	CO3
	c. The emf in lead – iron thermocouple, one junction of which is at 0°C , is given by $E = 1784t - 2.4t^2$ (in μ volts) where t is temperature in $^\circ\text{C}$. Find the neutral temperature, π and σ .	5	L3	CO3

Module – 4

Q.7	a. Explain the construction and working of porous plug experiment with neat diagram.	8	L2	CO4
	b. Explain the Liquefaction of Helium.	8	L2	CO4
	c. In Joule Thomson experiment temperature changes from 100°C to 150°C for pressure change of 20 MPa to 170 MPa. Calculate Joule Thomson coefficient.	4	L3	CO4

OR

Q.8	a. Explain Joule Thomson effect. Derive $\Delta T = \frac{P_1 - P_2}{C_p} \left[\frac{2a}{RT} - b \right]$	8	L2	CO4
	b. Explain briefly the application of cryogenics in food processing and aerospace.	8	L2	CO4
	c. Calculate inversion temperature of gas. Given $a = 0.244 \text{ atm L}^2/\text{mol}^2$, $b = 0.027 \text{ L/mol}$ and $R = 0.0821 \text{ L atm/K/mol}$.	4	L3	CO4

Module – 5

Q.9	a. With neat diagram, explain the principle construction and working of Scanning Electron Microscope (SEM).	8	L2	CO5
	b. With neat diagram, explain the principle, construction and working of Atomic Force Microscope (AFM).	8	L2	CO5
	c. The spacing between principal planes of NaCl crystal is 2.82 \AA , it is found that first order Bragg reflection occur at an angle of 10° . Calculate the wavelength of X-rays.	4	L3	CO5

OR

Q.10	a. Describe the construction and working of transmission electron microscope (TEM).	8	L2	CO5
	b. Define nano-material and nano composite and classify the nano-materials based on the dimensional constraints.	7	L2	CO5
	c. Determine the crystallite size given the wavelength of X-rays 10 nm , the peak width 0.5° and peak position 25° for a cubic crystal given $K = 0.94$.	5	L3	CO5

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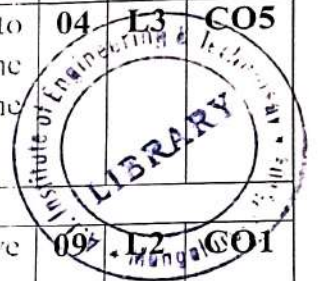
First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Applied Physics for Civil Engineering Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks, L: Bloom's level, C: Course outcomes.*

		Module - 1			
Q.1	a.	Setup the differential equation for damped oscillations. Explain overdamping, critical damping and under damping by graph.	M 07	L L2	C CO1
	b.	With a neat diagram, explain the construction and working of Reddy shock tube. Mention any two applications of shock waves.	09	L2	CO1
	c.	A vibrating system of natural frequency 500 cycles/second is forced to vibrate with a periodic force/unit mass of amplitude 100×10^{-5} N/kg in the presence of damping/unit mass of 0.01×10^{-3} rad/s. Calculate the maximum amplitude of vibration of the system.	04	L3	CO5
OR					
Q.2	a.	Define stiffness factor of a spring. Obtain an expression for the effective spring constant of springs in series and parallel combinations.	09	L2	CO1
	b.	Define Mach number and Mach angle. Classify the waves based on Mach number.	06	L1	CO1
	c.	A car has a spring system that support the in-built mass 1000 kg. When a person with a weight 980 N sits at the C of G, the spring system sinks by 2.8 cm. When the car hits a bump, it starts oscillating vertically. Find the period of oscillations.	05	L3	CO5
Module - 2					
Q.3	a.	State and explain Hooke's law. Explain the nature of elasticity with the help of stress-strain diagram.	07	L2	CO1
	b.	Define Bending moment. Derive an expression for Bending moment in terms of moment of inertia.	09	L2	CO1
	c.	A brass bar of length 1 m, area of cross section 0.01 m^2 is clamped horizontally at one end. A mass of 1 kg is applied at the other end. What is the depression produced in the bar? [Given $Y = 9.78 \times 10^{10} \text{ N/m}^2$]	04	L3	CO5
OR					
Q.4	a.	Define Poisson's ratio and derive the relation between Young's modulus [Y], Rigidity modulus [n] and Poisson's ratio [σ].	09	L2	CO1
	b.	Explain the different types of beams and mention any two applications.	06	L2	CO1
	c.	A solid lead sphere of radius 10.3 m is subjected to a numerical pressure of 10 N/m^2 acting all over the surface. Determine the change in its volume. [Given Bulk modulus [K] for lead is $4.58 \times 10^{10} \text{ N/m}^2$]	05	L3	CO1



Module – 3

Q.5	a.	What is Radiometry? Explain the radiometric quantities such as Radiant energy, Radiant power, Radiant intensity, Radiance, Irradiance and Radiant exitance along with respective equations.	10	L2	CO2
	b.	Mention any six requisites for acoustics in auditorium.	06	L1	CO2
	c.	A cinema has a volume of 7500 m ³ with reverberation time of 1.5 sec. What should be the total absorption in the hall?	04	L3	CO2

OR

Q.6	a.	Define reverberation and reverberation time. Based on assumptions made by Sabine deduce the expression for reverberation time.	10	L2	CO2
	b.	What is acoustics? Explain the types of acoustics.	06	L2	CO2
	c.	Explain Cosine law and Inverse square law.	04	L2	CO2

Module – 4

Q.7	a.	Explain the construction and working of the semiconductor laser with a neat diagram.	08	L2	CO3
	b.	What is attenuation? Discuss the various losses in an optical fibre.	07	L2	CO3
	c.	The ratio of population of two energy levels is 1.059×10^{-30} . Find the wavelength of light emitted by spontaneous emissions at 330 K.	05	L3	CO5

OR

Q.8	a.	Explain propagation of light through optical fibre arrive at the expression for numerical aperture and angle of acceptance.	09	L2	CO3
	b.	Describe laser range finder in defense and speed checker.	06	L2	CO3
	c.	The attenuation in an optical fibre is 3.6 dB/km. What fraction of its initial intensity remains (i) after 1 km (ii) after 3 km?	05	L3	CO5

Module – 5

Q.9	a.	What is Landslide? Describe the cause for landslide.	07	L2	CO4
	b.	Enumerate any four causes and adverse effects of tsunami waves.	08	L1	CO4
	c.	The magnitude of earthquake arose in Gujarat during the year 2001 was 6.9. Calculate the energy released.	05	L3	CO4

OR

Q.10	a.	Define earthquake and mention its causes. Discuss the engineering structures that can be designed to withstand the forces of an Earthquake.	09	L2	CO4
	b.	Mention any three fire proof materials and fire fighting equipments.	06	L1	CO4
	c.	The intensity of one earthquake is 100 times the intensity of other. If the magnitude of the first earthquake is 8.5, estimate the magnitude of other.	05	L3	CO4

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Principles of Programming using C

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Explain the components of a computer with a neat diagram.	06	L2	CO1
	b.	Explain the formatted input and output statements with suitable syntax and example.	06	L2	CO2
	c.	Illustrate an algorithm, flowchart and program to compute area of a circle.	08	L2	CO2
OR					
Q.2	a.	What is variable? What are the rules to construct a variable?	06	L2	CO2
	b.	Identify the following as valid or invalid identifiers with justification: i) int ii) num2 iii) +add iv) a - 2 v) - sum vi) name __123	06	L2	CO2
	c.	Explain the structure of C program. Write a sample program to demonstrate the components in the structure of C program.	08	L2	CO2
Module – 2					
Q.3	a.	Discuss the functioning of the following operators with example. i) Arithmetic ii) Relational	06	L2	CO2
	b.	Compare between the break and continue statement.	06	L2	CO2
	c.	Explain switch statement with syntax. Write a program to simulate simple calculator.	08	L2	CO2
OR					
Q.4	a.	Explain for loop with syntax and example.	06	L2	CO2
	b.	Explain with syntax, if and if-else statements in C program.	06	L2	CO2
	c.	Develop a C program that takes three coefficients (a, b and c) of quadratic equation ($ax^2 + bx + c$) as input and compute all possible roots and print them with appropriate messages.	08	L3	CO5
Module – 3					
Q.5	a.	Explain the syntax of function declaration and function definition with example.	06	L2	CO4
	b.	Write a C program to swap two integers using call by value method of passing arguments to a function.	06	L2	CO3
	c.	Explain different types of storage classes with example.	08	L2	CO3

OR

Q.6	a.	Explain the declaration and initialization of 1D and 2D arrays with example.	06	L2	CO3
	b.	Illustrate the concept of recursive function with example.	06	L2	CO4
	c.	Write a C program to implement Bubble sort technique (ascending order).	08	L2	CO3

Module - 4

Q.7	a.	Write the operations that can be performed on string using built-in functions. Explain any two functions.	08	L2	CO4
	b.	Develop a C program to concatenate 2 strings without using built-in function.	06	L3	CO5
	c.	Explain array of strings with an example.	06	L3	CO5

OR

Q.8	a.	Develop a program using pointer to compute the sum, mean and standard deviation of all elements stored in array of N real numbers.	08	L3	CO5
	b.	Describe the pointer concept such as initialization, declaration with suitable program example.	06	L3	CO3
	c.	Explain gets() and puts() function with example.	06	L2	CO1

Module - 5

Q.9	a.	What is structure? Explain the C syntax of structure declaration with example.	06	L2	CO3
	b.	Compare structures and unions with syntax and example.	06	L2	CO3
	c.	Implement structures to read, write and compute average-marks of the students. List the students scoring above and below the average marks for a class of N students.	08	L3	CO5

OR

Q.10	a.	Discuss the different modes of operation on files with suitable example.	08	L2	CO4
	b.	Compare between fgets() and gets().	06	L2	CO4
	c.	Discuss the enumerated data type. Explain the declaration and access of enumerated data type with a code in C.	06	L2	CO1

CBCS SCHEME

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First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Basic Electronics for EEE Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.
3. Assume any missing data suitably.*

Module - 1			M	L	C
Q.1	a.	Explain the forward and reverse characteristics of semiconductor diode.	08	L2	CO1
	b.	Explain positive half wave rectifier with input and output waveforms.	06	L2	CO1
	c.	Explain Zener diode of voltage regulator with no load.	06	L2	CO1
OR					
Q.2	a.	Explain RC π filter.	08	L2	CO1
	b.	What is DC load line? Explain DC load line analysis for semiconductor diode.	08	L2	CO1
	c.	Write down the characteristics of Zener diode.	04	L2	CO1
Module - 2					
Q.3	a.	Explain BJT current amplification for increasing and decreasing IB level.	08	L2	CO2
	b.	Explain common base input characteristics of BJT.	06	L2	CO2
	c.	With a neat diagram explain the working of n channel JFET.	06	L2	CO2
OR					
Q.4	a.	Explain the operation of enhancement MOSFET.	08	L2	CO2
	b.	Draw the DC load line for transistor and identify Q points.	08	L2	CO2
	c.	Describe common emitter input characteristics.	04	L2	CO2
Module - 3					
Q.5	a.	With a neat block diagrams explain the typical op-Amp.	06	L2	CO3
	b.	Explain working of a differential amplifier.	08	L2	CO3
	c.	Explain op-Amp of an integrator circuit with an input and output waveform using square wave of input.	06	L2	CO3
OR					
Q.6	a.	Explain Differentiator with waveform and circuit.	08	L2	CO3
	b.	Define Op-amp parameters Gain, CMRR, Flew rate, input resistance.	08	L2	CO3
	c.	Explain inverting amplifier.	04	L2	CO3

Module – 4

Q.7	a.	Express the Boolean function $F = A + BC$ in a sum of minterms.	06	L2	CO4
	b.	Describe how NAND and NOR gates can be used as universal gates.	08	L2	CO4
	c.	Write down Axiomatic definition of Boolean algebra.	06	L2	CO4
OR					
Q.8	a.	Describe the working of the full adder using basic gates.	08	L2	CO4
	b.	Explain SOP and POS with examples.	06	L3	CO4
	c.	Express the Boolean function $F = XY + \bar{X}Z$ in a product of max term.	06	L2	CO1
Module – 5					
Q.9	a.	Explain the working of the potentiometer type transducer.	08	L2	CO5
	b.	Write a note on Photodiodes.	06	L2	CO5
	c.	Illustrate the piezoelectric transducer.	06	L2	CO5
OR					
Q.10	a.	Explain typical Radio Transmitter with neat block diagram.	08	L2	CO5
	b.	What is modulation? Explain the need for modulation.	06	L2	CO5
	c.	Explain the working of linear variable differential transducer.	06	L2	CO5



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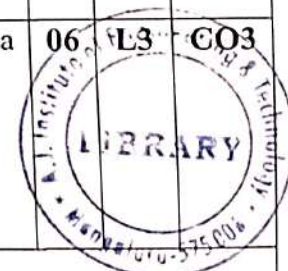
First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Elements of Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Data Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	State and explain Kirchoff's laws as applied to DC circuits.	06	L1	CO1
	b.	Derive an expression for energy stored in magnetic field.	06	L2	CO1
	c.	A circuit consists of two parallel resistors having resistance of 20 Ω and 30 Ω respectively, connected in series with a 15 Ω resistor. If the current through 30 Ω resistor is 1.2 A. Find i) Currents in 20 Ω and 15 Ω resistors ii) The voltage across the whole circuit iii) Voltage across 15 Ω resistor and 20 Ω resistor iv) Total power consumed in the circuit.	08	L3	CO3
OR					
Q.2	a.	State and explain Ohm's law and list out its limitations.	06	L1	CO1
	b.	Define coefficient of coupling. Prove that the coefficient of mutual inductance M between two coils of self-inductances L ₁ and L ₂ is given by $M = K\sqrt{L_1L_2}$.	08	L2	CO1
	c.	A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 Mwb. Calculate i) Self inductance ii) Energy stored iii) emf induced when the current is reversed in 0.01 s.	06	L3	CO3
Module - 2					
Q.3	a.	Define the (i) Frequency (ii) Form factor (iii) Peak factor of sinusoidally varying voltage.	06	L1	CO2
	b.	Derive the expression for RMS value of a sinusoidally varying quantity.	06	L2	CO2
	c.	A current of 0.9 A flows through a series combination of a resistor of 120 Ω and a capacitor of reactance 250 Ω. Find the impedance, power supply voltage, voltage across resistor, voltage across capacitor, apparent power, active power and reactive power.	08	L3	CO3
OR					
Q.4	a.	Explain the generation of single phase AC induced EMF with suitable diagram.	08	L2	CO2



Q.4	b.	Obtain the behaviour of a voltage, current, power in a pure inductor, connected to a single phase ac supply.	06	L2	CO2
	c.	An ac sinusoidal voltage $V = (160 + j120)V$ is applied to a circuit. The resulting current is $I = (-4 + j10)A$. Find the impedance of the circuit and state whether it is inductive or capacitance. Also, find the power factor, active power and reactive power.	06	L3	CO3
Module - 3					
Q.5	a.	Compare 3- ϕ star and delta connection systems.	06	L2	CO2
	b.	In 3- ϕ delta connections, find the relation between line and phase values of current and voltages. Also derive equation for three phase power.	08	L3	CO2
	c.	Two-wattmeter method was used to determine the input power to a three-phase motor. The readings were 5.2 KW and -1.7 KW, and the line voltage was 415 V. Calculate (i) the total power (ii) power factor (iii) the line current.	06	L3	CO3
OR					
Q.6	a.	What are the advantages of three phase system over single phase system.	06	L2	CO2
	b.	S.T the power factor in the balanced 3- ϕ connected circuit can be measured by two wattmeter. Draw the circuit and vector diagram.	08	L2	CO2
	c.	A 400 V, 3- ϕ supply is connected across a balanced load of three impedances each consisting of 32 Ω resistance and 24 Ω inductive reactance. Determine the current drawn from the power mains, if the three impedances are (i) Y - connected (ii) Δ - connected.	06	L3	CO3
Module - 4					
Q.7	a.	With neat diagram explain two types of wiring.	06	L2	CO5
	b.	Mention the difference between current transformer and potential transformer.	08	L2	CO4
	c.	Explain the construction and working of Wheatstone's bridge.	06	L2	CO1
OR					
Q.8	a.	Explain the construction and working of Megger.	06	L2	CO4
	b.	Explain the construction and working of Kelvin's double bridge.	06	L2	CO4
	c.	Explain two-way and three-way control of the lamp with circuit and truth table.	08	L3	CO5
Module - 5					
Q.9	a.	Write short notes on Fuse and MCB.	06	L2	CO5
	b.	What is electric shock? Give the list of preventive measures against the shock.	06	L2	CO5
	c.	What are the characteristics of tariff and explain two part tariff.	08	L2	CO5
OR					
Q.10	a.	With neat circuit diagram explain operation of RCCB.	06	L2	CO5
	b.	Explain types of earthing with diagrams.	08	L2	CO5
	c.	List out the power ratings of the household appliances including air conditioner, laptop, printer etc. Find the power consumed.	06	L2	CO5

CBCS SCHEME

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First/Second Semester B.E/B.Tech. Degree Examination, June/July 2025 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of steam table is permitted.

