Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination

10/6/24

JUNE-2024

ELECTRICAL/MECHANICAL/CIVIL **Duration: 03 Hours**

Course Code: BS-FST201 **Maximum Points: 100**

Course Name: ICDE **Semester: II**

- **Attempt any five out of seven questions**
- **Use of scientific calculator is allowed**

Integral calculus & Differential Equations

QNO.	QUESTION	POINTS	CO	BL	Module No.
Q1 a)	Evaluate $\iiint \frac{1}{(1+x+y+z)^3}\, dx\, dy\, dz$ over the volume of the tetrahedron $x=0, y=0, z=0, x+y+z=1$	06	3	2	4
Q1 b)	Solve $\frac{dy}{dx} + \left(\frac{4x}{x^2+1}\right) y = \frac{1}{1+x^2}$	06	1	3,5	1
Q1 c)	Using Runge - Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ given $y(0) = 1$ at $x = 0.2, 0.4$	08	1	1	5
Q2 a)	Prove that $\int_0^1 \sqrt{1-\sqrt{x}}\, dx \int_0^{1/2} \sqrt{2y-4y^2}\, dy = \frac{\pi}{30}$	06	2	2	5
Q2 b)	Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{1}{\sqrt{1-x^2-y^2-z^2}}\, dx\, dy\, dz$	06	2	2	4
Q2 c)	Solve $(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$	08	1	3	2
Q3 a)	Solve $(D^2 + 2D + 1)\, y = x \cos x$	06	1	2	2
Q3b	State and prove Duplication formula	06	2	2	4

Q3c)	Change the order of integration $\int_0^1 \left\{ \int_{\sqrt{2x-x^2}}^{1+\sqrt{1-x^2}} \phi(x,y)\,dy \right\} dx$	08	2	4,5	3
Q4 a)	Solve: $(D^2+4)\,y = \sin x + e^x + x^2$	06	1	3	2
Q4 b)	Find y(0.1), y(0.2) given $\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$ Using Taylor's series method.	06	2	2	1
Q4 c)	Prove that : $\int_0^\infty x e^{-x^8}\,dx \cdot \int_0^\infty x^2 e^{-x^4}\,dx = \frac{\pi}{16\sqrt{2}}$	08	3	3	1
Q5 a)	Find the area of the cardiod $r = a(1-\cos\theta)$	06	3	2	5
Q5 b)	Solve $\frac{dz}{dx} + \frac{z}{x}\log z = \frac{z}{x^2}(\log z)^2$	06	2	2	1
Q5c)	Solve: $(D^2-1)y = x\sin x + (1+x^2)e^x$	08	2	3	2
Q6 a)	Solve $\frac{di}{dt} + \frac{Ri}{L} = \frac{E}{L}$ in which the circuit has initial current i_0. at time t = 0 and emf $E = E_0 e^{-kt}$	06	1	4	2
Q6 b)	Find the mass of lamina bounded by the curves $y^2 = ax$ and $x^2 = ay$ if the density of the lamina at any point varies as the square of its distance from the origin.	06	3	3	5
Q6c)	Change to polar and evaluate $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2+y^2}}\,dx\,dy$	08	2	3	3
Q7 a)	Change the order of integration and evaluate $\int_0^2 \left\{ \int_{\sqrt{2y}}^{2} \frac{x^2}{\sqrt{x^4-4y^2}}\,dx \right\} dy$	06	2	3	3
Q7b	Find the length of the loop of the curve $9y^2 = (x+7)(x+4)^2$	06	3	2	5
Q7 c)	Solve $\frac{d^3y}{dx^3} - 4\frac{dy}{dx} = 2\cosh^2 2x$.	08	1	3,5	2

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Sardar Patel College of Engineering
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Munshi Nagar, Andheri (West), Mumbai – 400058.
End Semester Exam
JUNE 2024

12/6/24

Max. Marks: 100 Duration: 3 Hours
Class: F.Y. B.Tech (CME) **Semester: II** Program: B.Tech CME
Course Code : AE BT 201

CS
Communication Skills

NOTE:

- **Question 1 is compulsory.**
- **Out of remaining 6 questions attempt any 04**
- **Total questions to be attempted is 5 including question 1.**
- **Please write subsections of questions in a sequence**

