Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

21/7/2023

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

Course Code: BS-BT201 **Maximum Points: 100**

Course Name: ICDE **Semester: II**

Integral calculus & Diff. Equations

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

F.E. (C, M, E) Term II

QN O.	QUESTION	POINTS	CO	BL	Module No.
Q1 a)	Evaluate $\int\int\int \frac{1}{(1+x+y+z)^3}\,dx\,dy\,dz$ over the volume of the tetrahedron $x=0, y=0, z=0, x+y+z=1$	06	4	2	7
Q1 b)	Solve $\sin x\frac{dy}{dx}+3y=\tan\frac{x}{2}$	06	1	3, 5	1
Q1 c)	Prove that $\int_0^3 \frac{x^{3/2}}{\sqrt{3-x}}\,dx \int_0^1 \frac{1}{\sqrt{1-x^{1/4}}}\,dx = \frac{432\pi}{35}$	08	2	1	3
Q2 a)	Evaluate : $\int_0^1 x^{q-1}\left[\left(\log\frac{1}{x}\right)\right]^{p-1}$	06	2	2	3
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	4	2	6
Q2 c)	Solve $(2x+1)^2\frac{d^2y}{dx^2}-2(2x+1)\frac{dy}{dx}-12y=6x$	08	1	3	2
Q3 a)	Solve $\frac{d^2y}{dx^2}+4y=x\sin^2 x$	06	1	2	2
Q3 b)	State and prove Duplication Formula	06	2	2	3
Q3 c)	If $\frac{dy}{dx}=y-x$ and $y(0)=2$ then using Taylor's series find y at $x=0.4$. Compare the result with exact solution.	08	1	4, 5	1
Q4 a)	Solve: $(D^2+2)y=e^x\cos x+x^2e^{3x}$	06	1	3	2

Q4 b)	Solve $\left(\frac{\log(\log y)}{x} + \frac{2}{3}xy^3\right)dx + \left(\frac{\log x}{y \log y} + x^2y^2\right)dy = 0$	06	1	2	1
Q4 c)	Show that the length of the arc of the curve $ay^2 = x^3$ from the origin to the point whose abscissa is 'b' is $\frac{8a}{27}\left\{\left(1+\frac{9b}{4a}\right)^{3/2} - 1\right\}$	08	3	3	4
Q5 a)	Find the total area of $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$	06	4	2	7
Q5 b)	Solve $[y\sin(xy) + xy^2\cos(xy)]dx + [x\sin(xy) + x^2 y\cos(xy)]dy = 0$	06	1	2	1
Q5 c)	Change the order of integration $\int_0^{2a}\left\{\int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} \phi(x,y)\,dy\right\}dx$	08	4	2	5
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	2	4	2
Q6 b)	Find the length of the cardiod $r = a(1 - \cos\theta)$ lying inside the circle $r = a\cos\theta$ in the upper half plane.	06		3	
Q6 c)	Express in polar coordinates and evaluate $\int_0^{4a}\left\{\int_{y^2/4a}^{y}\left(\frac{x^2-y^2}{x^2+y^2}\right)dx\right\}dy$	08	4	3	5
Q7 a)	Change the order of integration and evaluate $\int_0^{3}\left\{\int_{1}^{\sqrt{4-y}}(x+y)\,dx\right\}dy$	06	4	3	5
Q7 b)	Solve: $(D^3 + D)y = \cos t + t^2 + 3$	06	3	2	2
Q7 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	4	3, 5	1

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End Semester Examination Sem II 2022-2023

July 2023

24/7/23.

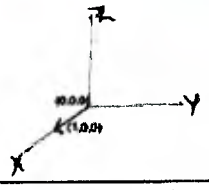
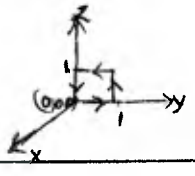
Total Marks: **100** Duration: **3 Hrs**