Module - 1			M	L	C
1	a.	Explain the role of mechanical engineering in industry and society.	7	L2	CO1
	b.	Explain emerging trends and technologies in automobile sector.	7	L2	CO1
	c.	Find enthalpy of 1 kg of steam at 12 bar when steam is : i) Dry saturated ii) 22% wet iii) Super heated to 250°C Assume specific heat of super heated steam as 2.25 kJ/kg K.	6	L3	CO4
OR					
2	a.	Explain with neat sketch working principle of hydel power plant.	7	L2	CO1
	b.	Explain with neat sketch working principle of nuclear power plant.	7	L2	CO1
	c.	Find the enthalpy of 0.5 kg of steam at a pressure of 10 bar when steam is : i) Dry saturated ii) 1.5% wet iii) Super heated to 200°C Assume specific heat of super heated steam as 2.25 kJ/kg K.	6	L3	CO4
Module - 2					
3	a.	Explain with neat sketches the following lathe operations : i) Turning ii) Knurling iii) Thread cutting.	10	L2	CO2
	b.	Explain with neat sketches the following drilling operations : i) Drilling ii) Boring iii) Counter sinking.	10	L2	CO2
OR					
4	a.	Explain with neat sketches the following milling operations : i) Plain milling ii) Slot milling iii) End milling.	10	L2	CO2
	b.	Explain the basic components and applications of CNC.	10	L2	CO2

Module – 3

			10	L2	CO2
		Explain with neat sketches the working principle of four stroke petrol engine.	5	L2	CO2
5	a.	Explain with neat sketches the working principle of four stroke petrol engine.	5	L3	CO4
	b.	Explain the properties of refrigerants.			
	c.	A four stroke single cylinder diesel engine has a piston diameter of 250 mm and stroke 400 mm. The mean effective pressure is 4 bar and speed is 500 rpm. The diameter of the brake drum is 1000 mm and effective brake load is 400 N. Find IP, BP and FP.			

OR

			10	L2	CO2
		Explain with neat sketch the working principle of VCR.	5	L2	CO2
6	a.	Explain with neat sketch the working principle of VCR.	5	L3	CO4
	b.	Explain the applications of Air Conditioner.			
	c.	A single cylinder four stroke engine runs at 1000 rpm and has a bore of 115 mm, stroke 140 mm. The brake load is 60 N at 600 mm radius and mechanical efficiency is 80%. Find IP, BP and mean effective pressure.			

Module – 4

			8	L2	CO3
		Explain with neat sketch spur and simple gear train.	6	L2	CO3
7	a.	Explain with neat sketch spur and simple gear train.	6	L3	CO4
	b.	Explain flat and v-belt drive.			
	c.	A simple gear train consists of 3 gears. The number of teeth on the driving gear is 60, on the idler gear 40 and on the driven gear 80. If the driving gear rotates at 1200 rpm. Find the speed of the driven gear and also velocity ratio. Sketch the arrangement of gear drive.			

OR

			8	L2	CO3
		Explain with a neat sketch Arc welding.	6	L2	CO3
8	a.	Explain with a neat sketch Arc welding.	6	L3	CO4
	b.	Explain with neat sketches types of flames used in gas welding.			
	c.	It is required to drive a shaft as 600 rpm by a belt using a pulley of 150 mm diameter on another parallel shaft B running at 240 rpm. What would be the diameter of the pulley on the shaft A and also find velocity ratio.			

Module – 5

			10	L2	CO3
		Explain the basic components of hybrid vehicle.	10	L2	CO3
9	a.	Explain the basic components of hybrid vehicle.			
	b.	Explain advantages of electric and hybrid vehicles.			

OR

			10	L2	CO3
		Explain with block diagram open and closed loop mechatronics system.	10	L2	CO3
10	a.	Explain with block diagram open and closed loop mechatronics system.			
	b.	Explain with neat sketch robot anatomy and applications of robots.			



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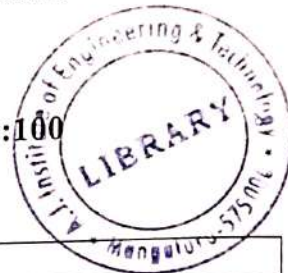
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First / Second Semester B.E. Degree Examination, June/July 2025

COMPUTER AIDED ENGINEERING DRAWING

Time: 3 Hours (COMMON TO ALL BRANCHES)

Max.Marks:100



- Note: 1. Answer all four full question
2. Grid sheets may be provided for making preparatory sketches

Module - 1

Q. No.		Marks
1	A circular lamina of 30 mm diameter rests on HP such that the surface of the lamina is inclined at 30° to HP and the diameter passing through the corner on which the lamina rests on HP is inclined at 45° to VP. Draw its top and front views in this position.	20

Module - 2

2	A pentagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projection of the pyramid when the axis of the pyramid is inclined to HP at 40° and appears to be inclined to VP at 45°.	30
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Module - 3

3	<p>Following figure shows the front and side views of solid. Draw the isometric projection of the solid.</p>	25
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Module - 4

4	A square prism of base sides 30 mm and axis length 60 mm is resting on HP with all the vertical faces equally inclined to VP. It is cut by an inclined plane 60° to HP and perpendicular to VP and is passing through a point on the axis at a distance of 50 mm from the base. Obtain the development for the truncated portion of the solid.	25
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Examiner 2:
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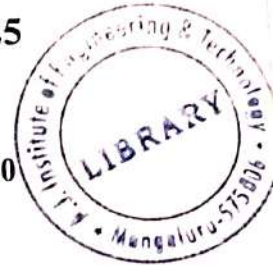
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First / Second Semester B.E. Degree Examination, June/July 2025

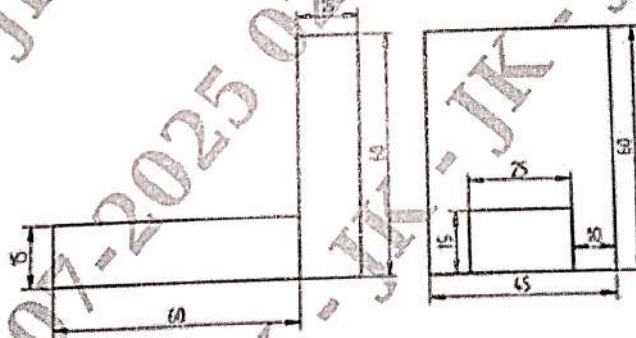
COMPUTER AIDED ENGINEERING DRAWING

Time: 3 Hours (COMMON TO ALL BRANCHES) Max.Marks:100



- Note: 1. Answer all four full question
2. Grid sheets may be provided for making preparatory sketches

Module – 1		Marks
Q. No.		
1	A rectangular lamina of 35 mm x 20 mm rests on HP on one of its shorter edges. The lamina is rotated about the edge on which it rests till it appears as a square in the top view. The edge on which the lamina rests being parallel to both HP and VP. Draw its projections and find its inclinations to HP and VP.	20
Module – 2		
2	A hexagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its slant edges. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45° .	30
Module – 3		
3	Following figure shows the front and top views of solid. Draw the isometric projection of the solid.	25
Module - 4		
4	A cube of its side 40 mm is resting on HP with its base on HP such that one of its vertical faces is inclined at 30° to the VP. It is cut by a section plane perpendicular to VP, inclined to HP at an angle 45° and passes through the midpoint of the axis. Draw the development of the lower lateral surface of the cube.	25



Examiner 1:
Name:
Signature:

Examiner 2:
Name:
Signature:

OR

8	a.	Explain the declaration, initialization of strings in C and arrays of strings with examples.	10	L2
	b.	Implement structure to read, write and compute average marks of the students scoring. Display students scoring above and below the average marks for a class of N students.	10	L4

Module – 5

9	a.	Using suitable code, discuss the working of the following string functions : (i) Strcat() (ii) Strlen() (iii) Strcmp()	6	L2
	b.	Write a program to transpose the elements of a 3×3 matrix.	8	L3
	c.	Implement a structure of student with elements NAME, USN and GRADE. Write functions to read and display student structure.	6	L4

OR

10	a.	Explain structures with syntax and example.	6	L2
	b.	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.	7	L4
	c.	Explain the passing of pointer variables to a function with examples.	7	L2



CBCS SCHEME

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BESCK104C

First Semester B.E./B.Tech. Degree Examination, June/July 2025 Introduction to Electronics and Communication

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1

		Q.1	M	L	C
	a.	Define the term rectifier. Explain the principle of working of full-wave bridge rectifier using a neat circuit diagram and waveforms.	7	L2	CO1
	b.	Discuss why negative feedback is used in amplifiers. Derive an expression for overall gain of an amplifier with negative feedback.	7	L2	CO1
	c.	A mains transformer having a turns ratio 44 : 1 is connected to a 220 V rms mains supply. If the secondary output is applied to a half wave rectifier, determine the peak voltage that will appear across a load.	6	L3	CO1

OR

Q.2	a.	With a block diagram explain the working of a d.c. power supply. Also mention the major components used in each block.	7	L2	CO1
	b.	Explain with circuit diagram, the working of, (i) Voltage doubler (ii) Voltage tripler systems.	7	L2	CO1
	c.	An amplifier produces an output voltage of 2V for an input of 50 mV. If the input and output currents in this condition are, respectively, 4 mA and 200 mA, determine : (i) Voltage gain (ii) Current gain (iii) Power gain.	6	L3	CO1

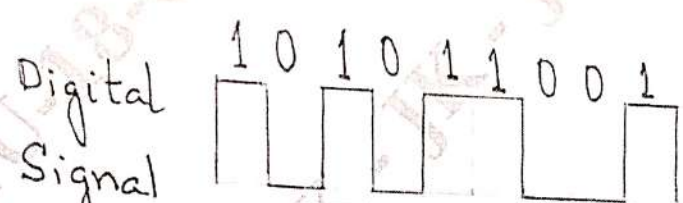
Module – 2

Q.3	a.	Draw the neat circuit diagram and accompanying waveforms of the following circuits using operational amplifier : (i) Voltage follower (ii) Differentiator (iii) Integrator	6	L1	CO2
	b.	Mention the conditions for sustained oscillations in an oscillator. Draw the circuit and provide the equations for output frequency of phase shift oscillator.	7	L2	CO2
	c.	With a neat circuit diagram and waveform, describe the operation of crystal controlled oscillator.	7	L2	CO2

OR

Q.4	a.	What is an operational amplifier? Write a note on ideal characteristics of op-amp.	7	L2	CO2
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	b.	Explain the operation of single stage astable oscillator with its circuit diagram.	7	L2	CO2
	c.	Determine the frequency of oscillations of a three stage ladder network in which $C = 10 \text{ nF}$ and $R = 10 \text{ K}\Omega$.	6	L3	CO2
Module - 3					
Q.5	a.	Mention different theorems and postulates of Boolean algebra and prove each of them with truth table.	7	L2	CO3
	b.	With the help of truth table, explain the operation of half adder with its circuit diagram and expressions for sum and carry.	5	L2	CO3
	c.	(i) Minimize the function : $F(x, y, z) = xy + x'z + yz$ (ii) Find the complement of : $F_1(x, y, z) = x'yz' + x'y'z$ $F_2(x, y, z) = x(y'z' + yz')$ (iii) Compute the 1's complement of : 11101.0110 ₍₂₎	8	L3	CO3
OR					
Q.6	a.	With the help of truth table, explain the operation of full adder with its circuit diagram and expressions for sum and carry.	8	L2	CO3
	b.	State and prove De-Morgan's theorem with its truth table.	6	L2	CO3
	c.	Convert the following : (i) $(673.124)_{(8)} = (?)_{(16)}$ (ii) Subtract using $(r-1)$'s complement method : $72532_{(10)} - 3250_{(10)}$ (iii) Subtract using r 's complement method : $1010100_{(2)} - 1000100_{(2)}$	6	L3	CO3
Module - 4					
Q.7	a.	What is an embedded system? Compare embedded systems and general purpose computing systems.	7	L2	CO4
	b.	Which component forms the core of an embedded system? Compare a microcontroller and a microprocessor used in an embedded system.	6	L2	CO4
	c.	Define the term transducer, with a representative diagram, explain the working of any one type of sensor and an actuator.	7	L2	CO4
OR					
Q.8	a.	Write a brief note on a semiconductor LED. With a neat diagram explain how a 7-segment LED can be used to display the data.	7	L2	CO4
	b.	Using different features, describe the classification of embedded systems.	7	L2	CO4
	c.	With a block diagram, explain briefly about the different elements of an embedded system.	6	L2	CO4

Module – 5					
Q.9	a.	What is meant by modulation in communication systems? Briefly describe each type of modulation.	8	L2	CO5
	b.	Brief about basic communication system with its block diagram.	7	L2	CO5
	c.	Compare analog communication with digital communication systems.	5	L2	CO5
OR					
Q.10	a.	Explain with a neat diagram, the concept of Radio Wave propagation and its different types.	7	L2	CO5
	b.	Describe about radio signal transmission and multiple access techniques.	7	L2	CO5
	c.	Consider the following binary data and sketch the ASK, FSK and PSK modulated waveforms.	6	L3	CO5
<p style="text-align: center;">  </p> <p style="text-align: center;">Digital Signal</p> <p style="text-align: center;">Fig. Q10 (c)</p>					