Sr.No.	Questions	Points	CO	BL
Q.1. A	"The single most important characteristics of the human race is the ability to communicate". Explain the process and elements of communication process in detail. Draw a neat diagram of the communication process.	10	02	01
Q.1.B.	Write Short Notes on any (TWO) a. Eye training and Mind Training to effective reading b. Proxemics and haptics as means of non-verbal communication. c. Discuss the important characteristics of conversation. d. Advantages of Oral Communication	10 05 Each.	02	02
Q.2. A.	Does our culture influence our interpretation of the behaviour of those from other cultures? Explain the cultural barriers to communication in relation to values, time, space, paralanguage, colour, space distance.	12	03	03
Q.2. B.	Discuss the main classification of Non-Verbal Communication with diagram. Describe the importance of non-verbal communication in daily life with examples.	08	02	01
Q.3. A.	A passage for summarization and comprehension: In the ever-evolving landscape of engineering, the effective utilization of the latest technology is not merely advantageous but imperative for staying ahead of the curve. From artificial intelligence to quantum computing, engineers are constantly challenged to adapt to and harness the power of emerging technologies to solve complex problems and drive innovation. One such groundbreaking technology is quantum computing, which has the potential to revolutionize the field of computational engineering. Unlike classical computers that rely on binary bits,	20	01	03

which can represent either a 0 or a 1, quantum computers utilize quantum bits or qubits, which can exist in multiple states simultaneously. This quantum parallelism enables quantum computers to perform calculations at exponentially faster speeds, unlocking new possibilities for modeling complex systems and optimizing engineering processes.

Moreover, the integration of artificial intelligence (AI) and machine learning algorithms has ushered in a new era of autonomous engineering. Engineers can leverage AI to analyze vast datasets, identify patterns, and make data-driven decisions with unparalleled accuracy and efficiency. Whether it's optimizing energy consumption in smart buildings or fine-tuning production processes in manufacturing plants, AI-powered systems are redefining the boundaries of what's possible in engineering.

Furthermore, the Internet of Things (IoT) has emerged as a game-changer in engineering, enabling the seamless integration of physical devices and digital systems. Through IoT sensors and connectivity, engineers can remotely monitor and control equipment in real-time, predict maintenance needs, and optimize performance for maximum efficiency and reliability. This interconnectedness not only enhances productivity but also enhances safety and sustainability across various engineering domains.

Comprehension Questions:

1. What is quantum computing, and how does it differ from classical computing? 02

2. How can artificial intelligence benefit engineers in decision-making processes? 02

3. What role does the Internet of Things (IoT) play in engineering? 01

4. How does quantum parallelism enable faster computations in quantum computing? 01

5. What are some examples of how engineers can utilize AI in various industries? 02

6. Choose the synonym for "imperative": a) optional b) crucial c) insignificant d) minor 01

7. Select the antonym of "efficiency": a) productivity b) effectiveness c) inefficiency d) capability 01

	8. In the phrase "quantum parallelism enables quantum computers to perform calculations," what part of speech is "parallelism"? a) noun b) verb c) adjective d) adverb 01 9. Write a summary in 120 words for the above passage. 05			
Q. 3.B.	One word substitutes: 1. An annual calendar that contains important dates and time. 2. A structure on which abstractly defined structure is based. 3. Copying someone else's work and trying to submit as your own. 4. Exact use of words that were being used originally.	04	01	01
Q.4. A.	'Listening is hearing with thoughtful attention'. Explain in detail the importance of listening and the different types of listening. What strategies help improve listening?	12	04	05
Q.4. B.	Case Study: *There are times when teachers are too busy to listen to their students' difficulties. Students find them preparing the next day's lecture, correcting scripts, doing administrative jabs, or discussing college problems with other teachers.* *Geeta, an Engineering student finds herself appraaching her Head of Department, who seldom encourages students to discuss their personal problems or any course related questions or concerns. The teacher brushes her off by pointer her mistakes, shouting at her publicly and saying she is too busy to deal with her problems.* ***Geeta:** Madam?* ***Ms. Sanika:** Yes?* ***Geeta:** Can I talk to you for a minute? I need your help.* ***Ms. Sanika:** Not Now Geeta, I am making papers and I have lot of papers to correct. I am also busy with other department related work.* ***Geeta:** Madam then can I see you after my class, Please?* ***Ms. Sanika:** No Not today. I have to attend the faculty meeting and also have to prepare for tomorrow's lectures. Why don't you approach Rita Madam?* ***Geeta:** Madam, I had actually first gone to Rita Madam. She also told me she is not free. She too was busy with some administrative work.* ***Ms. Sanika:** Yes, Geeta, we all are very busy till the end of this month. And yes, attend lectures regularly so that you do not have to come with problems to us.*	08 02 each question.	04	05