CLASS/SEM : **F.Y.B Tech (C/M/E) Sem.-II** COURSE NAME : **ENGINEERING PHYSICS-II**

COURSE CODE: **BSBT205** DATE: **24/07/2023**

- **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.	Test the fundamental theorem of gradients for the function $T=x^2+4xy+2yz^3$ along the path (0,0,0) to (1,0,0) as shown in the diagram. 	**5**	1	1	3,5
b.	Test if the following is a possible magnetic field: $\bar{v} = y^2\hat{i} + (2xy + z^2)j + 2yz\hat{k}$.	**5**	2	1	3,5
c.	What is the spacing between structures in a feather that acts as a diffraction grating, given that they produce a first-order maximum for 525-nm light at a 30.0° angle?	**5**	4	3	3
d.	Calculate the power delivered by a Ruby laser pulse, given that the pulse length in time is 10^{-9}s. Compare this with the Nd:YAG laser and comment on the result.	**5**	5	4	3,5
Q2.	**(20 mark)**				
a.	Test Stoke's theorem for the function $\bar{v} = 2yz\hat{j} + 3xz\hat{k}$ for a square surface of side unit length lying in the y-z plane. 	**8**	1	1	3,5

b.	(a) What visible wavelength has its fourth-order maximum at an angle of 25.0° when projected on a 25,000-line-per-centimeter diffraction grating? (b) What is unreasonable about this result? (c) Which assumptions are unreasonable or inconsistent?	**6**	4	3	3,5
c.	Derive Ampere's law in differential form from its integral form.	**6**	2	1	3
Q3.	**(20 mark)**				
a.	If $\overline{B}$ is uniform and $\overline{A} = -\frac{1}{2}(\overline{r} \times \overline{B})$, find $\overline{\nabla} \bullet \overline{A}$ and $\overline{\nabla} \times \overline{A}$ where $\overline{r}$ is the position vector.	**8**	2	1	3
b.	A He-Ne laser beam of aperture diameter 5mm is sent to the moon at a distance $4x10^8$m from earth. Determine (a) Angular spread and (b) Areal spread when it reaches the moon.	**6**	5	4	3
c.	Derive continuity equation from Ampere-Maxwell equation.	**6**	3	2	3
Q4.	**(20 mark)**				
a.	State Maxwell's equations and hence derive magnetic wave equation from Maxwell-Ampere equation.	**8**	3	2	1, 3
b.	Explain spherical polar co-ordinates and hence give expressions for line element and volume element in spherical polar co-ordinate system.	**6**	1	1	1
c.	A monochromatic light with a frequency of $8x10^{14}$ Hz is traveling through the air and is incident on a thin film coating of RI 1.2 on top of a piece of glass having RI 1.5. a) Determine the minimum thickness of the film that will result in constructive interference of the reflected light. b) Determine the minimum thickness of the film that will result in destructive interference of the reflected light.	**6**	4	3	3
Q5.	**(20 mark)**				
a.	Explain construction and working of a He-Ne laser in detail.	**8**	5	4	1,2
b.	State the expressions for curl and divergence of magnetic field and hence state Biot-Savart's law.	**6**	2	1	3
c.	State the intensity expression for Fraunhofer diffraction through a double slit. Also plot graphs of intensity distribution when b=2a.	**6**	4	3	3,4
Q6.	**(20 mark)**				
a.	Derive an expression for path difference of light when light gets reflected from a wedge shaped film. Also state conditions of constructive and destructive interference.	**8**	4	3	2
b.	Find the field and potential outside a uniformly charged sphere of radius R and total charge q. Consider the reference point at infinity.	**6**	1	1	3
c.	Derive the relation between vector potential and magnetic field. Suppose the vector potential $\overline{A}$ is given by $\overline{A} = xy\hat{i} + 2yz\hat{j} + 3xz\hat{k}$, find the magnetic field.	**6**	2	1	4
Q7.	**(20 mark)**				
a.	Derive Gauss' law in integral and differential form and hence write significance of the same.	**8**	1	1	3
b.	Derive Faraday's law in differential form and hence state electrodynamic equations before Maxwell.	**6**	3	2	3
c.	Describe in detail about the principle of construction and reconstruction in LASER holography.	**6**	5	4	3

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End Semester Exam

July 2023

F.Y. B.Tech (CME) Sem II

Max. Marks: 100 Duration: 3 Hours

Class: F.Y. B.Tech (CME) **Semester: II** Program: B.Tech CME

Course Code : HSM BT 208

Communication Skills 26/7/23

Note:

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

Sr. No	Questions	Points	CO	BL
Q.1 A.	"Should managers try to shut down the informal communication network if they discover that employees are spreading negative gossips or false rumors'? Why or Why Not?" 1. Explain the above question by describing the informal channel of communication in an organization its advantages and disadvantages and the strategies to make the channel effective. Illustrate with diagram the types of grapevine in an organisation.	**12**	**02**	**01**
Q.1.B.	**Write short Notes on any Two:(100 words)** 1. Importance of External Communication in a business organization 2. The seven C's of Effective writing 3. Four Quadrants of Johari Window Model 4. Types of Listening skills. 5. The Communication Process with diagram	**08**	**1,2,3,4**	**1, 2**
Q.2. A.	You are the Head of Computer Engineering department in your institute Sardar Patel college of Engineering. You are in the process of establishing a new computer lab for the first year engineering students. Write a letter to Wipro India Pvt. Ltd, asking them the configuration, details, guarantee, warranty,	12	05	3

	price lists, of the computers. Invent Necessary details. (Use Complete Block Form)			
Q.2.B.	Your friend has to deliver a speech of 5 minutes in the class. Explain in detail the talk power program and give him techniques to improve speaking.	08	04	3
Q.3.A.	Write a complaint letter to the sales manager of the company (Invent the name and address of the company) stating that you are not satisfied with the quality of the Executive chairs which you have purchased in bulk for an international conference to be hosted by your college next month. State the specific matter of complaint and inform them that you need a complete refund for the chairs. Invent necessary details (Use Modified block form).	12	5	6
Q.3.B.	**State True or False:** 1) The process of communication begins when the sender converts the idea into words or gestures. 2) It is the duty of the receiver to keep the communication channel free from interference. 3) The scope of 'ideation' is not determined by the situation. 4) Formal communication channels are based on social relationships in which employees talk about work during formal social gatherings 5) A business proposal from the branch manager of a company to the managing director of the company is an example of horizontal communication. 6) Body language includes both intentional and unintentional messages 7) Everyone can control facial expressions 8) Chronemics is the study of color in non-verbal communication.	08	02	02
Q.4. A.	"Body Language is entirely unconscious and involuntary". Write a detailed note on Non-verbal communication and explain its significance and importance. (350 words)	12	03	04
Q.4. B.	**Read the following Case Study and answer the questions that follows:** 1. Mr. Lele was the National sales head of a media giant. He announced in front of staff members of all the company's branches across India that the following year, " *All the sales executives would get an equal opportunity to be promoted and given perks if they could achieve the sales targets*".	08	02	05

	The message was continuously echoed throughout the year to sales executives in different forums, and it appeared that the company and Mr. Lele were very serious about implementing this incentive. The first step Mr. Lele did was to make the target too high. The sales executives worked hard during their selling cycle and 3 members achieved the revenue target of 5 lakhs. In the performance appraisal discussion all the three demanded the perks and promotion. However none was given one. Lele told the first executive, 'You have achieved the target but not the volume'. To the second he told, 'You have achieved the target but you are in your probation period. We will see your performance next year. To the third he said, "you are a top performer but your team members are not happy with you. You are a poor team player. After one month the top sales executives resigned from the company. The remaining went on strike. The complaint went to the CEO of the company and he called for an immediate meeting with Mr. Lele. Q.1. Identify the barriers to communication in the above situation. 02 Q.2. What steps should be taken to overcome the barrier? 02 2. Identify the barriers in the given situations: (02 each) 1) "Every time I have a meeting with Mr.Gupta, I end up disagreeing with him about a particular issue". 2) Teacher: 'Students, why haven't you submitted the report within the fortnight?' Students: 'But you asked us to submit it bimonthly!'			
Q.5.A.	"Formal channels of communication flows along prescribed channels which all members desirous to of communicating with one another are obliged to follow". Explain with the help of diagram the formal channels of communication in an organisation. Describe the objectives, and limitations of upward communication.	12	05	03
Q.5.B.	**Write short notes on any two:** 1) Oculesics as means of non-verbal communication 2) You-Attitude in a business letter	08	04	03