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BETCK105B

First Semester B.E./B.Tech. Degree Examination, June/July 2025 Green Buildings

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Define the term Green Building. Explain any four green building materials.	10	L1	CO2
	b.	List down the environmental impacts of building.	10	L2	CO1
OR					
Q.2	a.	(i) What is meant by stabilized mud block? (ii) What are the environmental impact of brick manufacturing?	10	L2	CO1
	b.	(i) What is meant by fibre-reinforced polymer composite? (ii) Explain the benefits of adding lime to concrete.	10	L2	CO1
Module – 2					
Q.3	a.	Write short notes on : (i) Filler slab (ii) Composite beam and panel roof (iii) Ferro-concrete	10	L2	CO2
	b.	Explain rôle of Nirmithi Kendra and Habitat in developing and propagating cost-effective construction.	10	L2	CO2
OR					
Q.4	a.	Write notes on : (i) Cavity wall construction (ii) Corner wall comprising rat trap bond	10	L2	CO2
	b.	(i) Write any five advantages of pre-engineered buildings. (ii) What are the categories of building frame?	10	L2	CO2
Module – 3					
Q.5	a.	(i) What is meant by Global Warming? Explain. (ii) Explain the effect of global warming.	10	L2	CO3
	b.	Explain environmental benefits of Green buildings.	10	L2	CO3
OR					
Q.6	a.	Compare green building with conventional building.	10	L2	CO3
	b.	Explain the environmental life cycle of building.	10	L2	CO3
Module – 4					
Q.7	a.	Discuss green rating for integrated habitat assessment.	10	L2	CO4
	b.	Discuss fundamental principles of sustainable building design.	10	L2	CO4
OR					
Q.8	a.	What is BREEAM certified building?	10	L2	CO4
	b.	What is the difference between BREEAM and LEED?	10	L2	CO4
Module – 5					
Q.9	a.	Define Solar Energy. Which are the two main categories of solar power?	10	L2	CO5
	b.	Write a short note on solar heating and cooling.	10	L2	CO5
OR					
Q.10	a.	Explain : (i) Sullage (ii) Sewage	10	L2	CO5
	b.	Explain the concept of Green composites.	10	L2	CO5

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First Semester B.E./B.Tech. Degree Examination, June/July 2025

Introduction to Python Programming

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1				M	L	C
Q.1	a.	Explain the different data types supported in Python with syntax and examples.	6	L2	CO1	
	b.	Develop a program in Python to find the sum of n natural numbers. Read the number from user.	6	L3	CO1	
	c.	Define Exception and illustrate the concept of exception handling in Python using suitable example.	8	L2	CO1	
OR						
Q.2	a.	Define the rules to develop a user-defined function in Python and define a function called exchange() to swap two numbers, show the output.	6	L2	CO1	
	b.	Develop a program to find the largest among the three numbers.	6	L3	CO1	
	c.	Explain the syntax and example of the following statements i) for loop ii) While loop iii) if-elif-else.	8	L2	CO1	
Module – 2						
Q.3	a.	List out the augmented operators and give the examples to illustrate the same.	7	L1	CO2	
	b.	Write a program to show the traversing of key-value pairs in dictionaries.	7	L3	CO2	
	c.	Explain the random choice and random shuffle function with lists.	6	L2	CO2	
OR						
Q.4	a.	Describe Lists in Python and examples to create list, list concatenation and replication.	7	L1	CO2	
	b.	Write a function named displayInventory() that would take any possible "inventory" and display it like the following : Inventory : 12 arrow, 42 gold coin, 1 rope, 6 torch, 1 dagger, Total number of items : 62.	7	L3	CO2	
	c.	Explain with an example slicing, in and not in operator with strings.	6	L2	CO2	
Module – 3						
Q.5	a.	Write a program to accept string and display total number of alphabets.	8	L3	CO3	

	b.	Discuss various methods available to remove the white spaces in a string with examples.	6	L2	CO3
	c.	Differentiate between absolute and relative paths in specifying file paths.	6	L2	CO3
OR					
Q.6	a.	Write a program in Python to perform reading and writing operations on files.	8	L3	CO3
	b.	List the string methods to analyze strings. Explain any four with syntax and examples.	6	L2	CO3
	c.	Explain how to save and retrieve variables with the Shelve module.	6	L2	CO3
Module – 4					
Q.7	a.	Discuss how shutil module helps to perform the operations such as copy, move, rename and delete files.	8	L2	CO3
	b.	What is logging? Explain the logging levels to categorize the log messages in Python.	6	L2	CO3
	c.	Write an algorithm for implementation of multi clipboard functionality.	6	L3	CO3
OR					
Q.8	a.	Explain the backing up a folder into a zip, with a program code.	8	L2	CO3
	b.	Describe how Raise exception is done using an example.	6	L2	CO3
	c.	Differentiate between Step over, Step In and Step Out buttons in the debugger.	6	L3	CO3
Module – 5					
Q.9	a.	Differentiate between the class method and instance method with suitable program examples.	8	L3	CO4
	b.	Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N ($N \geq 2$) complex numbers and to compute the addition of N complex numbers.	8	L3	CO4
	c.	Write a <code>_str_</code> method for the Point class. Create a Point object and print it.	4	L2	CO4
OR					
Q.10	a.	Write a class with following criteria Class name : Flower Objects : Lilly, Rose, Hibiscus Attributes : price, color, smell Methods : <code>get()</code> , <code>display()</code>	8	L3	CO4
	b.	Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint : Use list to store the marks in three subjects and total marks. Use <code>__init__()</code> method to initialize name, USN and the list to store marks and total. Use <code>getMarks()</code> method to read marks into the list, and <code>display()</code> method to display the score card details.	8	L3	CO4
	c.	Describe poly morphism with example.	4	L2	CO4

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BPLCK105D

First Semester B.E./B.Tech. Degree Examination, June/July Introduction to C++ Programming



Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			
Q.1	a.	Describe the structure of C++ program with syntax and suitable program.	M L C
	b.	Explain message passing with an example program.	10 L2 CO1
OR			
Q.2	a.	What is the need of Abstract class in C++? Discuss with an example.	10 L2 CO1
	b.	Write a C++ program to find the Sum of all the natural numbers from 1 to N?	5 L3 CO1
	c.	Discuss object and classes in brief.	5 L2 CO1
Module - 2			
Q.3	a.	What is a token? List the various types and explain in brief.	10 L2 CO1
	b.	Explain inline function with a suitable programming example.	10 L2 CO2
OR			
Q.4	a.	List the different types of operators in C++. Explain any three important operators and illustrate their usage in C++ program.	10 L3 CO2
	b.	Write a C++ program to demonstrate function overloading for the following prototype add (int a, int b) add (double a, double b).	10 L3 CO2
Module - 3			
Q.5	a.	Explain single inheritance with suitable programming example.	10 L2 CO2
	b.	Define constructor give the general syntax for different types of constructor and illustrate the same with suitable example program.	10 L2 CO3
OR			
Q.6	a.	Describe the importance of destructors and explain it with a suitable C++ program.	10 L2 CO3
	b.	Describe the syntax of multiple inheritance with an example program.	10 L2 CO3
Module - 4			
Q.7	a.	Write a note on I/O streams.	10 L2 CO1
	b.	Write a C++ program to create a text file created or not, if created it will write some text into the file and then read the text from the file.	10 L3 CO4
OR			
Q.8	a.	Explain the uses of ifstream and ofstream classes for file input and output.	10 L2 CO2
	b.	Write a C++ program to write and read time into/from binary file using f-stream.	10 L3 CO4
Module - 5			
Q.9	a.	Define exception, explain mechanism of exception handling in C++ with syntax and programming example.	10 L2 CO4
	b.	What is array of bound, write a C++ program, which handles array of bound exception?	10 L3 CO4
OR			
Q.10	a.	Discuss multiple catch statements with syntax and programming example.	10 L2 CO4
	b.	Write a function which throw a division by zero exception and catch it in catch blocks write a C++ program to demonstrate the usage of try, catch and throw to handle exception.	10 L3 CO4

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First Semester B.E./B.Tech. Degree Examination, June/July 2025 Renewable Energy Sources

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	What are the principles of Renewable Energy? Explain the causes of Energy scarcity.	06	L2	CO1
	b.	Classify the Renewable Energy Sources. What are the factors affecting energy resource development.	08	L2	CO1
	c.	Discuss the Indian Energy availability.	06	L2	CO1
OR					
Q.2	a.	What are the advantages and limitations of Renewable Energy Sources?	06	L2	CO1
	b.	Explain briefly the energy sources based on : i) Wind energy ii) Tidal energy iii) Biomass energy iv) Ocean thermal energy.	10	L2	CO1
	c.	Write a note on Internet of Energy (IOE).	04	L2	CO1
Module – 2					
Q.3	a.	What are the devices used for the measurement of Solar Radiation? With a neat figure explain the working of Angstrom type Pyrheliometer.	06	L2	CO2
	b.	Explain the advantages of Solar Pond. Discuss the operation of solar pond electric power generation.	06	L2	CO2
	c.	Briefly explain any four solar thermal energy applications.	08	L2	CO2
OR					
Q.4	a.	With a neat sketch, discuss the operation of solar flat plate collector with main parts.	07	L2	CO2
	b.	Explain the principle of Solar photovoltaic power generation. What are the main components?	07	L2	CO2
	c.	What are the advantages and applications of Solar PV cells?	06	L2	CO2
Module – 3					
Q.5	a.	Explain the working principle of Wind Energy. What are the classifications of Wind Energy systems?	6	L2	CO3
	b.	Explain with structure of Wind Energy Conversion System (WECS) with functions of each part.	8	L2	CO3

	c.	Derive an expression for power available in the wind.	6	L3	CO3
OR					
Q.6	a.	Classify the biomass conversion technologies. Explain clearly the factors affecting the biogas generation.	8	L2	CO3
	b.	Explain with block diagram of Urban Waste Recovery Management Scheme.	6	L2	CO3
	c.	What are the applications of Gassifiers? Explain with neat sketch, the working of downdraft Gassifiers.	6	L2	CO3
Module – 4					
Q.7	a.	What is the working principle of Tidal energy conversion? Explain the single basin type tidal power plant.	7	L2	CO4
	b.	What are the advantages and limitations of wave energy? Explain the various devices for harnessing wave energy.	8	L2	CO4
	c.	Write a note on the tidal power generation in India.	5	L2	CO4
OR					
Q.8	a.	What is the working principle of OTEC plants? Explain the OTEC system based on open cycle plant.	7	L2	CO4
	b.	State the merits and demerits of OTEC plants. Describe the closed cycle OTEC plants.	7	L2	CO4
	c.	State the types of Tidal energy schemes. Discuss the relative merits and demerits of Tidal power.	6	L2	CO4
Module – 5					
Q.9	a.	What is fuel cell? Explain the basic principle of fuel cell with reference to $H_2 - O_2$.	7	L2	CO5
	b.	What are classification of fuel cells? Explain the Hydrogen energy storage and applications.	8	L2	CO5
	c.	Write a note on Zero energy concepts.	5	L2	CO5
OR					
Q.10	a.	Explain the different hydrogen production technologies.	8	L2	CO5
	b.	Explain the advantages and disadvantages of fuel cells.	6	L2	CO5
	c.	Explain the problems associated with hydrogen energy.	6	L2	CO5

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First Semester B.E./B.Tech. Degree Examination, June/July 2025 Introduction to Internet of Things (IoT)

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	With necessary sketches, explain the classification of computer networks with respect to the following parameters. i) Type of connections ii) Physical Topology	10	L2	CO1
	b.	Illustrate networked communication between two hosts with a neat diagram. Also explain seven layers of OSI model.	10	L3	CO1
OR					
Q.2	a.	Explain six broad categories of IOT networking components along with a neat diagram.	10	L2	CO1
	b.	Differentiate between following: i) M2M versus IoT ii) IoT versus CPS iii) IoT versus WoT	10	L3	CO1
Module - 2					
Q.3	a.	Explain the classification of sensor based on the i) Power requirements ii) Sensor output iii) Property to be measured	10	L2	CO2
	b.	Describe the different sensing types divided in to four different categories.	10	L2	CO2
OR					
Q.4	a.	Define Actuator and its mechanism. Explain different types of actuators.	10	L2	CO2
	b.	Discuss the major factors that influence the choice of sensors in IOT based sensing solution.	10	L3	CO2
Module - 3					
Q.5	a.	Explain the types of data involved in IoT systems based on the following parameters. i) Based on data Format ii) Based on processing urgency	10	L2	CO3
	b.	In detail explain the two types processing topologies mentioned below: i) Onsite processing ii) Off site processing	10	L2	CO3
OR					
Q.6	a.	With a typical outline diagram of an IoT deployment, briefly explain the classification of offload location types.	10	L2	CO3
	b.	Explain the important factors considered for IOT device design and selection considerations.	10	L2	CO3

Module – 4

Q.7	a.	Define virtualization. Discuss the advantages of virtualization from the perspective of end-user and CSP with suitable examples.	10	L3	CO4
	b.	Explain service model and deployment model with respect to cloud model.	10	L2	CO4

OR

Q.8	a.	What is service level agreement? Explain the importance of SLA with its different metrics.	10	L2	CO4
	b.	Write a short note on : i) Cloud Sim ii) Cloud Analyst	10	L2	CO4

Module – 5

Q.9	a.	Explain the architecture of vehicular IOT and its sublayers and components.	10	L2	CO3
	b.	Briefly explain the architectural layers and components of healthcare IoT.	10	L2	CO3

OR

Q.10	a.	Discuss the advantages and challenge of machine learning.	10	L2	CO3
	b.	With a neat sketch, explain the architecture of Ambusens system and its hardware.	10	L2	CO3



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BETCK105J

First Semester B.E./B.Tech. Degree Examination, June/July 2025 Introduction to Embedded Systems

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks, L: Bloom's level, C: Course outcomes.