	Questions: A. Discuss the barrier to Listening as shown by response of the teacher to Geeta. (02) B. What, according to you, is the real reason for the teacher's inability to listen to Geeta? Are they really too busy to listen to students' problems? (02) C. 'I am too busy'. What does this statement show about the nature of the responses of some teachers? (02) D. What tips will you give to teachers to improve listening? (02)			
Q.5. A.	Discuss the formal and informal channels of communication. What gives rise to informal channels of communication in an organization? How can the management prevent it from spreading?	10	04	01
Q.5. B.	Answer the following questions : a. Explain the Advantages and Limitations of Horizontal means of communication. (05) b. Choose only **one correct and appropriate answer** from choices given: (05) **1. In organizations, the flow of communication sometimes slows down because there are too many:** i. Managers ii. Channels iii. Hierarchical levels iv. Departments. **2. To create a cooperative, understanding, and pleasant work environment in an organization, decision making should be:** i. Transparent ii. Strong iii. Flexible iv. Quick **3. A limitation of informal communication is that it is:** i. inadequate ii. personal iii. unwarranted iv. false **4. Formal channels of communication promotes:** i. Quick transmission of information ii. Unofficial information iii. Hierarchical authority iv. Communication through prescribed routes. **5. Horizontal means of communication:** i. Helps in spreading rumors' ii. Creates misunderstanding amongst peers iii. Helps in thrashing out problems through mutual cooperation.	10 marks 05 each	05	04

Q.6.A.	Write a mail to Head of department (First year Engineering program) seeking permission to conduct a one- week short- term training program on soft skills and Interpersonal skills during summer vacation . Invent necessary details with schedule and detaiis of speakers.	10	03	06
Q.6. B.	What do you understand by netiquette? Write in detail the rules to be followed for etiquette while using the internet and rules to be followed while writing emails.	10	05	06
Q.7. A.	Explain **(Any Two)** of the following principles of business correspondence with examples. : 1. You-Attitude 2. Emphasize the positive 3. Avoiding verbosity in a business letter.	10	05	02
Q.7. B.	A reply letter to an erring customer: Read the letter and Rewrite the letter according to the principles of effective correspondence. Apply all the principles of effective business writing. Write the letter using ali 8 basic parts of a letter in correct format. *Dear Sir;* *Your letter of 23rd, with a cheque for Rs. 25,000 on account, is to hand.* *We note what you say regarding the difficulty you experienced in collecting your outstanding accounts, but we are compelled to remark that we do not think that you are treating us with consideration we have a right to expect.* *It is true that small remittances have been forwarded from time to time, but the debit balonce against you has been steodlly increasing during the post twelve months until It now stands at the considerable total of Rs. 85,000.* *Having regard to the many years during which you have been a customer of this house and the generally satisfactory character of your account, we are reluctant to resort to harsh measures.* *We must however, insist that the existing balance be cleared by regular Installments of say Rs. 10,000 per month, and the first installment should reach us by the 7 July. Meanwhlle, you shall to pay cash for all further gods; we are allowing you an extra 3 percent discount in lieu of credit.* *We shall be glad to hear from you about this favor that Is being offered to you, as otherwise we shaii have no alternative but to close your account and place the matter In your hands.* *Sincerely,*	10	05	06

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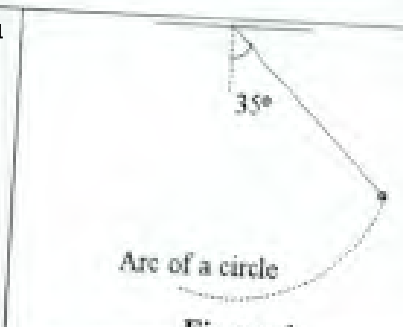
End Semester Examination
19th June 2024

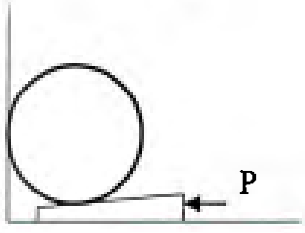
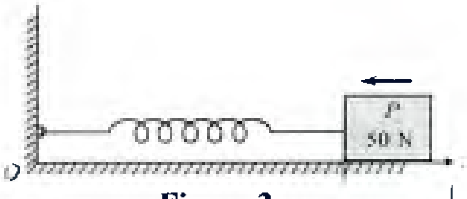
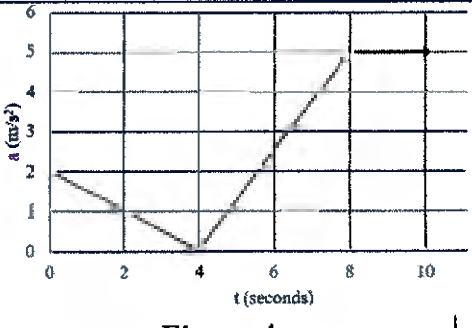
Program: UG First Year
Course Code: ES-BT204
Course Name: Engineering Mechanics - II