	3) AIDA principle of sales letter			
Q.6.A.	Write an effective sales letter to promote your newly launched coaching classes for engineering students.	10	05	03
Q.6.B.	Draw the modified block format mentioning the eight basic parts of a letter.	04		
Q.6 C.	**Match the column:** a. Enquiry — Left Adjustment b. Reply to enquiry — contract c. order — Adjustment of claim d. Apology — Asking for quotations e. Regret — Readers point of view f. Complete block format — Letter of complaint	06		
Q.7 A.	Read the following passage and answer the questions: Like most of my generation, I was brought up on the saying: 'Satan finds some mischief for idle hands to do.' Being a highly virtuous child, I believed all that I was told, and acquired a conscience which has kept me working hard down to the present moment. But although my conscience has controlled my actions, my opinions have undergone a revolution. I think that there is far too much work done in the world, that immense harm is caused by the belief that work is virtuous, and that what needs to be preached in modern industrial countries is quite different from what always has been preached. Everyone knows the story of the traveler in Naples who saw twelve beggars lying in the sun, and offered a lira to the laziest of them. Eleven of them jumped up to claim it, so he gave it to the twelfth. This traveler was on the right lines. But in countries which do not enjoy Mediterranean sunshine, idleness is more difficult, and a great public propaganda will be required to inaugurate it. I hope that, after reading the following, the leaders of the Y.M.C.A. will start a campaign to induce good young men to do nothing. If so, I shall not have lived in vain. But in all seriousness, I truly believe that a great deal of harm is being done in the modern world by belief in the virtuousness of work, and that the road to happiness and prosperity lies in an organized diminution of work. First of all: what is work? Work is of two kinds: first, altering the position of matter at or near the earth's surface relatively to	20	01	06

other such matter; second, telling other people to do so. The first kind is unpleasant and ill paid; the second is pleasant and highly paid. The second kind is capable of indefinite extension: there are not only those who give orders, but those who give advice as to what orders should be given. Usually two opposite kinds of advice are given simultaneously by two organized bodies of men; this is called politics. The skill required for this kind of work is not knowledge of the subjects as to which advice is given, but knowledge of the art of persuasive speaking and writing, i.e. of advertising.

From the beginning of civilization until the Industrial Revolution, a man could, as a rule, produce by hard work little more than was required for the subsistence of himself and his family. The small surplus above bare necessities was not left to those who produced it, but was appropriated by warriors and priests. Much that we take for granted about the desirability of work is derived from this system, and, being pre-industrial, is not adapted to the modern world. Modern technology has made it possible for leisure, within limits, to be not the prerogative of small privileged classes, but a right evenly distributed throughout the community. The morality of work is the morality of slaves, and the modern world has no need of slavery.

It is obvious that, in primitive communities, peasants, left to themselves, would not have parted with the slender surplus upon which the warriors and priests subsisted, but would have either produced less or consumed more. At first, sheer force compelled them to produce and part with the surplus. Gradually, however, it was found possible to induce many of them to accept an ethic according to which it was their duty to work hard, although part of their work went to support others in idleness. The conception of duty, speaking historically, has been a means used by the holders of power to induce others to live for the interests of their masters rather than for their own. Of course, the holders of power conceal this fact from themselves by managing to believe that their interests are identical with the larger interests of humanity. Sometimes this is true; ancient Athenian slave-owners, for instance, employed part of their leisure in making a permanent contribution to civilization which would have been impossible under a just economic system. Leisure is essential to civilization, and in former times leisure for the few was only rendered possible by the labors of the many. But those labors were valuable, not because work is good, but because leisure is good. And with modern technology, it would be possible to distribute leisure justly without injury to

civilization.

1. Which of the following best describes the relation between work, leisure, and civilization? 01

1] Leisure is what makes work valuable and equitable distribution of leisure is vital to civilization.
2] Leisure is important for civilization, but not as important as work, and the latter is what makes the former possible.
3] Leisure is vital to civilization, while work, as the product of an outdated social order, is irrelevant to modern civilization.
4] Though leisure is important for civilization, it is not possible for all members of society to enjoy it, as some must do productive work.

2. Which of the following correctly states the gist of this passage? 01

1] Historically, leisure has been the privilege of only a few people. But this will soon change as modern technology changes contemporary civilization.
2] Historically, leisure has been the privilege of only a few people. But this is a relic of a pre-industrial society, and should have no place in modern civilization.
3] Historically, work has been unfairly emphasized over leisure. But this is a relic of a pre-industrial society, and should have no place in modern civilization.
4] Historically, work has been unfairly emphasized over leisure. But this will soon change as modern technology changes contemporary civilization.

3. What is the point of the anecdote of the twelve beggars? 01

1] The laziest beggar was so lazy that he wasn't even interested in making money.
2] Though the laziest beggar was not actually very lazy, he got the reward because he did not attempt to claim it.
3] The laziest beggar was so lazy that he did not even make an effort to prove that he was lazy.
4] The laziest beggar, unlike the others, did not care about material rewards, so he did not attempt to claim the lira.