		Module - 1	M	L	C
Q.1	a.	Classify embedded system based on complexity and performance and give 2 examples for each category.	06	L2	CO1
	b.	With diagram, list the sequence of operations for communicating with an I2C slave device.	08	L2	CO1
	c.	Explain the use of following devices in an embedded system: i) Opto-coupler ii) Relay	06	L2	CO1
OR					
Q.2	a.	Discuss the purpose of embedded system.	06	L1	CO1
	b.	Explain the role of following devices/circuits in an embedded system: i) Brown out protection circuit ii) Watchdog timer	08	L2	CO1
	c.	Briefly explain the core of an embedded system.	06	L2	CO1
Module - 2					
Q.3	a.	Explain the important characteristics of an embedded system.	06	L2	CO2
	b.	With diagram, explain the parts and working of washing machine.	08	L2	CO2
	c.	Discuss the non operational quality attributes of an embedded system.	06	L1	CO2
OR					
Q.4	a.	Explain the different communication buses and Electronic Control Units (ECUs) used in automotive applications.	06	L2	CO2
	b.	With Product Life Cycle (PLC) curve, explain the different phases of an embedded product.	08	L2	CO2
	c.	Discuss the operational quality attributes of an embedded system.	06	L1	CO2
Module - 3					
Q.5	a.	With diagram, explain open collector configuration. Mention its advantages.	08	L2	CO3
	b.	Draw the FSM model for: i) Automatic seat belt warning system ii) Timer	08	L2	CO3
	c.	Write VHDL description of D flip-flop.	04	L1	CO4

OR

Q.6	a.	Briefly explain the fundamental issues in hardware software co-design.	08	L2	CO3
	b.	With flow diagram, explain various steps involved in HDL based VLSI design process.	08	L2	CO4
	c.	Define decoder. Draw the logic circuit and truth table of 3 to 8 decoder.	04	L1	CO3

Module – 4

Q.7	a.	With diagram, explain monitor program based firmware debugging and its features.	08	L2	CO2
	b.	Explain the super loop based approach for embedded firmware design. Mention its advantages.	08	L2	CO3
	c.	Mention the details stored in an object file.	04	L1	CO3

OR

Q.8	a.	Define simulator. Describe the features, advantages and limitations of simulator based debugging.	08	L2	CO2
	b.	With diagram, explain the steps involved in conversion of a program written in assembly language to machine language.	08	L2	CO3
	c.	Mention the advantages and limitations of high level language based development.	04	L1	CO3

Module – 5

Q.9	a.	Draw the basic operating system architecture and explain.	08	L2	CO5
	b.	Describe multitasking. Explain different types of multitasking.	08	L2	CO5
	c.	Differentiate between threads and process.	04	L1	CO5

OR

Q.10	a.	With diagram, explain the structure and memory organization of a process.	08	L2	CO5
	b.	Three processes with process IDs P_1 , P_2 , P_3 with estimated completion time 6, 4, 2 milliseconds respectively enter the ready queue together in the order P_1 , P_2 , P_3 . Calculate the waiting time and Turn Around Time (TAT) for each process and average waiting time and turn around time in round robin scheduling with time slice = 2 ms.	08	L2	CO5
	c.	Mention the factors to be considered for the selection of a scheduling criteria.	04	L1	CO5



8. Added to the Preamble by the 42nd Constitutional Amendment :
 a) Republic b) Secular c) Federal d) Justice
9. "Socialist" in the Preamble means :
 a) State ownership of all property
 b) Equal wealth for all
 c) Commitment to social and economic equality
 d) Absence of religion
10. This is not a Fundamental Right :
 a) Right to Equality b) Right to Property
 c) Right to Freedom d) Right against Exploitation
11. Fundamental Rights can be suspended :
 a) When elections are held in the nation b) During a national emergency
 c) When Parliament is dissolved d) During the President's rule in states
12. _____ contains the Directive Principles of State Policy (DPSPs).
 a) Part II b) Part III c) Part IV d) Part V
13. DPSP's aim to establish :
 a) Religious and Wealth - Oriented b) Capitalist and Military
 c) Welfare and Egalitarian d) Monarchical and Rigid
14. Fundamental Duties were added to the Constitution through :
 a) 42nd Amendment, 1976 b) 44th Amendment, 1978
 c) 86th Amendment, 2002 d) 73rd Amendment, 1992
15. Indian President is elected by the :
 a) Direct vote of Citizens
 b) Members of Parliament only
 c) Electoral College of MPs and MLAs
 d) Prime Minister's office recommendation
16. The Union Cabinet is collectively responsible to :
 a) The President b) The Supreme Court
 c) The Rajya Sabha d) The Lok Sabha
17. Scope of Fundamental Duties in modern Indian society is :
 a) They provide a legal basis for elections
 b) They are moral obligations to strengthen national unity
 c) They are punished for not obeying laws
 d) They replace Fundamental Rights
18. What is the present strength of the Lok Sabha as on 2025?
 a) 500 b) 530 c) 560 d) 545
19. Rajya Sabha MP's are elected for the term of :
 a) 3 years b) 5 years c) 6 years d) 4 years

20. "Zero Hour" in Parliament takes place at :
- Time after lunch break
 - Time before the lunch break
 - Time immediately after the question hour
 - Time for budget presentation
21. The Supreme Court of India was established on :
- 12th January 1950
 - 15th August 1947
 - 26th January 1950
 - 26th November 1949
22. Composition of a Constitution Bench of the Supreme Court is :
- At least 3 judges
 - At least 5 judges
 - At least 2 judges
 - At least 4 judges
23. What is Judicial Activism?
- When judges contest elections
 - When judiciary actively makes laws
 - When judiciary interprets and enforces rights proactively, especially in public interest
 - When judiciary refuses to hear PILs.
24. Governor appointment by :
- Chief Minister
 - Prime Minister
 - President of India
 - Speaker of the State Assembly
25. After Governor, Executive power at the state level lies with the :
- Governor
 - Chief Justice
 - Chief Minister
 - Speaker
26. The following is true about the Vidhan Parishad (Legislative Council) :
- It exists in all Indian States
 - It is elected by the people directly
 - It is a permanent house like Rajya Sabha
 - It is more powerful than Vidhan Sabha
27. The Constitutional head of the State :
- Speaker
 - Chief Minister
 - Governor
 - State Cabinet
28. Which body conducts free and fair elections in India?
- Supreme Court
 - President
 - Election Commission of India
 - Cabinet Secretariat
29. To contest in a Vidhan Sabha (State Legislative Assembly) election one should have reached the age of :
- 18 years
 - 21 years
 - 25 years
 - 30 years
30. Amendment made the Right to Education a Fundamental Right :
- 42nd Amendment
 - 44th Amendment
 - 86th Amendment
 - 73rd Amendment
31. 42nd Amendment Act, 1976 is known for its :
- Reducing Fundamental Rights
 - Introducing Panchayati Raj
 - Making the constitution more rigid
 - Making India a socialist and secular republic



32. _____ allows the President to declare National Emergency :
 a) Article 352 b) Article 356 c) Article 360 d) Article 365
33. What type of emergency is declared due to financial instability?
 a) State Emergency b) National Emergency
 c) President's Rule d) Financial Emergency
34. Constitution Day is :
 a) 15th August b) 26th January c) 26th November d) 2nd October
35. The Father of our Nation :
 a) Mahatma Gandhi b) Jawaharlal Nehru c) B.R. Ambedkar d) Rajendra Prasad
36. _____ parts are there in the Indian Constitution (originally) :
 a) 20 b) 22 c) 25 d) 30
37. _____ of the Constitution contains Fundamental Rights.
 a) Part I b) Part III c) Part IV d) Part V
38. _____ Fundamental Rights are provided in the Constitution.
 a) 5 b) 6 c) 7 d) 8
39. Preamble of the Constitution declare India to be a _____
 a) Democratic Republic
 b) Sovereign Socialist Secular Democratic Republic
 c) Federal Nation
 d) Kingdom of India
40. The head of the Indian State is _____
 a) Prime Minister b) Chief Justice c) President d) Governor
41. _____ is the lengthiest written Constitution in the World.
 a) USA Constitution b) UK Constitution
 c) Indian Constitution d) Canadian Constitution
42. Article _____ deals with the Right to Equality.
 a) Article 14 b) Article 19 c) Article 21 d) Article 32
43. _____ schedules are there in the Indian Constitution as on 2025.
 a) 10 b) 12 c) 15 d) 8
44. President of India is elected by the _____
 a) Citizens only
 b) Parliament only
 c) Elected members of Parliament and State Legislatures
 d) Prime Minister
45. The term of the Lok Sabha is _____
 a) 4 years b) 5 years c) 6 years d) 3 years



46. _____ added Fundamental Duties of the Constitution.
a) 42nd Amendment b) 44th Amendment c) 52nd Amendment d) 86th Amendment
47. Minimum age to become the President of India is _____
a) 25 years b) 30 years c) 35 years d) 40 years
48. CJI – Chief Justice of India is appointed by the _____
a) Prime Minister b) Speaker of Lok Sabha
c) President of India d) Law Minister
49. Who conducts parliament elections?
a) Election commission b) Government of India
c) Parliament office d) Supreme Court
50. Article 44 is about _____
a) Supreme Court b) Legal Service
c) Uniform Civil Code d) Article 370.



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Question Paper Version : D

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Balake Kannada

Time: 1 hr.]

[Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries one mark.
2. Use only Black ball point pen for writing / darkening the circles.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.
4. Darkening two circles for the same question makes the answer invalid.
5. Damaging/overwriting, using whiteners on the OMR sheets are strictly prohibited.



Note : Choose the appropriate answer :

1. Hugu : Hogona :: Ba : _____
a) Baralla b) Hodanu c) Barona d) Bandanu
2. Kalegu + inda : balegininda :: Mane + inda : _____
a) Maneyinda b) Manege c) Maneyannu d) Maneyalli
3. Kudi : Kudiyiri :: Haaki : _____
a) Haakona b) Hogona c) Beku d) Hakiri

Note : Write the English word for Kannada work :

4. Aata : Adidanu :: Oota : _____
a) Odidanu b) Madidanu c) Enu illa d) Mane
5. Pramaana : _____
a) Very good b) Promise c) Purpose d) Thankyou
6. Ganita : _____
a) Biology b) Physics c) Mathematics d) English
7. Bili : _____
a) Black b) Red c) Yellow d) White
8. Dodda : _____
a) Small b) Big c) Fat d) Thin

9. Kodabeda : _____
a) Give me b) Give us c) Give d) Don't give
10. Kaagada : _____
a) Paper b) Computer c) English d) Tamil
11. Samskruti : _____
a) Festival b) Haritage c) Weep d) Culture
12. Vidyarthi : _____
a) Teacher b) Principal c) Head d) Student
13. Navilu : _____
a) Hen b) Peacock c) Ant d) Parrot
14. Banna : _____
a) White b) Banana c) Colour d) Red
- Hendati : _____
a) Husband b) Wife c) Sister d) Son
16. Idu _____
a) This b) That c) What d) Who
17. Yelli _____
a) Where b) Which c) Your d) Our
18. Namma _____
a) Our b) Your c) There d) Where
19. Navu _____
a) We b) Do c) It d) He
20. Nata _____
a) Actor b) Actress c) Scientist d) None of these
21. Hosadu _____
a) Old b) New c) Must d) Just
22. Vandanevalu _____
a) Good night b) Thank you c) Go d) Went
23. Railu _____
a) Train b) Bus c) Scooter d) Car
24. Hogabeda _____
a) Go b) Don't go c) Don't come d) Come
25. Oodu _____
a) Play b) Run c) Were d) Call
26. Kaalu _____
a) Leg b) Hand c) Finger d) Stomach



27. Malagu _____
a) Keep b) Sleep c) Walk d) Do
28. Hogu _____
a) Go b) Open c) Put d) Do

Note : Write Kannada word for the given English word and English word for the given Kannada word :

29. Holiday _____
a) Raje b) Festival c) Health d) Celebrations
30. Song _____
a) Nrutya b) Vignana c) Kadime d) Haaddu
31. Kai _____
a) Neck b) Hand c) Head d) Leg
32. Tale _____
a) Hand b) Head c) Ear d) Nose
33. Tarakaari _____
a) Banana b) Vegetable c) Fruit d) Milk
34. Habba _____
a) Marriage b) Festival c) Heritage d) Ritual
35. Magalu _____
a) Father b) Daughter c) Son d) Mother
36. Mane _____
a) House b) Temple c) Hospital d) Garden
37. Had your lunch? Choose the correct answer in Kannada.
a) Beda b) Aitu c) Oota d) Thindi
38. Thota _____
a) House b) Garden c) Gowdon d) Shop
39. Granthalaya means _____
a) Class room b) Library c) Temple d) Lab
40. "Arogya" means
a) Shelter b) House c) Health d) Wealth
41. "Ishta Illa" means
a) I will not do b) I don't like c) I will do d) Nothing
42. "Good Night" means.
a) Shubha Ratri b) Danya vadagalu c) Kshamisi d) None of these



43. Animal _____
a) Praani b) Aane c) Jinke d) Kuri
44. Fruit _____
a) Hannu b) Talakari c) Mara d) Gida
45. Teacher _____
a) Farmer b) Gurugalu c) Manthre d) Sainika

Note : Choose the correct word to compare the sentence :

46. Ivaru Nanna _____
a) Sari Ide b) Tande c) Chikkadu d) Doddadu
47. Nanna _____ Mysuru.
a) Kaalu b) ishta c) Nagu d) Ooru
48. Neenu _____ Baa
a) Akka b) Bega c) Auna d) Tande
49. Nanage kannada _____
a) Red b) Yellow c) Orange d) Gottu
50. Nanu _____ Aadide.
a) Aata b) Oota c) Malagu d) Galate



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First/Second Semester B.E/B.Tech. Degree Examination, June/July 2025

ಸಂಸ್ಕೃತಿಕ ಕನ್ನಡ

(COMMON TO ALL BRANCHES)



[Max. Marks: 50]

Time: 1 hrs.]

ಸೂಚನೆಗಳು

1. ಎಲ್ಲ ಜಂ ಪ್ರಶ್ನೆಗಳಿಗೂ ಉತ್ತರಿಸಿರಿ. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಒಂದು ಅಂಕ.
2. ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಯು.ಎಸ್.ಎನ್ ಸಂಖ್ಯೆ ಹಾಗೂ ಪಶ್ಚಿಮ ಪತ್ರಿಕೆಯ ಶ್ರೇಣಿಯನ್ನು ಅಂದರೆ A, B, C ಅಥವಾ D ಯನ್ನು ತಪ್ಪಿಲ್ಲದಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಗುರುತಿಸುವುದು ಅಭ್ಯರ್ಥಿಯ ಜವಾಬ್ದಾರಿಯಾಗಿರುತ್ತದೆ.
3. ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ನಿಗದಿಪಡಿಸಿರುವ ಸ್ಥಳದಲ್ಲಿ ಭರ್ತಿಮಾಡದೆ ಹಾಗೆಯೇ ಬಿಟ್ಟಲ್ಲಿ ಅಥವಾ ಭರ್ತಿಮಾಡಿದ ಮಾಹಿತಿಯಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಿದ್ದಲ್ಲಿ ಅಂತಹ ಉತ್ತರ ಪತ್ರಿಕೆಗಳನ್ನು ರದ್ದು ಪಡಿಸಲಾಗುವುದು.
4. ಕೇವಲ ಒಂದು ಉತ್ತರವನ್ನು ಮಾತ್ರ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಗುರುತಿಸತಕ್ಕದ್ದು. ಒಂದೆ ಪ್ರಶ್ನೆಗೆ ಎರಡು ಉತ್ತರವನ್ನು ಗುರುತಿಸುವುದು ಅಮಾನ್ಯ.
5. ಎಲ್ಲಾ ಉತ್ತರಗಳನ್ನು ನಿಮಗೆ ಒದಗಿಸಲಾದ ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯ ಹಾಳೆಯ ಮೇಲೆ ಕಪ್ಪು ಅಥವಾ ನೀಲಿ ಶಾಹಿಯ ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ನಿನಿಂದ ಗುರುತು ಮಾಡಬೇಕು.