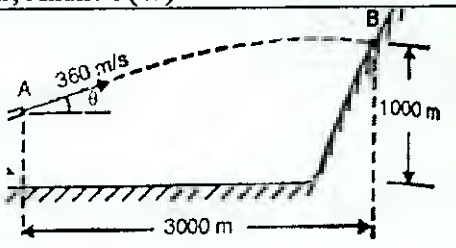
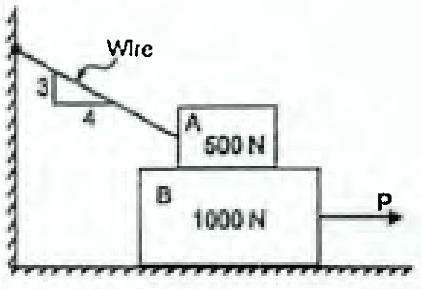
Duration: 3 Hours
Maximum Points: 100
Semester: II

Notes:

- **Question 1 in compulsory.** Solve **any four** out of remaining six questions
- Start a new question on a new page and group all sub-questions together.
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained,** and **Bloom's Taxonomy Level**

Q. No.			Points	CO	BL
1	a	State the laws of friction	5	1	2
	b	A 2.5 kg ball moving with a velocity of 0.4 m/s towards the east, collides head on with another ball of mass 2 kg, moving with 0.8 m/s towards the west. Determine the velocities of the balls after impact if the collision is perfectly plastic.	5	3	3
	c	An object is dropped from a high rise structure and it reaches the ground surface in 4.09 seconds. Calculate the height of the structure.	5	2	3
	d	A block of weight 10 kg is pushed with an initial velocity on a horizontal surface such that it travels 1.5 m before coming to rest. If $\mu_k = 0.26$, calculate the initial velocity.	5	3	3
2	a	A circus trapeze is swinging from the top of a tent. If the rope is 1.5 m long and he moves along the arc of a circle, then for the position shown in Figure 1, find his velocity and acceleration if the tension in the rope is 2.2 times his weight.  **Figure 1**	10	3	3
	b	A motorist is traveling at 80 kmph on Mumbai Pune expressway when he sees a bull standing on the road at a distance of 250 m ahead. Calculate the deceleration required to ensure that the motorist does not hit the bull.	5	2	3
	c	The velocity of a particle which is moving along a straight line is given by $v = 9t^2 - 11t - 5$ where v is in m/s and t is in seconds. Find the acceleration and position of the particle at t=3 seconds if x=0 at t=0.	5	2	3

3	a	A 5 degree wedge is used to lift a 1000kg cylinder as shown in Figure 2. If the coefficient of friction is 0.25 for all surfaces, determine the force P required to move the wedge and raise the cylinder.  **Figure 2**		**10**	**3**	**3**
	b	Water leaks from a ceiling 20 m high, at the rate of 4 drops per second. Find the distance between the first and second drop when the first drop has just touched the ground		**10**	**2**	**3**
4	a	A block of weight 50 N is pulled so that the spring is extended by 15 cm as shown in Figure 3. The stiffness of the spring is 5 N/cm and coefficient of friction between the block and ground surface is 0.3. Find the velocity of the block at the point where the spring returns to its undeformed state and also determine the maximum compression in the spring.  **Figure 3**		**10**	**3**	**3**
	b	A man of mass 85 kg and a girl of mass 45 kg dive off a boat of mass 200 kg with a horizontal velocity of 3 m/s relative to the boat. Determine the velocity of the boat just after both of them dive off simultaneously. Assume the boat is initially at rest. Also determine the velocity of the boat if the girl dives first, followed by the man.		**10**	**2**	**3,4**
5	a	A particle having rectilinear motion with initial velocity of 2 m/s is moving with an acceleration as shown in Figure 4. Draw the v-t and s-t diagram.  **Figure 4**		**10**	**2**	**3**
	b	A ladder of length 3 m weighing 25 kg is resting against a vertical wall and horizontal floor at an angle of 50 degrees to the floor. A boy of weight 60 kg tries to climb the ladder. Calculate the distance which he can climb along the ladder if the coefficient of friction between ladder and floor is 0.2 and that between ladder and wall is 0.3.		**10**	**1**	**3**

6	a	Shotcreting is done using a nozzle gun where the shotcrete is pumped out at a velocity of 360 m/s. Determine the angle θ of the nozzle such that the spray is targeted exactly at point B as shown in Figure 5.Assume the height of the gun is negligible.  Figure 5		10	2	3
	b	A ball is thrown vertically downwards with a velocity of 8 m/s from a height of 3 m. If the coefficient of restitution between the ball and the ground is 0.5determine the maximum height it can reach after hitting the ground.		10	3	3,4
7	a	Block A is tied to the wall with a wire as shown in Figure 6. Determine the horizontal force P required to just pull block B if coefficient of friction between all surfaces is 0.3.  Figure 6		10	1	3
	b	A lift weighing 10 kN starts from rest and moves with a constant acceleration. It acquires an upward velocity of 3.5 m/s over a distance of 5 m. Determine the tension in the cable supporting the lift.		5	3	3,4
	c	A collar of mass 600 g slides smoothly on a curved rod in the vertical plane as shown in Figure 7. The collar starts from rest at A and due to horizontal force of 10 N applied to it horizontally, it reaches B at a horizontal distance of 750 mm. Calculate its velocity at B		5	3	3