4. What is the relation of the first paragraph to the rest of the passage? 01

1] It provides a rather roundabout way of getting to the main point of the passage.
2] It provides a slightly tongue-in-cheek introduction to the serious topic of the passage.

	3] It introduces the topic of the passage by using a proverb and anecdote that state the opposite. 4] It introduces in brief all the main points that the author goes on to discuss in the rest of the passage. **5. The example of the ancient Athenian slave-owners in the last paragraph shows that .... 01** 1] An unjust economic system deliberately cultivated by holders of power, sometimes affords them the leisure to make permanent contributions to civilization. 2] A just and equal society is not always a desirable thing, as the ancient Athenians, who had unjust practices like slavery, made permanent contributions to civilization. 3] Though the ancient Athenians had unjust practices like slavery, the slaves were treated so well that they even had leisure to make permanent contributions to civilization. 4] A just and equal society is not always a desirable thing, as the slaves of the ancient Athenians, in spite of the injustice meted out to them, made permanent contributions to civilization. **6. The author is likely to disapprove of which of the following? 01** 1] A rich politician who works long hours 2] A poor laborer who refuses to do any work 3] A philosopher who does not do any work 4] An artist who works only in intervals **7. Give synonyms for the following words: 01** a. Subsistence b. leisure **8. Write a summary of the passage in 100 words. 05**			
Q.7. B	**Give one word substitute for the following: 05** a. An unconventional style of living._____ b. A person who has changed his faith_____ c. A person who is incapable of being tampered with _____ d. A person who is primarily concerned with making money at the expense of ethics e. A community of people smaller than a village _____			
Q.7.C	**Add prefixes to the following words to produce antonyms:** i. Sophisticated ii. Toxic			
	The End			

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END SEMESTER-II EXAMINATION JULY 2023

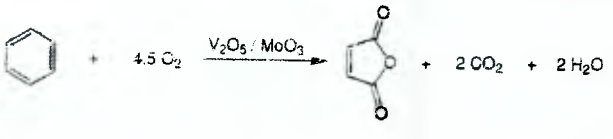
Program: F.Y. B.Tech C, M, E Sem II **Duration:** 180 Min

Course Code: BS-BT-206 **Maximum Points:** 100

Course Name: Engineering Chemistry-II 28/7/23 **Semester:** II

Instructions:

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

Q.No.	Questions	Points	CO	BL	Mod. No.
Q1					
a	A Coal sample contain following composition by weight C=86%, H=3%,O=4%, S=1%,N=5% and Ash=1% calculate gross and net calorific value	5	2	3	2
b	A coal sample subjected to ultimate analysis. 3.0 g of coal on combustion in bomb calorimeter gave 0.75g $BaSO_4$. Calculate percentage of sulphur content in sample	5	2	1	2
c	Calculate the Atom Economy for following reaction $CH_3\text{-}NH_2 + COCl_2 \dashrightarrow CH_3\text{-}N{=}C{=}O + 2HCl$	5	3,4	3	5
d	Calculate the Atom Economy for following reaction 	5	3,4	3	5
Q2					
a	Write a short note on the cetane value of diesel fuel	5	2,3	1	2
b	Explain biodiesel synthesis with its advantages	5	3	2	2
c	Explain the determination of nitrogen content by ultimate analysis with its chemical reaction, calculation, and its significance	10	2,4	2	2
Q3					
a	Explain differential aeration corrosion with suitable example	5	1	2	1
b	Write the difference between wet and dry corrosion	5	1	1	1

END SEMESTER-II EXAMINATION JULY 2023

c	Explain wet corrosion with a suitable reaction, diagram, and mechanism	10	1	2	1
Q4					
a	Explain 12 Principal of green chemistry	5	4	2	5
b	Explain the atom economy of a chemical reaction with significance	5	1	3	5
c	Write different types of addition reactions with examples and explain the mechanism of electrophilic substitution reaction	10	4	2	4
Q5					
a	Write the difference between octane and cetane value	5	2	3	2
b	Explain knocking in internal combustion engines, and how it related to the carbon chain in the fue	5	2	1	2
c	Define fuel with classification and write the ideal characteristics of good quality fuel	10	2	2	2
Q6					
a	Write the difference between anodic and cathodic coating for the protection of metal from corrosion	5	2,4	1	3
b	Explain the electrochemical and galvanic series.	5	2,4	2	3
c	Explain different methods for protection of metal from the corrosion process	10	1	1	2