1. ಭಾರತದಲ್ಲಿ ಬೇರೆ ಬೇರೆ ಬಣ್ಣಗಳನ್ನು ನೀಡುವ ಸುಮಾರು ____ ಗಿಡಗಳಿವೆ.
a) 200 b) 300 c) 500 d) 600
2. ಕಣ್ಣು ಕಣದಲ್ಲಿ ಮಣ್ಣವನ್ನು ಹೊತ್ತು ಶ್ರಮದಿಂದ ಯಾರು ಗೂಡನ್ನು ಕಟ್ಟುತ್ತಾರೆ?
a) ಹಾವುಗಳು b) ಗೆದ್ದಲ ಹುಳುಗಳು c) ಇರುವೆಗಳು d) ಗೊದ್ದಗಳು
3. ದ.ರಾ.ಬೇಂದ್ರೆ ಅವರ ಕಾವ್ಯನಾಮ ಯಾವುದು?
a) ಬೇಂದ್ರೆ b) ಶ್ರೀರಂಗ
c) ಅಂಬಿಕಾತನಯದತ್ತ d) ಡಿ.ವಿ.ಜಿ
4. ತಾಳ ತಂಬೂರಿಯನ್ನು ಹಿಡಿದು ಕೀರ್ತನೆಗಳನ್ನು ಹಾಡಿದವರು
a) ವೃದ್ಧರು b) ದಾಸರು
c) ವೈಷ್ಣವರು d) ಅಂಧರು

5. ಕುವೆಂಪುರವರಿಗೆ ನೀಡಿರುವ ಬಿರದು ಯಾವುದು?
 a) ಕಥೆಗಾರ
 b) ರಾಷ್ಟ್ರಕವಿ
 c) ಲೇಖಕ
 d) ಸಾಹಿತಿ
6. ಕರ್ನಾಟಕ ರಾಜ್ಯವು ಉದಯವಾದ ವರ್ಷ
 a) 1950
 b) 1948
 c) 1956
 d) 1962
7. ಕುವೆಂಪುರವರ ಜನ್ಮ ಸ್ಥಳ ಯಾವುದು?
 a) ತೀರ್ಥಹಳ್ಳಿ
 b) ಗುಲಬರ್ಗಾ
 c) ತುಮಕೂರು
 d) ಬೆಂಗಳೂರು
8. ಹೆಂಡತಿಯ ಕಾಗದ ಪದ್ಯವನ್ನು ಯಾವ ಕಾವ್ಯ ಸಂಕಲನದಿಂದ ಆಯ್ಕೆ ಮಾಡಲಾಗಿದೆ?
 a) ರಾಮಾಯಣ ದರ್ಶನಂ
 b) ಮೈಸೂರು ಮಲ್ಲಿಗೆ
 c) ನಾಕುತಂತಿ
 d) ನಾದಲೀಲೆ
9. ಜೀವನದ ಪರ್ಯಂತ ಜೀತದ ಆಳಾಗಿ ದುಡಿದರೂ ಒಂದು ತುಂಡು ___ ಪಡೆಯಬೇಕೆಂಬ ಹಂಬಲ ಕನಸಾಗ ಉಳಿಯುತ್ತದೆ.
 a) ಬಾನು
 b) ಭೂಮಿ
 c) ಆಹಾರ
 d) ಮಾಂಸ
10. ಯಾವ ಜಿಲ್ಲೆಯಲ್ಲಿ ಕೃಷ್ಣರಾಜಸಾಗರ ನೆಲೆಗೊಂಡಿದೆ?
 a) ಮಂಡ್ಯ
 b) ಹಾಸನ
 c) ಬೆಳಗಾವಿ
 d) ಮೈಸೂರು
11. ಶಿವಮೊಗ್ಗ ಜಿಲ್ಲೆಯ ತಾಳಗುಪ್ಪದ ಗಿರಿಜನ ಆಶ್ರಮ ಶಾಲೆಯ ಮಾಸ್ತರ ಹೆಸರೇನು?
 a) ಹುಚ್ಚಪ್ಪ
 b) ಕರಿಯಪ್ಪ
 c) ನಾಗಣ್ಣ
 d) ಸೋಮಣ್ಣ
12. ಕುಣಬಿಯಲ್ಲಿ ಜನಸಂಖ್ಯೆ ಎಷ್ಟು?
 a) 180
 b) 140
 c) 150
 d) 160
13. ಭಾರತದಲ್ಲಿ ತಯಾರಾದ ಬಟ್ಟೆಗೆ ಯಾವ ದೇಶದಲ್ಲಿ ಅಪಾರ ಬೇಡಿಕೆಯಿತ್ತು?
 i) ಗ್ರೀಸ್ ii) ಏಷಿಯಾ ಮೈನರ್ iii) ಅರೇಬಿ iv) ಮೆಡಿಟರೇನಿಯನ್
 a) ii, iii, iv
 b) i, ii
 c) i, iv
 d) i, ii, iii, iv
14. ಕ್ರಿ. ಪೂ ___ ವರ್ಷಗಳಿಂದಲೂ ಭಾರತೀಯ ಕರಕುಶಲ ಕಲೆಗಳಿಗೆ ಅಪಾರ ಬೇಡಿಕೆ ಇದೆ.
 a) 1400
 b) 1500
 c) 1700
 d) 1100

15. ಹೋಳಿ ಹುಣ್ಣಿಮೆಯ ಹಬ್ಬ ಬಂದರೆ ಕುಣವಿಗಳು ಯಾವ ನರ್ತನೆ ಮಾಡುತ್ತಾರೆ.
a) ನಿಗ್ಗಾ b) ಹುಲಿ c) ಬಿಹು d) ಲಾವಣಿ
16. ಕುಣವಿಯಲ್ಲಿ ಎಷ್ಟು ಮಕ್ಕಳಿಗೆ ಶಾಲೆಯ ಕಲ್ಪನೆಯೂ ಇಲ್ಲ
a) 40 b) 10 c) 50 d) 30
17. ಆರ್ಕಳದ ಪರ್ವತ ಶ್ರೇಣಿಯ ಮೇಲೆ ಮಗಾನ್ ಎಂಬ ಹಳ್ಳಿಯಲ್ಲಿ _____ ಜನಾಂಗ ವಾಸವಾಗಿದ್ದರು.
a) ಕುಣವಿ b) ಸಂತಾಲರು c) ಬಿಲ್ಲರು d) ನಾಗರು
18. ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಇದರ ವಿವಿಧ ರೂಪಗಳಲ್ಲಿ ಸುಮಾರು _____ ಜನರು ಅಡುನುಡಿಯಾಗಿ ಬಳಸುತ್ತಿದ್ದಾರೆ.
a) 60 ದಶಲಕ್ಷ b) 50 ದಶಲಕ್ಷ c) 60 ಲಕ್ಷ d) 50 ಲಕ್ಷ
19. 1957-58 ರಲ್ಲಿ ಬೀದರ್ ನಗರದಲ್ಲಿ ನಡೆದ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಮ್ಮೇಳನದ ಅಧ್ಯಕ್ಷರು ಯಾರು?
a) ನರಸಿಂಹಾಚಾರ್ಯ b) ಶಶಿಕುಮಾರ್
c) ಕೃಷ್ಣರಾಜ ಒಡೆಯರ್ d) ವೆಂಕಟರಾಯರು
20. ಅನ್ಯರನ್ನು ನಗಿಸುವುದು ಏನೆಂದು ಡಿ.ವಿ.ಜಿ ಅವರು ತಮ್ಮ ಪದ್ಯದಲ್ಲಿ ಹೇಳಿದ್ದಾರೆ?
a) ಅತಿಶಯ ಧರ್ಮ b) ಧರ್ಮವಲ್ಲ
c) ಪರಧರ್ಮ d) ಯಾವುದು ಅಲ್ಲ.
21. ವಿಶ್ವೇಶ್ವರಯ್ಯನವರು _____ ರಲ್ಲಿ ಸ್ವಂತ ಇಚ್ಛೆಯಿಂದ ದಿವಾನಗರಿಯನ್ನು ಬಿಟ್ಟುಕೊಟ್ಟರು.
a) 1917 b) 1919 c) 1916 d) 1918
22. ಕರ್ನಾಟಕದ ರಾಜಧಾನಿ ಯಾವುದು?
a) ಬೆಳಗಾವಿ b) ಹುಬ್ಬಳ್ಳಿ c) ಬೆಂಗಳೂರು d) ಮೈಸೂರು
23. ಕುರುಡು ಕಾಂಚಾಣವನ್ನು ಯಾವ ಕಾವ್ಯ ಸಂಕಲದಿಂದ ಆಯ್ದುಕೊಳ್ಳಲಾಗಿದೆ?
a) ನಾದಲೀಲೆ b) ಬಯಲು ಸೀಮೆ
c) ಸಂಗೀತಪುರ d) ಆರ್ಕಳ
24. ಹಾಡುವಳ್ಳಿಗೆ ಹಿಂದೆ ಇದ್ದ ಇನ್ನೊಂದು ಹೆಸರೇನು?
a) ನಾಗವಳ್ಳಿ b) ಬಯಲು ಸೀಮೆ c) a) ಮತ್ತು b) d) ಸಂಗೀತಪುರ
25. ಗೋಪಣ್ಣನವರ ಹೆಂಡತಿಯ ಹೆಸರೇನು?
a) ರೇಣುಕಾ b) ಲಕ್ಷ್ಮಮ್ಮ c) ನಾಗಮ್ಮ d) ರುಕ್ಮಿಣಮ್ಮ



26. ದುಡಿಮೆಯ ಜೀವನಕ್ಕೆ ತಮ್ಮನ್ನು ಅರ್ಪಿಸಿಕೊಂಡು ಯಾರು ತಮ್ಮ ಅನುಭವದಿಂದ ಜಾನಪದಗಳನ್ನು ನಿರೂಪಿಸಿದ್ದಾರೆ?
 a) ದಾಸರು
 b) ಸಂತರು
 c) ಶರಣರು
 d) ಗ್ರಾಮೀಣ ಜನತೆ
27. ಕನ್ನಡ ಏಕೀಕರಣದ ಬಗ್ಗೆ ಹೇಳಿದ ಬಳ್ಳಾರಿ ಜಿಲ್ಲೆಯ ಕಲೆಕ್ಟರ ಯಾರು?
 a) ಮದರ್ ಥೆರೇಸಾ
 b) ಸರ್ ಥಾಮಸ್ ಶೆಲ್ಟಿ
 c) ಸರ್ ಕ್ಲೈವ್
 d) ಸರ್ ಥಾಮಸ್ ಮನ್ರೊ
28. ಹಾಡುವಳ್ಳಿಯಿಂದ _____ ಕಿ.ಮೀ ದೂರದಲ್ಲಿ ಆರ್ಕಳ ಎಂಬ ಜಾಗವಿದೆ.
 a) 6 ಕಿ.ಮೀ
 b) 4 ಕಿ.ಮೀ
 c) 5 ಕಿ.ಮೀ
 d) 8 ಕಿ.ಮೀ
29. “ರೂಢಿಯನ್ನು ಕಟ್ಟುವುದು ಕಷ್ಟ ಮುರಿಯುವುದು ಇನ್ನೂ ಕಷ್ಟ” ; ಮರೆಯುವುದಂತೂ ಇನ್ನೂ ಕಷ್ಟ” ! ಇದು ಯಾರು ಬಳಸುವ ಸಾಲು
 a) ವಸುಧೇಂದ್ರ
 b) ಡಾ.ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ
 c) ಎ.ಎಸ್. ಮೂರ್ತಿರಾವ್
 d) ಡಾ. ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ
30. ಜಾನಪದ ಅಕಾಡೆಮಿಯ ಅಧ್ಯಕ್ಷರು ಯಾರು?
 a) ಶ್ರೀ.ಎಸ್. ಕೆ ಕರೀಂಖಾನ್‌ರವರು
 b) ಡಾ. ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ
 c) ಇ.ಎಸ್. ಮೂರ್ತಿರಾವ್
 d) ವಸುಧೇಂದ್ರ
31. ಶರಣರು ಯಾರ ಭಕ್ತರು?
 a) ಶಿವ
 b) ಹರಿ
 c) ಬ್ರಹ್ಮ
 d) ಇಂದ್ರ
32. ದೀನದುರ್ಬಲರ ಪಾಲಿಗೆ ನಾವು ಏನಾಗಬೇಕು?
 a) ಬೆಲ್ಲ ಸಕ್ಕರೆ
 b) ಕಲ್ಲು ಮುಳ್ಳು
 c) ಹುಲ್ಲಾಗಬೇಕು
 d) ಮಲ್ಲಿಗೆ
33. ವೈಷ್ಣವ ದರ್ಷನಕ್ಕೆ ಜೈನ ದರ್ಷನಕ್ಕೆ ಭೇದವಿಲ್ಲವೆಂದು ಯಾರು ಹೇಳಿದ್ದಾರೆ?
 a) ವಿಷ್ಣುವರ್ಮ
 b) ಧರ್ಮರಾಯ
 c) ಬಸವಣ್ಣ
 d) ಬುಕ್ಕರಾಯ
34. ಹೊಸಬಾಳಿನ ಗೀತೆ ಪದ್ಯವನ್ನು ಬರೆದ ಕವಿ ಯಾರು?
 a) ದ.ರಾ.ಬೇಂದ್ರೆ
 b) ಕುವೆಂಪು
 c) ಕನಕದಾಸರು
 d) ಡಿ.ವಿ.ಜಿ



35. ಸಹಗಮನ ಮಾಡುವ ಸ್ತ್ರೀಯರನ್ನು ಏನೆಂದು ಕರೆಯುತ್ತಾರೆ.
 a) ಮಹಾಸತಿ
 b) ಸತಿ
 c) ಗೌರಿ
 d) ಸತಿಯರು
36. ಯಾವುದು ಲಿಖಿತ ಸ್ವರೂಪದಲ್ಲಿ ಇಲ್ಲದೆ ಮೌಖಿಕ ರೂಪದಲ್ಲಿ ಇರುತ್ತದೆ?
 a) ಜಾನಪದ
 b) ವಚನಗಳು
 c) ತತ್ವಪದ
 d) ಗೀತೆ
37. 1955 ರಲ್ಲಿ ನಡೆದ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಷತ್ತಿನ ಸಮ್ಮೇಳನ ಎಲ್ಲಿ ನಡೆಯಿತು?
 a) ಬೆಳಗಾವಿ
 b) ಬೆಂಗಳೂರು
 c) ರಾಮನಗರ
 d) ರಾಯಚೂರು
38. ಮನೆಯವರಿಗೆ ಯಾವುದು ಸಹಜವಾದ ಧರ್ಮವೆಂದು ಡಿ.ವಿ.ಜಿ ಅವರು ಹೇಳಿದ್ದಾರೆ?
 a) ಅಳುವುದು
 b) ನಗುವುದು
 c) ನಗಿಸುವುದು
 d) ದುಮ್ಮಾನಪಡಿಸುವುದು
39. ಹಳೆಯ ತತ್ವಗಳಿಂದ ಕೂಡಿದ ಧರ್ಮ ಹೊಸ _____ ಕೂಡಿದರೆ ಚೆನ್ನ.
 a) ಭಕ್ತಿಯಿಂದ
 b) ಶಕ್ತಿಯಿಂದ
 c) ಯಕ್ತಿಗಳಿಂದ
 d) ದೈವ
40. ಕುರುಡ ಕಾಂಚಾಣ ಕವನವನ್ನು ಬರೆದವರು ಯಾರು?
 a) ದ.ರಾ.ಬೇಂದ್ರೆ
 b) ಕುವೆಂಪು
 c) ಕನಕದಾಸರು
 d) ಪುರಂದರ ದಾಸರು
41. ಕನ್ನಡ ಭಾಷೆಗೆ ಎಷ್ಟು ಜ್ಞಾನಪೀಠ ಪ್ರಶಸ್ತಿಗಳು ಲಭಿಸಿವೆ?
 a) 3
 b) 5
 c) 6
 d) 8
42. ಧರ್ಮ ಸಹಿಷ್ಣುತೆ ಕನ್ನಡಿಗರ _____
 a) ಪ್ರತಿಷ್ಠೆ
 b) ಪರಂಪರೆ
 c) ಹಿರಿಮೆ
 d) ಗೌರವ
43. ಪ್ರೊ. ಹಂಪ ನಾಗರಾಜಯ್ಯನವರು ಎಲ್ಲಿ ಜನಿಸಿದರು?
 a) ಹಂಪಸಂದ್ರ
 b) ಹಂಪಿ
 c) ಶ್ರೀರಂಗಪಟ್ಟಣ
 d) ಹಾಸನ