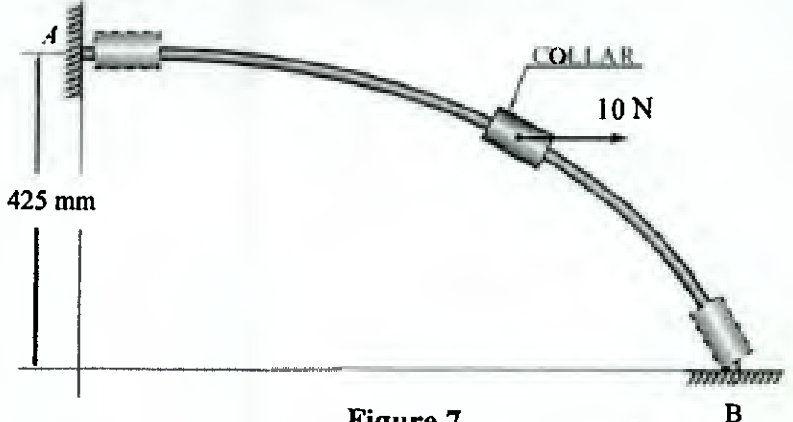


Figure 7

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END SEMESTER EXAMINATION JUNE 2024

21/6/24

Program: FY B.TEC. (C/M/E)

Duration: 2 Hour

Course Code: MC-BTE02 **Maximum Points: 50**

Course Name: Indian Traditional Knowledge. **Semester: II**

Note: Attempt Any Five Questions

Q.No.	Questions	Points	CO	BL	Module No.
1	Complete the Statements by Selecting Proper Alternative.	10	2	2	3
A.	Sankya philosophy is based on the analysis of the ____elements of existence. a)20 b) 25 c) 15 d) 5				
B	_____ studies how speech sounds are produced by the human vocal apparatus. a) Syntax b) Phonetics c) Semantics d) Pragmatics				
C	Rigveda Consists of _____ mandalas which are organized by metre, deity and purpose. a) 9 b) 15 c) 12 d) 10				
D	_____ Sahita Provided Comprehensive knowledge about anatomy, diseases and treatments. a) Sushruta b) Bhaskara c) Nagaurjuna d) Yaska				
E	_____ is a traditional practice in yoga consisting breath control. a) Acupuncture b) chiropractic c) pranayama d) Niyama				
F	Classical Tamil Literature includes the -------- Literature. a) Sanskrut b) Pakrit c) Kharosthi d) Sangam				
G	_____ deals with the Interpretation of Difficult words and Passages in the Vedas. a) Kalpa b) Chandas c) Nirukta d) Shiksha				

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END SEMESTER EXAMINATION JUNE 2024

H	The____ outlook involves to adopt a rational and evidence-based approach. a) Scientific b) Spiritual c) Metaphysical d) Theological				
I	_____ Veda is the Vedic Science of Music, Dance and aesthetics. a) Dhanur b) Sthapatya c) Gandharva d) Ayur				
J	The Constitution--------- adopted in 1950 which enshrines the principles of democracy, secularism and Federalism. A) France b) India c)USA d) England				
2	Explain the Correlation Between the Scientific outlook and human values. OR Discuss the fundamental unity of India	10	1	5	1
3	Write about Yoga and Pranayama OR Explain the Relevance of Science and Spirituality	10	3	2	2
4	Narrate the Heroic Role of India in World Civilization. OR Describe ancient Indian engineering knowledge.	10	2	4	4
5	Explain main branches of Linguistics with Features OR Comment on Indian Linguistic tradition	10	4	3	6
6	Give an account of four Vedas OR Discuss the Six Vedangas.	10	3	2	5
7	Illustrate the Philosophy of the Following. (Any Two) a) Guru Nanak b) Kabir c) Kanad D) Tukaram	10	2	5	7

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END SEMESTER EXAMINATION MAY 2024

Invigilator Name:	SET A	Student Name:
Signature with date:	25/6/24	Registration Number:

Program: First Year B.Tech Civil
Course Code: ES-BTC201
Course Name: Engineering Graphics

Duration: 03 Hr
Maximum Points: 100
Semester: II

Notes:

1. Solve any **FIVE** questions.
2. Assume suitable data wherever necessary and justify the same.
3. Create the folder in the specified location to save the files.
4. Folder name should be student's registration number (Ex: C2110058).
5. File name for respective questions should the question number itself (Ex. Q1/Q2)
6. Q1 and Q2 files must be saved separately in the same folder.
7. Save the work frequently.