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End Semester – July 2023 Examination

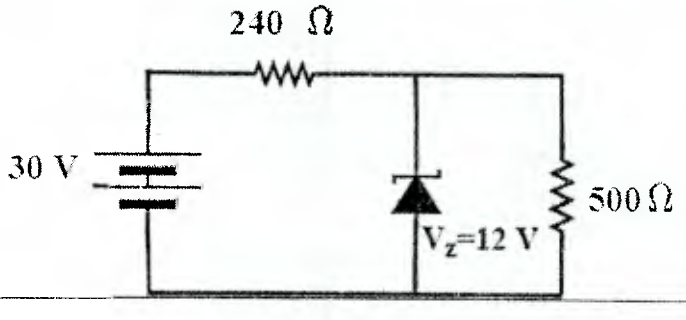
31/7/23

Program: B.Tech (C/M/E)
Course Code: ES-BT202
Course Name: BEE

Duration: 3h
Semester: II
Maximum Points: 100

Basic Electronics Engg.
F.Y. B.Tech (Sem. II) (C.M.E). Sem II

- Attempt any **five** questions.
- Make suitable assumptions wherever necessary.
- Club all sub question together.

Q.No	Questions	Points	CO	BL	Module
Q1. (a)	Compare Bipolar junction transistor and Field effect transistor.	5	1	5	2,3
(b)	Derive the relation between α and β in a BJT. What are their typical values? Find the value of β if α=0.99.	5	1	6	2
(c)	Write the truth table for the NOT, AND and OR basic gates.	5	4	1	5
(d)	Explain the ideal characteristics of an OP-AMPS	5	3	2	4
Q2(a)	Explain the working of π- filter connected to full wave rectifier. Derive the ripple factor for the same.	8	2	2	1
(b)	A FWR uses two diodes and a centre tapped transformer. Primary of a transformer is operated with 230V ac, 50 Hz main. The turn ratio of the transformer is 10.It uses a *π filter with L* =3 H and C=550μ F, the load current is 1A and the load resistance is 10Ω. i. Calculate ripple voltage across the load. ii. Calculate ripple voltage across the load if the above rectifier uses LC filter *with L* =2 H and C=350 μF. iii. Performance of which filter is better.	6	2	3	1
(c)	Circuit of a Zener diode shunt regulator is shown below. Calculate (a) the load voltage (b) voltage drop across series resistance and (c) current through the Zener diode. 	6	2	3	1

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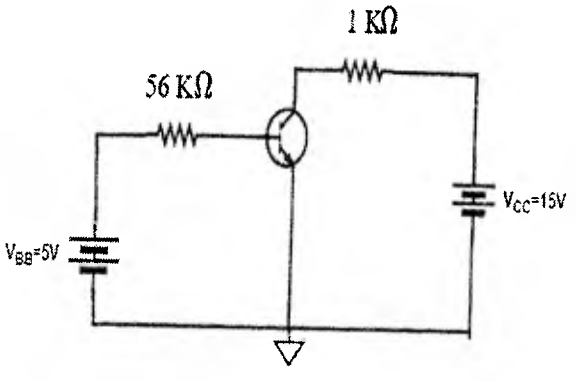
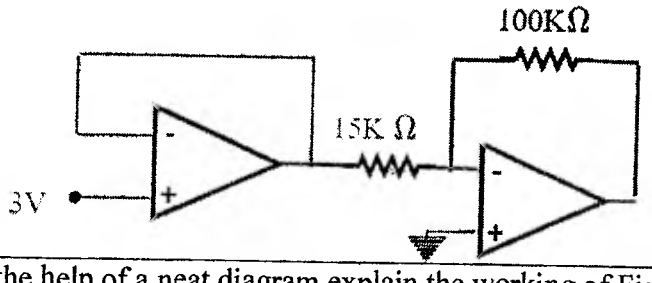
End Semester – July 2023 Examination