44. ಸನಾತನವಾದ ಮಹಾವ್ಯಕ್ತದಂತೆ ಆಳವಾಗಿ ಬೇರು ಬಿಟ್ಟು ಸ್ಥಿರವಾಗಿ ನಿಂತಿರುವುದು ಈ _____ ಮುಖ್ಯ ಲಕ್ಷಣ.
 a) ರಾಜ್ಯದ
 b) ಸಂಸ್ಕೃತಿಯ
 c) ಮಣ್ಣಿನ
 d) ನಾಡಿನ
45. ರಾ.ಹ. ದೇಶಪಾಂಡೆಯವರ ಪ್ರಯತ್ನದಿಂದ ವಿದ್ಯವರ್ಧಕ ಸಂಘವು ಯಾವ ವರ್ಷದಂದು ಸ್ಥಾಪನೆಯಾಯಿತು.
 a) 1945
 b) 1905
 c) 1890
 d) 1985
46. ' ಕರ್ನಾಟಕ ಗತವೈಭವ ' ಈ ಗ್ರಂಥವನ್ನು ರಚಿಸಿದವರು
 a) ಕುವೆಂಪು
 b) ಆಲೂರು ವೆಂಕಟರಾಯರು
 c) ದ.ರಾ. ಬೇಂದ್ರೆ
 d) ಶಿವರಾಮ ಕಾರಂತ
47. ಲಿಪಿಗಳ ರಾಣಿ ಎಂದು ಯಾವ ಲಿಪಿಯನ್ನು ಕರೆದಿದ್ದಾರೆ?
 a) ಹಿಂದಿ
 b) ಕನ್ನಡ
 c) ತಮಿಳು
 d) ತೆಲುಗು
48. ಬಸವಣ್ಣನವರ ವಚನಗಳ ಅಂಕಿತನಾಮ ಯಾವುದು?
 a) ಸಂಗಮರಾಯ
 b) ಕೂಡಲ ದೇವರಾಯ
 c) ಕೂಡಲಸಂಗಮದೇವ
 d) ಗುಹೇಶ್ವರ ದೇವ
49. ಕನ್ನಡ ಭಾಷೆಯು ಸುಮಾರು _____ ವರ್ಷಗಳಿಂದಲೂ ಕ್ರಿಯಾಶೀಲ ಭಾಷೆಯಾಗಿದೆ.
 a) ಒಂದು ಸಾವಿರ
 b) ಎರಡು ಸಾವಿರ
 c) ಐದುನೂರು
 d) ಏಂಟುನೂರು
50. ಅಡವಿಯೊಳಗೆ ಅಡಗಿರುವ ಪ್ರಾಣಿ-ಪಕ್ಷಿಗಳಿಗೆ ಆಹಾರವನ್ನು ನೀಡುವುದು _____
 a) ಪ್ರಕೃತಿ
 b) ದೈವ
 c) ಸರೋವರ
 d) ಮರ

* * * * *

CBCS SCHEME

BIDTK158/258/22BD16

USN

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Question Paper Version : A

First/Second Semester B.E./B.Tech./B.Design Degree Examination,
June/July 2025

Innovation and Design Thinking

Time: 1 hr.

Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

1. Design thinking supports in
 - a) Developing the product
 - b) Developing the strategy
 - c) Developing the process
 - d) All of these
2. What is design considerations are not linked with?
 - a) Products
 - b) Services
 - c) Business
 - d) Computers
3. Design thinking supports in developing product features to improve the services to the customers.
 - a) Yes
 - b) No
4. Design thinkers in an organizations are
 - a) People
 - b) Employees
 - c) Managers
 - d) All of these
5. What are the steps of Design Thinking process?
 - a) Understand > Draw > Ideate > Create > Test
 - b) Empathize > Define > Ideate > Prototype > Test
 - c) Empathize > Design > Implement > Produce > Test
 - d) Understand > Define > Ideate > Produce > Try
6. Which of the below firm is associated the most with design thinking?
 - a) Ikea
 - b) Ideo
 - c) Idea
 - d) Ikei
7. Design thinking helps in?
 - a) Innovation
 - b) Data analytics
 - c) Financial planning
 - d) Operational efficiency

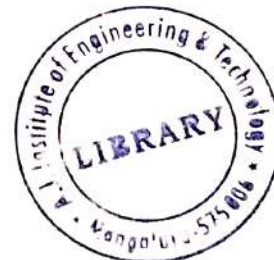
8. During which stage would you consult experts to learn more about the areas of concern and gain an understanding of other people's experiences?
 - a) Prototype
 - b) Define
 - c) Ideate
 - d) Empathize
9. When defining a problem your problem statement should include solutions?
 - a) True
 - b) False
10. Team based design thinking involves
 - a) Right type of team
 - b) Right team culture
 - c) Leadership
 - d) All of these
11. The main uses of a customer journey map are,
 - a) This gives design thinkers a near first-hand experience of what a customer goes through.
 - b) The map can give us the emotional roller coaster of the designer.
 - c) The output of the map is a list of problems that the design techniques involve.
 - d) The map also serves as a visual aid to communicate the situation of the user
12. Which among the below options is the most compelling type of story
 - a) Visual
 - b) Textual
 - c) Graphs
 - d) None of these
13. Journey mapping is also called as _____ mapping.
 - a) Path
 - b) Experience
 - c) Conduct
 - d) Feedback
14. A prototype is a simple experimental model of a proposed solution used to,
 - a) Test ideas
 - b) Validate ideas
 - c) Both (a) and (b)
 - d) None of these
15. Which of the following are not tools of design thinking
 - a) Co-creation
 - b) Prototype
 - c) Mind mapping
 - d) Online marketing
16. Co-creation with respect to design thinking means
 - a) Building a new product with in the available resources.
 - b) Any process that brings users and designers together to work towards a shared goal
 - c) Finding a new market for the product available
 - d) None of these
17. Mind mapping is used for
 - a) Visualize
 - b) Organize
 - c) Classify
 - d) All of these
18. Visualization as a tool of design thinking would involve presenting data through
 - a) Clear presentations
 - b) Images and Stories
 - c) Both (a) and (b)
 - d) None of these
19. The end goal of value chain analysis is to
 - a) Create better value for the customers
 - b) To set common skills and goals for value chain partners
 - c) Both (a) and (b)
 - d) None of these



20. Rapid concept development with reference to design thinking tool refers to,
 - a) New business opportunities
 - b) Faster thinking ability
 - c) Both (a) and (b)
 - d) None of these
21. Procedure models facilitates communication between
 - a) Business Analysts
 - b) Process Partners
 - c) Developers
 - d) All of these
22. In the last few decades business process model has replaced organization's packages, Time and movement (TMS) and Total Quality Management (TQM).
 - a) Yes
 - b) No
23. Identify which is not the advantage of business process modeling from below options
 - a) Improves process communications
 - b) Increase control and consistency
 - c) Improves operational efficiency
 - d) Decreases market-share and in-turn revenues
24. Agile methods are popular in software industry but other industries do not want to pursue those agile methods.
 - a) True
 - b) False
25. Design thinking features include,
 - a) Uses empathy to understand how people feel about using a product or service
 - b) Ultimate goal is to improve customer live and knowledge
 - c) Both (a) and (b)
 - d) None of these
26. Agile method can accommodate changes at any time compared to the waterfall method
 - a) True
 - b) False
27. Design thinking encompasses,
 - a) Feasibility
 - b) Viability
 - c) Desirability
 - d) All of these
28. Where does the information of defining the problem in the define stage come from
 - a) Testing stage
 - b) Prototype stage
 - c) Ideate stage
 - d) Empathy stage
29. What is the meaning of SCRUM?
 - a) Systematic customer resolution unravelling meeting
 - b) Systematic continues recharge unravelling meeting
 - c) Systematic customer redesign unravelling meeting
 - d) Systematic continues recovery unravelling meeting
30. Agile methodology is a practice,
 - a) Continuous iteration of development and testing in the software development process
 - b) Continuous thinking of development and verify the software development process
 - c) Continuous process of thinking and verify the software development process
 - d) Continuous follow up of thinking and design the software development process



31. Strategic management is the process of setting,
 - a) Goals
 - b) Procedures
 - c) Objectives
 - d) All of these
32. Which of the below mentioned is not the practice of integrating design thinking and strategic innovation?
 - a) Reviewing
 - b) Stimulating
 - c) Collaborating
 - d) All of these
33. Sustaining innovation means,
 - a) Concept of improving and growing the existing markets
 - b) Create a new value to the existing market and also create a completely new market
 - c) Both (a) and (b)
 - d) None of these
34. Disruptive innovation means,
 - a) Concept of improving and growing the existing markets
 - b) Create a new value to the existing market and also create a completely new market
 - c) Both (a) and (b)
 - d) None of these
35. Radical innovation refers to,
 - a) a new technology completely disrupts existing business or economy and creates a new business model
 - b) refers to a series of small, gradually built improvements to existing products processes or methods to maintain competitive position over time
 - c) both (a) and (b)
 - d) None of these
36. Architectural innovation is described as the reconfiguration of existing product technologies,
 - a) True
 - b) False
37. In what type of innovation one or more components of a product is changed while the overall design stays the same.
 - a) Architectural innovation
 - b) Modular innovation
 - c) Both (a) and (b)
 - d) None of these
38. Which of the below mentioned is the feature of strategic innovation?
 - a) Concept is based on long term perspective
 - b) To create competitive space for the products and services
 - c) Combines business process with creative solutions to the problems in the organizations
 - d) All of these
39. What are the four quadrants of innovation matrix?
 - a) Radically disruptive-incrementally disruptive
 - b) Radically sustaining-incrementally sustaining
 - c) both (a) and (b)
 - d) None of these



40. Benefits of interaction between the design thinking and strategic innovation in an organization are,
 a) Design thinking helps in developing products and services and in turn strategy of the organization.
 b) Design thinking provides an opportunity to integration of new idea essential for the development of right strategy for the organization.
 c) both (a) and (b)
 d) None of these
41. Mr. Rahul wants to design a new bed that he can sell to nursing homes to use with their patients. However, Rahul doesn't want anything to do with older adults or people with disabilities. According to the design thinking process, Mr. Rahul will face problems because he is missing _____.
 a) Empathy b) Creativity c) Practicality d) Imagination
42. Mr. Ram is creating a new product for university students. He takes a design thinking approach. His first step is addressing who he is creating the product for and conducts research on understanding this target market. What is this step in the design thinking process?
 a) Define b) Ideate c) Empathize d) Prototype
43. Learning goals in design thinking workshop are related to,
 a) Define learning outcomes b) Mapping with the problem statement
 c) Understanding culture of the organization d) Defining learning styles
44. During the design thinking workshop, providing introduction is important to engage participants.
 a) True b) False
45. Closing remarks of the design thinking workshop supports in motivating the participants to apply concepts of design thinking at the workplace.
 a) True b) False
46. Stages of Design thinking workshop are planning stage and workshop stage
 a) True b) False
47. In the stages of design thinking empathy means
 a) Identifying areas of concern in the business
 b) Identifying from the perspective of the employees
 c) Identifying from the perspective of the product
 d) All of these
48. You will interview people to gain an understanding of how they feel during the _____ stage of design thinking.
 a) Test b) Define c) Ideate d) Empathize
49. Prototype should only be demonstrated and tested within the team.
 a) True b) False
50. No alterations are to be made after the testing phase.
 a) True b) False

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Ver-A 5 of 5



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Second Semester B.E./B.Tech. Degree Examination, June/July 2025

Mathematics – II for EEE stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.*
 2. VTU Formula Hand Book is permitted.
 3. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1		M	L	C
Q.1	a. Find the angle between the surface $xy^2z = 3x + z^2$ and $3x^2 - y^2 + 2z = 1$ at the point $(1, -2, 1)$	7	L3	CO1
	b. Evaluate $\text{curl}(\text{curl } \vec{F})$ and $\text{div}(\text{curl } \vec{F})$ if $\vec{F} = x^2yi + y^2zj + z^2xk$	7	L3	CO1
	c. Show that the vector $\vec{F} = \frac{x\vec{i} + y\vec{j}}{x^2 + y^2}$ is both solenoidal and irrotational.	6	L2	CO2
OR				
Q.2	a. Find the total work done by the force $\vec{F} = 3xy\vec{i} - y\vec{j} + 2zx\vec{k}$ in moving a particle around the circle $x^2 + y^2 = 4$.	7	L3	CO1
	b. Using Green's theorem evaluate $\oint_C (xy + y^2)dx + x^2dy$ over the region bounded by the curves $y = x$ and $y = x^2$	7	L2	CO3
	c. Using modern mathematical tools, write the code to find gradient of $\phi = x^2y + 2xz - 4$.	6	L2	CO5
Module – 2				
Q.3	a. Define a Subspace. Show that any plane passing through the origin is a subspace of \mathbb{R}^3 .	7	L1	CO1
	b. Let V be the vector space of all real valued continuous functions over \mathbb{R} . Show that the set W of solutions of differential equations $5\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 2y = 0$ is a subspace of V.	7	L2	CO2
	c. Define a Inner Product space. Consider $f(t) = 3t - 5$ and $g(t) = t^2$, the inner product $\langle f, g \rangle = \int_0^1 f(t)g(t)dt$. Find $\langle f, g \rangle$	6	L2	CO2
OR				
Q.4	a. Express the vector $(3, 5, 2)$ as a linear combination of the vectors $(1, 1, 0)$, $(2, 3, 0)$, $(0, 0, 1)$ of $V_3(\mathbb{R})$.	7	L2	CO3



	b. State Rank-Nullity theorem. Verify the Rank-Nullity theorem for the $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ defined by $T(x, y, z) = (x+2y-z, y+z, x+y-2z)$	7	L2	CO2
	c. Using the modern mathematical tool, write the code to represent the reflection transformation $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ and to find the image of vector (10, 0) when it is reflected about the y-axis.	6	L1	CO3

Module - 3

Q.5	a. Find the Laplace transform of, (i) $e^{-3t}(2 \cos 5t - 3 \sin 5t)$ (ii) $\frac{\cos at - \cos bt}{t}$	7	L3	CO3
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	b. Given $f(t) = \begin{cases} E, & 0 < t < \frac{a}{2} \\ -E, & \frac{a}{2} < t < a \end{cases}$ where $f(t+a) = f(t)$, show that $L[f(t)] = \frac{E}{S} \tanh\left(\frac{aS}{4}\right)$.	7	L2	CO2
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	Express $f(t) = \begin{cases} \cos t, & 0 < t < \pi \\ \cos 2t, & \pi < t < 2\pi \\ \cos 3t, & t > 2\pi \end{cases}$ in terms of the Heaviside unit step function and hence find $L[f(t)]$.	6	L3	CO4
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OR

Q.6	a. Find $L^{-1}\left[\frac{2s^2 + 5s - 4}{s^3 + s^2 - 2s}\right]$	7	L3	CO3
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	b. Using the convolution theorem, find the inverse Laplace Transform of $\frac{s}{(s^2 + a^2)^2}$	7	L3	CO4
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	c. Solve $y''' + 2y'' - y' - 2y = 0$, given $y(0) = y'(0) = 0$ and $y''(0) = 6$ by using Laplace transform method.	6	L2	CO3
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Module - 4

Q.7	a. By Newton-Raphson method, find the root of $x \tan x + 1 = 0$ which is near to $x = \pi$.	7	L3	CO2
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	b. Using Newton's forward difference formula find $f(38)$, <table border="1" style="display: inline-table; margin-left: 20px;"> <tr> <td>x</td> <td>40</td> <td>50</td> <td>60</td> <td>70</td> <td>80</td> <td>90</td> </tr> <tr> <td>y</td> <td>184</td> <td>204</td> <td>226</td> <td>250</td> <td>276</td> <td>304</td> </tr> </table>	x	40	50	60	70	80	90	y	184	204	226	250	276	304	7	L3	CO3
x	40	50	60	70	80	90												
y	184	204	226	250	276	304												

	c. Use Lagrange's interpolation formula to find y at $x = 10$, given <table border="1" style="display: inline-table; margin-left: 20px;"> <tr> <td>x</td> <td>5</td> <td>6</td> <td>9</td> <td>11</td> </tr> <tr> <td>y</td> <td>12</td> <td>13</td> <td>14</td> <td>16</td> </tr> </table>	x	5	6	9	11	y	12	13	14	16	6	L3	CO3
x	5	6	9	11										
y	12	13	14	16										