Q.No.	Questions	Points	CO	BL	Module No.
1	Point P is 40 mm and 30 mm from horizontal and vertical axis respectively. Draw hyperbola.	20	1,4	3	1
2	The projectors drawn from VT & end A of line AB are 40 mm apart. End A is 15mm above HP and 25 mm in front of VP. VT of line is 20 mm below HP. If line is 75mm long, Draw its projections and find inclinations with HP & VP.	20	1,4	3	2
3	A thin 30°- 60° set-square has its longest edge in the V.P. and inclined at 30° to the H.P. Its surface makes an angle of 45° with the V.P. Draw its projections.	20	1,2	3	3
4	A square pyramid, base 38 mm side and axis 50 mm long, is freely suspended from one of the comers of its base. Draw its projections, when the axis as a vertical plane makes an angle of 45° with the V.P.	20	1,2	3	4
5	Draw the isometric view of the casting shown in fig.	20	3,4	3	5

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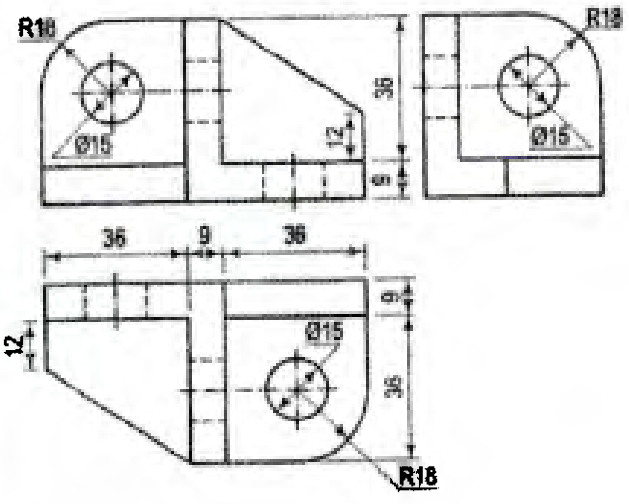
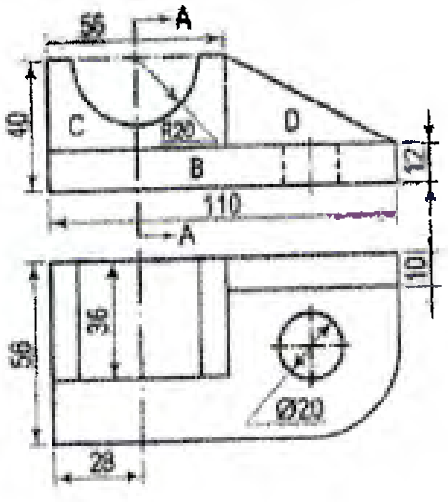
END SEMESTER EXAMINATION MAY 2024

					
6	The major axis of an ellipse is 150 mm long and the minor axis is 100 mm long. Find the foci and draw the ellipse by arcs of circles method. Draw a tangent to the ellipse at a point on it 25 mm above the major axis. **OR** Front View and Top View of the object is given as shown in figure. Draw the Sectional Side View. 	20	3,4	3	1,5
7	A regular pentagon of 30 mm sides is resting on HP on one of it's sides while it's opposite vertex (corner) is 30 mm above HP. Draw projections when side in HP is 30^0 inclined to VP.	20	3,4	3	3,5

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END SEMESTER EXAMINATION MAY 2024

Invigilator Name: Signature with date:	**SET B**	Student Name: Registration Number:

Program: First Year B.Tech Civil
Course Code: ES-BTC201
Course Name: Engineering Graphics
Notes:

Duration: 03 Hr
Maximum Points: 100
Semester: II

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6. Q1 and Q2 files must be saved separately in the same folder.
7. Save the work frequently.

Q.No.	Questions	Points	CO	BL	Module No.
1	Draw archemedian spiral of one convolution. Take distance PO 40 mm.	20	1,4	3	1
2	End A of line AB is in HP and 25 mm behind VP. End B in VP. and 50 mm above HP. Distance between projectors is 70 mm. Draw projections and find it's inclinations with HT, VT.	20	1,4	3	2
3	A circular plate of negligible thickness and 50 mm diameter appears as an ellipse in the front view, having its major axis 50 mm long and minor axis 30 mm long. Draw its top view when the major axis of the ellipse is horizontal.	20	1,2	3	3
4	Draw the projections of a cube of 25 mm long edges resting on the H.P on one of its corners with a solid diagonal perpendicular to the V.P.	20	1,2	3	4
5.	Draw the isometric view of the bracket shown in two views in fig.	20	3,4	3	5