Q3.(a)	Explain the Cut-off, Saturation and active region for BJT with common emitter configuration with the help of a neat diagram.	8	1	2	2
(b)	An N-P-N transistor at room temperature has its emitter disconnected. A voltage of 5V is applied between collector and base. With collector positive, a current of 0.4μA flows. When the base is disconnected and the same voltage is applied between collector and emitter, the current is found to be 30μA. Find α, I_E and I_B when collector current is 2mA.	8	1	3	2
(c)	Sketch the transfer curve of FET when I_{DSS} is 12mA and V_p is -6V.	4	1	3	3
Q4.(a)	For an N channel JFET, I_{DSS}=8.7 mA, V_p=-3V, V_{GS}=-1V; calculate I_D, g_{mo} and g_m.	6	1	3	3
(b)	Figure shows base bias circuit. Find (a) I_B (b) I_C (c) V_{CE} (d) draw the load line and marked the I_C (sat), V_{CE} (off), operating point Q. 	8	1	3	2
(c)	Find the output voltage of the following circuit, 	6	3	3	4
Q5. (a)	With the help of a neat diagram explain the working of Field effect transistor. Why at pinch off voltage the drain current does not ceases. Explain the drain characteristic of FET when V_{GS}=0.	10	1	3	3
(b)	Realize basic gates using NAND and NOR universal gates	10	4	5	5

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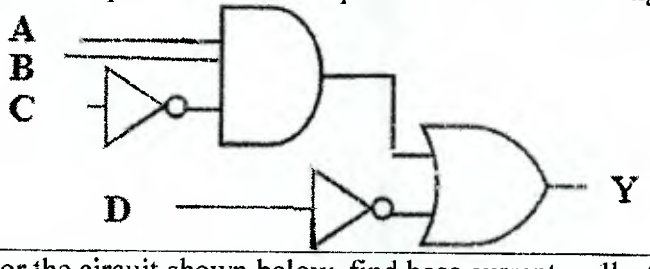
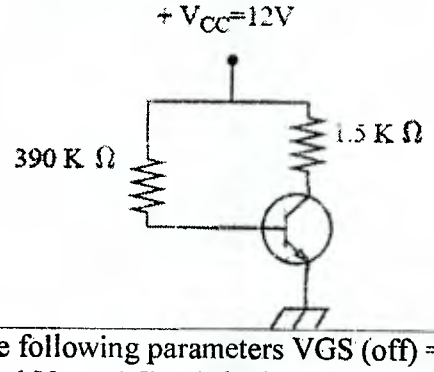
Q6.(a)	Using rules of Boolean algebra simplify the given expression and implement using basic gates. Draw circuit diagram neatly. $A\bar{C}+B\bar{C}D+A\bar{B}\bar{C}+ACD$	8	4	3	5
(b)	Design an OP-AMP circuit that will produce an output equal to $-(4V_1+V_2+0.1V_3)$	4	3	6	4
(c)	Explain with the help of neat diagram OP-AMP as an inverting and non-inverting amplifier.	8	3	2	4
Q7 (a)	Write simplified Boolean expression for the following circuit 	4	4	3	5
(b)	For the circuit shown below, find base current, collector current and collector emitter voltage, if $\beta = 150$. Also comment in which region BJT is operating. 	6	1	3	2
(c)	A FET has the following parameters VGS (off) = -8V, I_{DSS}=32mA and V_{GS}=-4.5V. Calculate the value of the drain current.	3	1	3	3
(d)	A full wave rectifier uses 2 diodes each having a forward resistance of 25Ω. The RMS value of a secondary voltage fed between centre tap to each secondary terminal is 48V. Load resistance is 1KΩ. Calculate: (i) DC output voltage (ii) DC output current (iii) Rectification efficiency (iv) Power delivered to the load (v) PIV (vi) Draw Thevenin equivalent circuit	7	2	3	1

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End Semester Examination

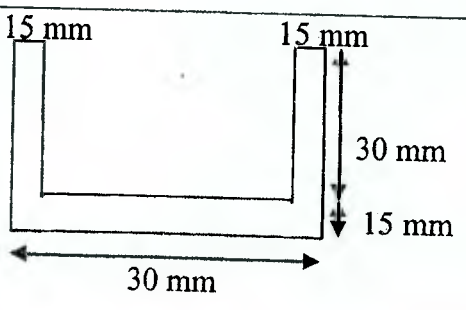
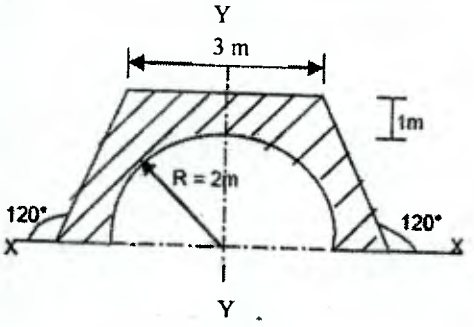
2nd August 2023 2/8/23