OR

Q.8	a.	Find a real root of the equation $x^3 - 2x - 5 = 0$ correct to three decimal places by the method of false position in (2, 3).	7	L4	CO4														
	b.	Find the interpolating polynomial using Newton's dividend difference formula for the following data, <table border="1" style="margin: 5px auto;"> <tr> <td>x</td> <td>2</td> <td>4</td> <td>5</td> <td>6</td> <td>8</td> <td>10</td> </tr> <tr> <td>y</td> <td>10</td> <td>96</td> <td>196</td> <td>350</td> <td>868</td> <td>1746</td> </tr> </table>	x	2	4	5	6	8	10	y	10	96	196	350	868	1746	7	L3	CO4
	x	2	4	5	6	8	10												
y	10	96	196	350	868	1746													
c.	Use Simpson's $\frac{3}{8}$ rule to obtain the approximate value of $\int_0^1 (1 - 8x^3)^2 dx$ by considering 3 equal intervals.	6	L2	CO2															

Module - 5

Q.9	a.	Use Taylor's series method, find $y(0.1)$ considering upto fourth degree term if $y(x)$ satisfies the equation, $\frac{dy}{dx} = x - y^2$, $y(0) = 1$.	7	L3	CO3
	b.	Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$. Compute $y(0.2)$ by taking $h = 0.2$, using Runge-Kutta method of fourth order.	7	L2	CO3
	c.	Apply Milne's method to compute $y(1.4)$, correct to four decimal places given $\frac{dy}{dx} = x^2 + \frac{y}{2}$ and following the data $y(1) = 2$, $y(1.1) = 2.2156$, $y(1.2) = 2.4649$, $y(1.3) = 2.7514$	6	L2	CO2

OR

Q.10	a.	Using modified Euler's method to find y at $x = 0.2$ given $\frac{dy}{dx} = x - y^2$ and $y(0) = 1$ by taking step size $h = 0.1$.	7	L4	CO4
	b.	Using the Runge-Kutta method of fourth order find $y(0.1)$ given that $\frac{dy}{dx} = 3e^x + 2y$, $y(0) = 0$ taking $h = 0.1$.	7	L3	CO2
	c.	Using modern mathematical tools, write the code to find the solution of $\frac{dy}{dx} = x - y^2$ at $y(0.1)$, given that $y(0) = 1$ by Runge-Kutta 4 th order method.	6	L2	CO3



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Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Mathematics – II for CSE Stream

Time: 3 hrs.

Max. Marks: 100

- Note:* 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. VTU Formula Hand Book is permitted.
 3. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x+y+z) dy dx dz$	07	L3	CO1
	b.	Evaluate $\int_0^z \int_x^z \frac{e^{-y}}{y} dy dx$ by changing the order of integration.	07	L3	CO1
	c.	Show that $\beta(m, n) = \frac{\Gamma(m) \cdot \Gamma(n)}{\Gamma(m+n)}$	06	L2	CO1
OR					
Q.2	a.	Evaluate $\int_0^1 \int_0^{\sqrt{1-y^2}} (x^2 + y^2) dy dx$ by changing to polar coordinates.	07	L3	CO1
	b.	Using double integration find the area of a plate in the form of a quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	07	L3	CO1
	c.	Using mathematical tools, write the code to find the volume of the tetrahedron bounded by the planes $x = 0, y = 0, z = 0$ and $6x + 3y + 2z = 6$.	06	L3	CO5
Module – 2					
Q.3	a.	Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$.	07	L2	CO2
	b.	Evaluate $\text{div } \vec{F}$ and $\text{curl } \vec{F}$ at the point $(1, 2, 3)$, given $\vec{F} = \text{grad}(x^3y + y^3z + z^3x - x^2y^2z^2)$	07	L3	CO2
	c.	Express the vector $\vec{F} = 2x\hat{i} - 3y^2\hat{j} + zx\hat{k}$ in cylindrical form.	06	L3	CO2
OR					
Q.4	a.	Find the directional derivative of $\phi(x, y, z) = x^2yz + yxz^2$ at $(1, -2, 1)$ in the direction of the vector $2\hat{i} - \hat{j} - 2\hat{k}$.	07	L2	CO2
	b.	Show that the vector $\vec{F} = \frac{x\hat{i} + y\hat{j}}{x^2 + y^2}$ is both solenoidal and irrotational.	07	L3	CO2
	c.	Using mathematical tool, write the code to find the gradient of $xy^3 + yz^3$.	06	L3	CO5



Module - 3

Q.5	a.	Show that the set $W = \{(x, y, z) / x + y + 2z = 0\}$ of the vector space $V_3(\mathbb{R})$ is a subspace of $V_3(\mathbb{R})$.	07	L2	CO3
	b.	Find the basis and dimension of the subspace spanned by the vectors $\{(1, -1, 0), (0, 3, 1), (1, 2, 1), (2, 4, 2)\}$ in \mathbb{R}^3 .	07	L3	CO3
	c.	Find the matrix of the linear transformation $T: V_2(\mathbb{R}) \rightarrow V_3(\mathbb{R})$ such that $T(-1, 1) = (-1, 0, 2)$ and $T(2, 1) = (1, 2, 1)$.	06	L2	CO3

OR

Q.6	a.	Determine whether the following set of vectors in 2×2 matrix space is linearly independent or linearly dependent: $S = \{v_1, v_2, v_3\}$ where $v_1 = \begin{bmatrix} 2 & 1 \\ 0 & 1 \end{bmatrix}$, $v_2 = \begin{bmatrix} 3 & 0 \\ 2 & 1 \end{bmatrix}$ and $v_3 = \begin{bmatrix} 1 & 0 \\ 2 & 0 \end{bmatrix}$	07	L2	CO3
	b.	Prove that $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ defined by $T(x, y, z) = (x + y, y + 2z)$ is a linear transformation.	07	L2	CO3
	c.	Verify the Rank - nullity theorem for the linear transformation $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ defined by $T(x, y, z) = (y - x, y - z)$.	06	L2	CO3

Module - 4

Q.7	a.	Find a real root of the equation $x \log_{10} x = 1.2$ by regula falsi method corrected to 4 decimal places between (2.5, 3). Carry out 4 iterations.	07	L2	CO4												
	b.	From the following table of half yearly premium for policies maturing at different ages, estimate the premium for the policies maturing at the age of 46. <table border="1" style="margin-left: 20px;"> <tr> <td>Age :</td> <td>45</td> <td>50</td> <td>55</td> <td>60</td> <td>65</td> </tr> <tr> <td>Premium (in Rs.)</td> <td>114.84</td> <td>96.16</td> <td>83.32</td> <td>74.48</td> <td>68.48</td> </tr> </table>	Age :	45	50	55	60	65	Premium (in Rs.)	114.84	96.16	83.32	74.48	68.48	07	L3	CO4
	Age :	45	50	55	60	65											
Premium (in Rs.)	114.84	96.16	83.32	74.48	68.48												
c.	Use Trapezoidal rule to estimate the integration $\int_0^1 \frac{1}{1+x^2} dx$ by taking 10 equal intervals.	06	L3	CO4													



OR

Q.8	a.	Find by Newton's Raphson method, the root of the equation $\cos x = x e^x$ near to 0.5, corrected to 4 decimal places.	07	L2	CO4												
	b.	Using Newton's divided difference interpolation, find the interpolating polynomial of the given data: <table border="1" style="margin-left: 20px;"> <tr> <td>x</td> <td>-4</td> <td>-1</td> <td>0</td> <td>2</td> <td>5</td> </tr> <tr> <td>f(x)</td> <td>1245</td> <td>33</td> <td>5</td> <td>9</td> <td>-1335</td> </tr> </table>	x	-4	-1	0	2	5	f(x)	1245	33	5	9	-1335	07	L3	CO4
	x	-4	-1	0	2	5											
f(x)	1245	33	5	9	-1335												
c.	Evaluate using Simpson's $(1/3)^{rd}$ rule, $\int \log x dx$ by dividing the range (4, 5.2) into seven ordinates.	06	L3	CO4													

Module - 5

Q.9	a.	Solve $y' = 3x + y^2$; $y(0) = 1$ using Taylor's series method at $x = 0.1$ and $x = 0.2$.	07	L3	CO4
	b.	Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with $y = 1$ when $x = 0$. Find an approximate y at $x = 0.1$ using Euler's modified method. (Use modified formula twice).	07	L3	CO4
	c.	From the data given below find y at $x = 1.4$ using Milne's method. Given $\frac{dy}{dx} = x^2 + \frac{y}{2}$.	06	L3	CO4

x :	1	1.1	1.2	1.3
y :	2	2.2156	2.4549	2.7514

OR

Q.10	a.	Using Runge - Kutta method of order 4, find y at $x = 0.2$, given $\frac{dy}{dx} = \frac{x^2 + y^2}{10}$; $y(0) = 1$ taking $h = 0.1$.	07	L3	CO4
	b.	Using modified Euler's method solve $y' = 3x + \frac{y}{2}$ with $y(0) = 1$ taking $h = 0.2$ at $x = 0.2$. (Use modified Euler's formula twice).	07	L3	CO4
	c.	Using mathematical tools, write the code to solve $\frac{dy}{dx} = x^2y - 1$; $y(0) = 1$ by Taylor's series method at $x = 0.1$ (0.1) 0.3	06	L3	CO5



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Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Introduction to Civil Engineering

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	Briefly explain the following : i) Geotechnical engineering ii) Environmental engineering.	10	L1	CO1
	b.	Write short notes on : i) Structural engineering ii) Transportation engineering.	10	L1	CO1
OR					
Q.2	a.	Write short notes on : i) Bricks ii) Concrete.	10	L1	CO1
	b.	Briefly explain the following : i) Foundation ii) Beams	10	L1	CO1
Module - 2					
Q.3	a.	Write a note on : i) Smart city concept ii) Clean city concept.	10	L1	CO2
	b.	Briefly explain the urban air pollution management.	10	L1	CO2
OR					
Q.4	a.	Write short notes on energy efficient buildings.	10	L1	CO2
	b.	Briefly explain the following : i) Solid waste management ii) Flood control.	10	L1	CO2
Module - 3					
Q.5	a.	Explain the classification of force systems.	10	L1	CO3
	b.	For the coplanar concurrent force system given below, find the magnitude and direction of the resultant.	10	L2	CO3

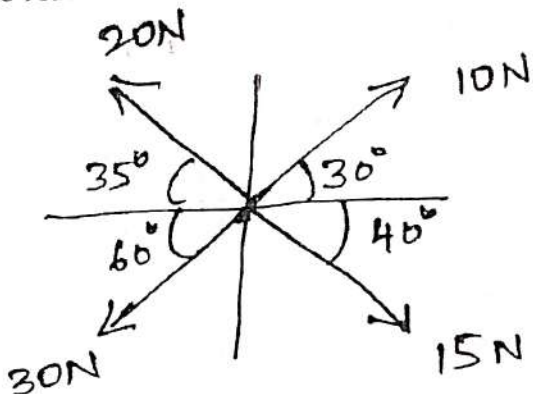


Fig.Q5(b)

OR

Q.6	a.	State and explain Varignon's theorem.	10	L1	CO3
	b.	Find the magnitude, direction and position of the resultant with respect to A for the Fig.Q6(b) shown below.	10	L2	CO3

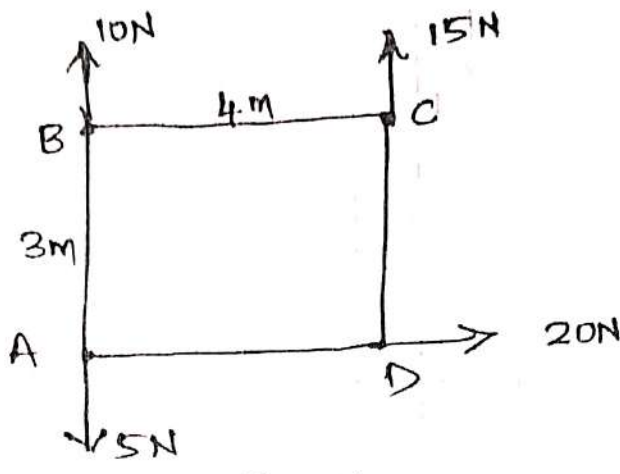


Fig.Q6(b)

Module - 4

Q.7	a.	Locate the centroid of a rectangular lamina using first principles.	10	L1	CO4
	b.	Find the centroid of the shaded area for the Fig.Q7(b) shown below.	10	L3	CO4

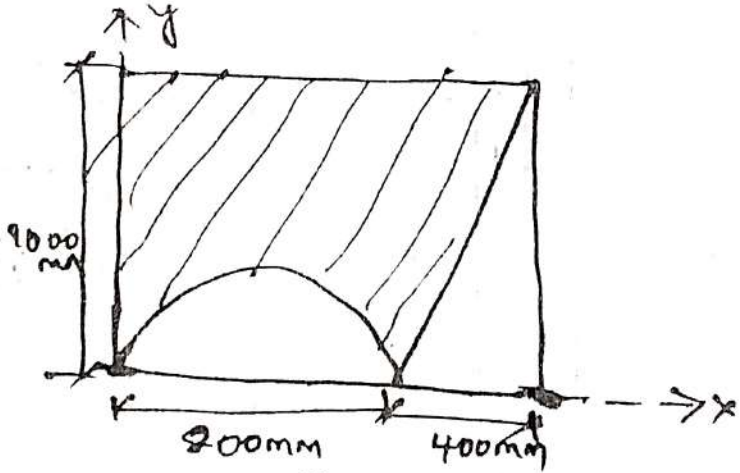


Fig.Q7(b)

OR

Q.8	a.	Locate the centroid of a semi circular lamina using first principle.	10	L1	CO4
	b.	Compute the centroid of the shaded portion for the Fig.Q8(b) shown below.	10	L3	CO4

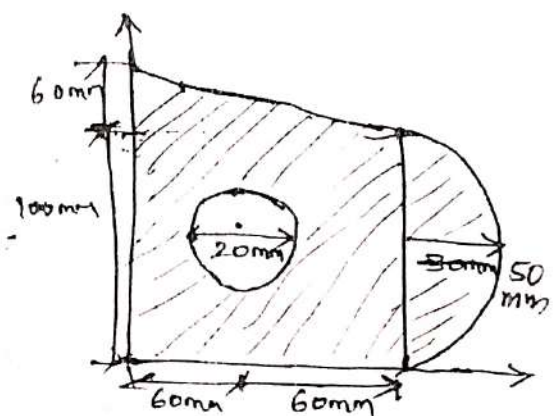


Fig.Q8(b)

Module - 5

Q.9	a.	State and prove parallel axis theorem.	10	L2	CO5
	b.	Calculate the moment of inertia of the Fig.Q9(b) shown below.	10	L3	CO5