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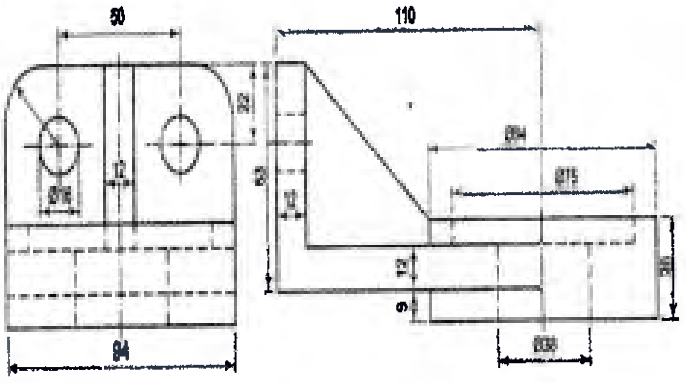
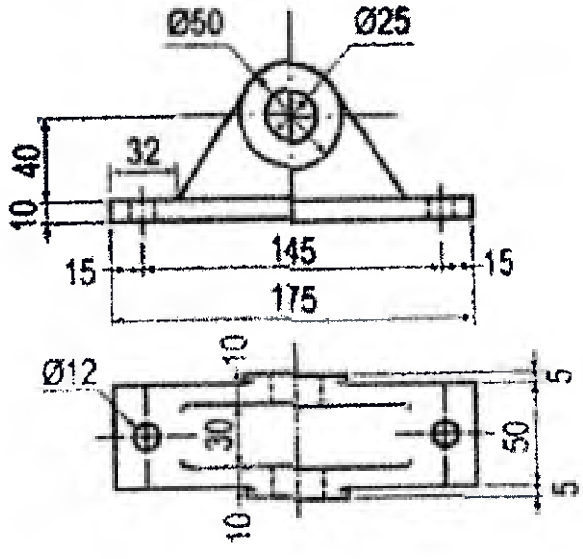
END SEMESTER EXAMINATION MAY 2024

					
6	The foci of an ellipse are 90 mm apart and the minor axis is 65 mm long. Determine the length of the major axis and draw half the ellipse by concentric-circles method and the other half by rectangle method. Draw a curve parallel to the ellipse and 25 mm away from it. **OR** Front View and Top View of the object is given as shown in figure. Draw the Missing View. 	20	3,4	3	1,5
7	A square prism with side of base 30 mm and axis 50 mm long has its axis inclined at 60^0 to HP, on one of the edges of the base which is inclined at 45^0 to VP.	20	3,4	3	3,5

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27/6/24

END SEMESTER EXAMINATION JUNE 2024

Program: B.Tech. Civil Engineering | **Duration: Three hours**

Course Code: PC-BTC201 | **Maximum Points: 100**

Course Name: Building Materials and Construction | **Semester: II**

Instructions:

1. Attempt any five out of seven Questions
2. Draw neat diagrams wherever required
3. Assume suitable data if necessary and state them clearly.

Q. No.	Questions	Points	CO	BL	PI
1					
a	Explain in brief Fiber board, Batten Board and plywood with their applications.	08	1	1	2.3.2
b	Differentiate between Arches and lintel	04	1	2	1.3.1
c	Explain lime cycle with flow diagram.	04	3	2	2.3.1
d	Differentiate between natural sand and processed sand	04	1	2	1.3.1
2.					
a	Explain the characteristics of good timber.	07	2	1	1.3.1
b	Describe in detail the process of internal plaster of 10 mm thick in a residential building.	08	3	3	2.3.2
c	Highlight the significance of ASR (Alkali Silica reaction) in Concrete.	05	2	1	1.2.1
3					
a	What are the characteristics of good bricks?	07	2	2	1.2.1
b	Enlist various methods of DPC and explain any two in detail.	08	1	1	1.3.1
c	Write a note on preservation of stone.	05	1	3	1.2.1
4					
a	Explain the various components of Cavity wall with neat sketch. Discuss advantages and disadvantages.	10	1	1	2.3.2
b	What are the forces acting on the structure? Explain them in detail.	05	1	1	1.3.1
c	State and explain the qualities of good paints?	05	4	2	2.3.1
5	How geotechnical investigation is carried out for a construction project?	05	2	1	1.2.1
a					
b.	Explain the characteristics of good formwork?	05	4	2	2.3.1
c.	What are the causes of dampness inside the building?	05	2	2	1.3.1
d.	Differentiate between plastering and pointing.	05	2	3	2.3.2

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END SEMESTER EXAMINATION JUNE 2024

6					
a.	Explain with neat sketch Raking shore.	05	3	2	2.3.1
b.	State the requirements of good foundation.	05	2		1.2.1
c.	Discuss the step-by-step procedure for pointing.	05	3	2	1.1.2
d.	How the composition of Alite, Belite, Celite and Felite affect the properties of cement?	05	3	1	1.3.1
7	***Write short Notes on (Any four)***				
a	Defects in plaster	05	1	3	1.3.1
b	Aluminum and cement paint	05	1	1	1.3.1
c	Uses of pure lime	05	2	2	1.3.1
d	X-ray shielding mortar	05	1	2	1.3.1
e	Cross section of timber	05	2	2	1.3.1
f	Batching of concrete	05	2	2	1.3.1

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Sardar Patel College of Engineering
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End Semester Examination Sem II 2023-2024
June 2024

F.Y. B.Tech (Civil) Sem II 14/6/24

Total Marks: **100** Duration: **3 Hrs**
CLASS/SEM : **F.Y.B.Tech Civil Sem.-II** COURSE NAME : **ENGINEERING PHYSICS**

COURSE CODE: **BSBTC202** DATE: **14/06/2024**

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

Good luck!

		Mark	MN	CO	BL
Q1.	**(20 mark)**				
a.	Find the wave vector and hence the momentum of the particles which come out as an output in a He-Ne laser.	**5**	1,5	1	3,5
b.	Sodium crystalises in a cubic structure. The edge of the unit cell is 4.3A°. The density of sodium is 963 kg/m^3 and its atomic weight is 23. What type of unit cell does sodium belong to?	**5**	3	3	3
c.	A silicon optical fibre with a core diameter large enough has a core refractive index of 1.50 and a cladding refractive index 1.47. Determine(i) the critical angle at the core cladding interface, and the numerical aperture for the fibre.	**5**	5	5	3
d.	Velocity of ultrasonic waves in mild steel is 5.9x10^3 m/s. The velocity of ultrasonic waves in brass calibrated for mild steel measured by an ultrasonic gauge meter is 4.8x10^3 m/s. If the thickness of brass plate measured by gauge meter is 12.8cm, calculate its real thickness.	**5**	4	4	3,5
Q2.	**(20 mark)**				
a.	Arrive at Schrodinger's time independent equation from its time dependent form.	**8**	2	2	2
b.	A He-Ne laser has an output power of 2.5mW. How many photons are emitted each milli second by this laser when operating?	**6**	5	5	3,5
c.	Derive an expression for interplanar spacing in parallel crystal planes in terms of Miller Indices.	**6**	3	3	3
Q3.	**(20 mark)**				
a.	Derive expressions for Numerical Aperture and Acceptance angle of Optical fibers.	**8**	5	5	3

b.	Evaluate the first three energy levels of an electron enclosed in a box of width 10A°. Compare it with those of a person of mass 80kg moving inside a potential well of width 1m. Comment on the results.	**6**	1	1	3
c.	2 ships are separated by a particular distance. Ultrasonic signals of frequency 150 kHz are sent from one ship to another through air and through water. Find distance between the ships and time required for the signal to travel through water. Given: velocity of the signal in air is 348 m/s and velocity in water is 1520 m/s and that the difference in times sent through water and air is 2s.	**6**	4	4	3
Q4.	**(20 mark)**				
a.	Explain HCP structure in detail mentioning clearly all the unit cell properties.	8	3	3	1, 3
b.	Evaluate the uncertainty in position of a particle if it has a wavelength corresponding to the wavelength output of a He-Ne Laser. Given: $\Delta\lambda$ is 0.69A°.	**6**	1&5	1 & 5	2,5
c.	An optical wire has light incident into the fiber from a liquid with an index of refraction of 1.33. If the index of refraction of the core is 1.58, what is the critical angle needed to achieve total internal reflection? Also calculate the Numerical aperture of the optical wire given that the fractional refractive index change is 0.05.	6	5	5	3,5
Q5.	**(20 mark)**				
a.	Explain construction and working of an Nd:YAG laser in detail.	**8**	5	5	1,2
b.	Copper has an FCC structure and atomic radius is 0.278nm. Calculate the interplanar spacing for (111) planes.	**6**	3	3	3
c.	Imagine an electron inside an infinite potential well of width 10A° in an energy state corresponding to the wavelength output of an Nd:YAG laser. Calculate the order of the excited state corresponding to this energy.	6	2&5	2	3,4
Q6.	**(20 mark)**				
a.	Explain the principle of working of a piezolectric oscillator in detail with a neat and labeled diagram.	**8**	4	4	3
b	Explain the working of a four level pumping scheme.	**6**	5	5	3
c.	Explain (with both mathematical and Physical reasoning) Heisenberg's Uncertainty Principle using the concept of a wave group.	**6**	1	1	3
Q7.	**(20 mark)**				
a.	Derive the Energy Eigen values and Eigen functions for a particle moving in an infinite height and of width L. Also sketch the probability function for the states n=1 and 2.	**8**	2	2	3
b.	Draw a diagram which clearly mentions important axes of a quartz crystal. Also mention different cuts of the quartz crystal.	**6**	4	4	3
c.	Wavelengths can be determined with accuracies of one part in 10^8. What is the uncertainty in the position of a 1.5A° X-ray photon when its wavelength is simultaneously measured?	**6**	1	1	3,5