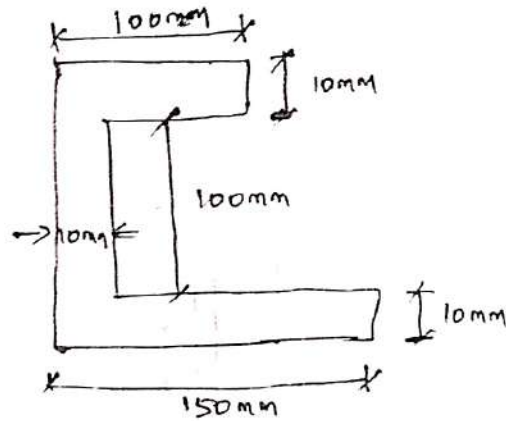


Fig.Q9(b)

OR

Q.10	a.	Derive the equation for moment of inertia of a triangular lamina.	10	L2	CO5
	b.	Determine the moment of inertia of the shaded portion about line MN for the Fig.Q10(b) shown below.	10	L3	CO5

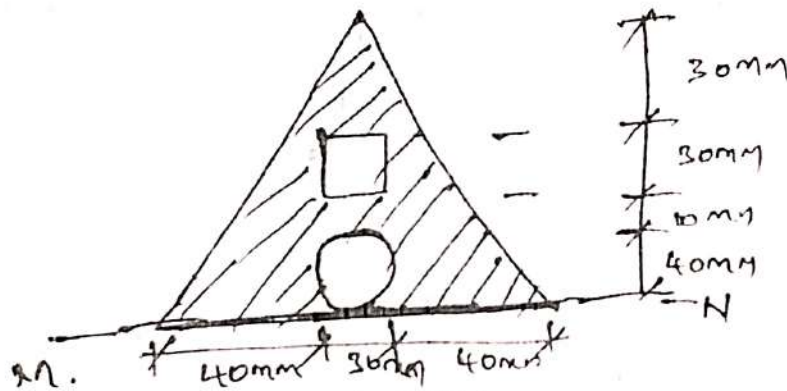


Fig.Q10(b)



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BESCK204B

Second Semester B.E./B.Tech. Degree Examination, June/July 2025

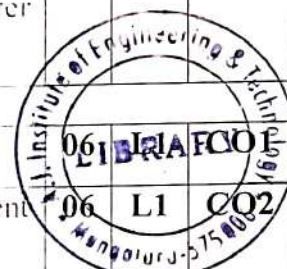
Introduction to Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. VTU Formula Hand Book is permitted.
 3. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Enumerate and explain briefly the essential elements of hydro power plant.	06	L2	CO1
	b.	State and explain Kirchhoff's laws.	06	L2	CO2
	c.	A resistance of 5Ω is connected in series with a parallel combination of 4Ω and 12Ω . If the current through 5Ω resistor is 10 A. find the (i) Currents in 4Ω and 12Ω resistors. (ii) Supply voltage and (iii) Power dissipated by each resistor.	08	L3	CO2
OR					
Q.2	a.	List the advantages and disadvantages of nuclear power plant.	06	L1	CO1
	b.	List the characteristics of parallel circuit. Obtain the expression for current through any resistor in a parallel circuit.	06	L1	CO2
	c.	Two batteries having emfs of 10 V and 7 V, and internal resistances of 2Ω and 3Ω respectively, are connected in parallel across a load of resistance 1Ω . Calculate (i) the current supplied by each battery. (ii) the current through the load, and (iii) the voltage across the load.	08	L3	CO2
Module – 2					
Q.3	a.	Show that the pure inductance does not dissipate any power. Draw the phasor diagram and the waveforms of voltage and current.	06	L2	CO2
	b.	What are the advantages of three phase system over a single phase system?	06	L1	CO2
	c.	A coil has a resistance of 10Ω and draws a current of 5 A when connected across a 100 V, 60 Hz source. Determine (i) the inductance of the coil (ii) the power factor of the circuit (iii) the voltage across inductance and (iv) the reactive power.	08	L3	CO2
OR					
Q.4	a.	Derive an expression for the average power consumed by a R-L series circuit. Draw the phasor diagram and the waveforms of voltage and current.	06	L2	CO2
	b.	A three-phase, delta connected load consumes a power of 120 KW, drawing a lagging line current of 200 A from a three-phase, 400 V, 50 Hz supply. (i) Find the parameters of each phase, (ii) What would be the power consumed if the loads were connected in star?	06	L3	CO2
	c.	A coil of resistance 10Ω and inductance 0.1 H is connected in series with a $150 \mu\text{F}$ capacitor across a 200 V, 50 Hz supply. Calculate (i) the impedance, (ii) the current, (iii) the power factor, (iv) the voltage across the coil and the capacitor.	08	L3	CO2



Module – 3

Q.5	a.	Explain the function of main parts of a dc machine.	06	L2	CO3
	b.	Sketch and explain speed-load characteristics of (i) series motor (ii) shunt motor. Mention two applications of each motor.	06	L2	CO3
	c.	A 4-pole, shunt generator with Lap-connected armature has field and armature resistances of 50Ω and 0.1Ω respectively. It supplies power to sixty 100 V , 40 W lamps. Calculate (i) the armature current (ii) the current per armature path, and (iii) the generated emf. Allow a contact drop of 1 V per brush.	08	L3	CO3

OR

Q.6	a.	Derive the emf equation for a dc generator.	06	L2	CO3
	b.	Explain the different methods used to control the speed of dc series motor.	08	L2	CO3
	c.	A 6 pole, Lap-connected dc series motor, with 864 conductors, takes a current of 110 A at 480 V . The armature and series-field resistance are 0.18Ω and 0.02Ω respectively. The flux per pole is 50 mwb . Calculate (i) the speed, and (ii) the gross torque developed by the armature.	06	L3	CO3

Module – 4

Q.7	a.	Derive the emf equations of a transformer and hence find the transformation ratio.	06	L2	CO4
	b.	Explain the principle of operation of a 3-phase induction motor and give reason for an induction motor cannot run at synchronous speed.	06	L2	CO4
	c.	A 600 KVA , single phase transformer has an efficiency of 92% both at full load and half full load, upf. Determine its efficiency at 75% full load, 0.9 pf .	08	L3	CO4

OR

Q.8	a.	Define slip. Derive an expression for frequency of rotor current. In what way, an induction motor is similar to a transformer?	06	L2	CO4
	b.	Explain the various losses that occur in a transformer. Also derive the condition for maximum efficiency of a transformer.	08	L2	CO4
	c.	A 4-pole, 3-phase, 50 Hz induction motor runs at a speed of 1470 rpm . Find (i) the synchronous speed (ii) the slip and (iii) the frequency of the induced emf in the rotor.	06	L3	CO4

Module – 5

Q.9	a.	With relevant circuit diagrams and switching tables, explain two-way and three-way control of a lamp. Mention its applications.	08	L2	CO5
	b.	Write a short note on Fuse and MCB.	06	L2	CO5
	c.	Explain the necessity of earthing. Explain pipe earthing with a neat diagram.	06	L2	CO5

OR

Q.10	a.	Explain different types of wiring systems.	06	L2	CO5
	b.	What is electric shock? What are the precautions to be taken to prevent electric shock?	06	L1	CO5
	c.	Define "unit" used for consumption of electrical energy and explain two-part tariff. Mention its advantages and disadvantages.	08	L2	CO5

CBCS SCHEME

BESCK204D

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Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Introduction to Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Explain briefly the emerging trends of Mechanical engineering in manufacturing and energy sector.	10	L2	CO1
	b.	Write a note on : i) Global warming ii) Ozone layer depletion.	10	L2	CO1
OR					
Q.2	a.	Explain the working of hydel power plant with a neat sketch.	10	L2	CO1
	b.	Explain with neat sketch. construction and working of a nuclear power plant.	10	L2	CO1
Module – 2					
Q.3	a.	Explain the working principle of Drilling Machine.	04	L2	CO2
	b.	Illustrate the following operations of milling with sketches: i) Plain milling ii) Slot milling	08	L3	CO2
	c.	With a neat sketch. explain the following operations performed on lathe machine: i) Turning ii) Facing	08	L2	CO2
OR					
Q.4	a.	Describe the various components of CNC with schematic diagram.	10	L2	CO2
	b.	Define 3D printing. List the various steps involved in the 3D printing.	06	L2	CO2
	c.	List the advantages and applications of CNC.	04	L1	CO2
Module – 3					
Q.5	a.	Analyze the working of the 4 stroke diesel engine with sketches. Plot the PV diagram.	12	L3	CO3
	b.	List the differences between 4 stroke petrol and diesel engine.	08	L1	CO3
OR					
Q.6	a.	Describe electric vehicles. Explain the components and working of electric vehicles.	08	L2	CO3
	b.	Describe Hybrid Vehicles. Explain the components of Hybrid vehicles.	08	L2	CO3
	c.	List the advantages and limitations of electric vehicles.	04	L1	CO3



Module - 4

Q.7	a.	Define engineering material. Briefly explain the classification of ferrous and non ferrous metals.	10	L2	CO4
	b.	Describe the following materials: i) Ceramics ii) Shape memory alloys iii) Glass iv) Diamond	10	L2	CO4

OR

Q.8	a.	List the differences between soldering, brazing and welding.	10	L1	CO4
	b.	Describe the construction and working of gas welding process with neat sketch.	10	L2	CO4

Module - 5

Q.9	a.	Enumerate the differences between open loop and closed loop systems.	06	L1	CO5
	b.	Based on the configuration explain different types of robots with sketches.	10	L2	CO5
	c.	Explain the physical design of IoT.	04	L2	CO5

OR

Q.10	a.	Define automation. Explain the three types of automation.	10	L2	CO5
	b.	Define IoT. List the characteristics of IoT.	10	L1	CO5



CBCS SCHEME

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BPLCK205B

Second Semester B.E./B.Tech. Degree Examination, June/July 2025 Introduction to Python Programming

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	Explain the print(), input() and string concatenation with examples.	06	L2	CO1
	b.	Explain the scope of local and global variables with suitable example.	06	L2	CO1
	c.	Develop a python program to calculate the area and circumference of a circle, input the value of radius and print the result.	08	L3	CO1
OR					
Q.2	a.	Explain the exception handling mechanism in python. Write a program to solve divide by zero exception.	06	L2	CO1
	b.	Define user defined function. How to pass parameters in functions? Explain with an example.	06	L2	CO1
	c.	Develop a program to generate Fibonacci series of length N. Read the value of N from console.	08	L3	CO1
Module - 2					
Q.3	a.	Explain the following methods with example: i) index() ii) append() iii) extend() iv) remove() v) insert() vi) sort()	06	L2	CO2
	b.	Explain the use of "in" and "not in" operators with suitable examples	06	L2	CO2
	c.	Develop a program to compute and print mean, variance and standard deviation.	08	L3	CO2
OR					
Q.4	a.	Define tuple data type. List the differences between tuple and list.	06	L2	CO2
	b.	Explain the following dictionary methods with suitable example: i) keys() ii) values() iii) items() iv) setdefault()	08	L2	CO2
	c.	Develop a python program to swap two numbers without using intermediate variable.	06	L3	CO2



OR

Q.6	a.	Explain the join() and Split() methods with suitable examples.	06	L2	CO3
	b.	Explain the following methods with examples: i) isalpha() ii) isanum() iii) isSpace()	06	L2	CO3
	c.	Illustrate with an example the process of reading from and writing to a file in python.	08	L3	CO3

Module – 4

Q.7	a.	Explain the following file operations in python with suitable example: i) Copying files and folders ii) Moving files and folders iii) Deleting files and folders	06	L2	CO3
	b.	What are Assertions? Explain the contents of assert statement with examples.	08	L2	CO3
	c.	Illustrate with an example the concept of walking a directory tree.	06	L2	CO1

OR

Q.8	a.	Illustrate the logging levels in python.	06	L2	CO3
	b.	List out the differences between Shutil.copy() and Shutil.copytree() methods.	06	L2	CO3
	c.	Develop a program with a function named DivExp which takes two parameters a and b and returns c (c = a/b). Write suitable assertion for a > 0 in function DivExp and raise an exception for when b = 0. Develop a python program which reads two values from the console and calls a function DivExp.	08	L3	CO3

Module – 5

Q.9	a.	Define classes and objects in python. Construct a class called rectangle and initialize it with height = 100, width = 200, starting point as (x = 0, y = 0) and write the method to display the center point coordinates of a rectangle.	08	L2	CO4
	b.	Explain __init()__ and __str()__ methods with examples.	06	L2	CO4
	c.	Define pure function. Explain the same with an example.	06	L2	CO4

OR

Q.10	a.	Define a function which takes two objects representing complex numbers and returns a new complex number with a addition of two complex numbers. Define a class 'complex' to represent the complex number. Develop a python program to read N(N >= 2) complex numbers and to compute the addition of N complex numbers.	08	L2	CO4
	b.	Explain the printing of objects with an example.	06	L2	CO4
	c.	Explain the concept of inheritance with an example.	06	L2	CO4

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BETCK205J

Second Semester B.E./B.Tech. Degree Examination, June/July 2025

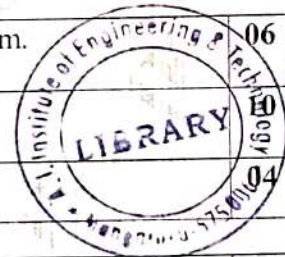
Introduction to Embedded Systems

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Differentiate between microprocessor and microcontrollers.	05	L2	CO1
	b.	Explain in detail about the purpose of embedded system.	10	L2	CO1
	c.	Explain Brown-out protection circuit with neat diagram.	05	L2	CO1
OR					
Q.2	a.	Explain in detail about the classification of embedded system.	10	L2	CO1
	b.	Describe 7-segment display with neat diagram.	05	L2	CO1
	c.	Write a short notes on Big endian and Little endian processors.	05	L2	CO1
Module – 2					
Q.3	a.	Write a short notes on characteristics of an embedded system.	06	L2	CO2
	b.	Explain in detail about the operational quality attributes.	10	L2	CO2
	c.	Write a short notes on Product Life Cycle.	04	L2	CO2
OR					
Q.4	a.	Describe application specific embedded system with neat diagram.	10	L2	CO2
	b.	Interpret the working of automotive embedded system with neat diagram.	10	L2	CO2
Module – 3					
Q.5	a.	Elaborate on the fundamental issues in hardware-software co-design.	10	L2	CO3
	b.	Discuss the impact of Electronic Design Automation (EDA) tools on modern embedded hardware design.	10	L2	CO3
OR					
Q.6	a.	Explain FSM Model for coin operated telephone with neat diagram.	10	L2	CO3
	b.	Describe binary counter using T-flip-flop with neat diagram.	10	L2	CO3
Module – 4					
Q.7	a.	Explain the Cross Compilation process. Describe the types of files generated and their purpose in embedded firmware development.	10	L2	CO4
	b.	With neat diagram, explain the conversion from assembly language to machine language.	10	L3	CO4



OR

Q.8	a.	Illustrate Incircuit Emulator (ICE) based firmware debugging with neat diagram.	10	L2	CO4
	b.	Discuss in detail the role and importance of embedded system development environment focusing on simulators, emulators and debugging tools.	10	L2	CO4
Module – 5					
Q.9	a.	Explain the operating system architecture with neat diagram.	10	L2	CO5
	b.	With neat diagram explain task scheduling.	10	L2	CO5
OR					
Q.10	a.	Explain the types of kernel with neat diagram.	06	L2	CO5
	b.	Differentiate between process and thread.	06	L2	CO5
	c.	Explain in detail about the multiprocessing and multitasking.	08	L2	CO5