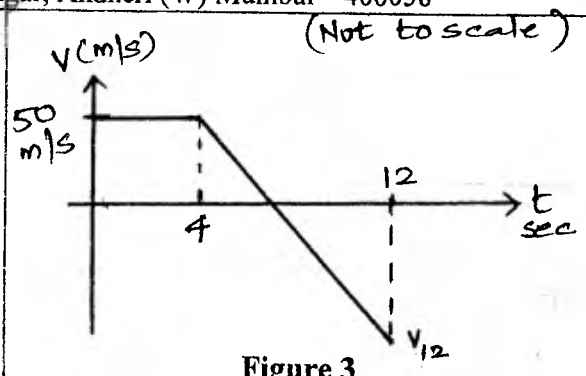
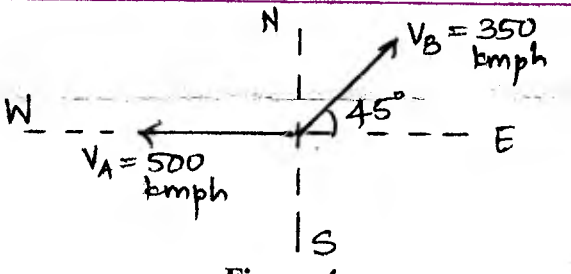
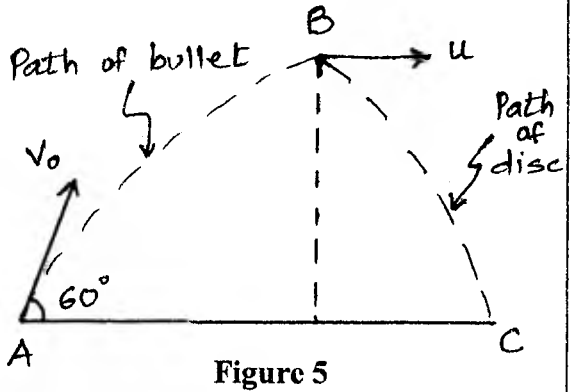
Program: UG First Year
Course Code: ES-BT204
Course Name: Engineering Mechanics - II

Duration: 3 Hours
Maximum Points: 100
Semester: II

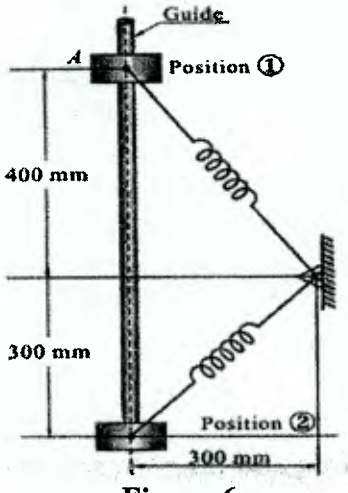
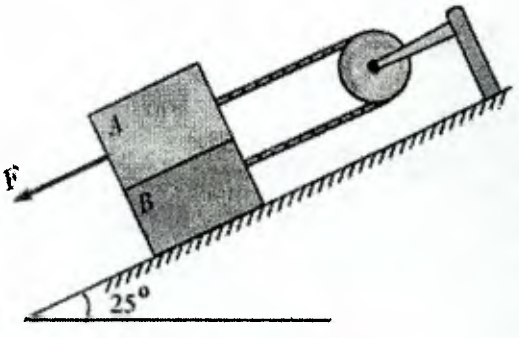
Notes: F.Y. B.Tech (C, M, E) Sem II

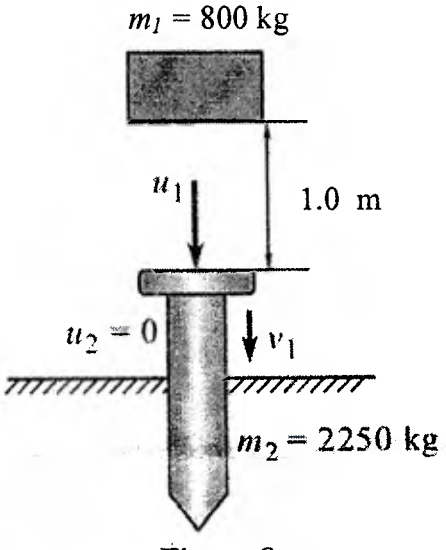
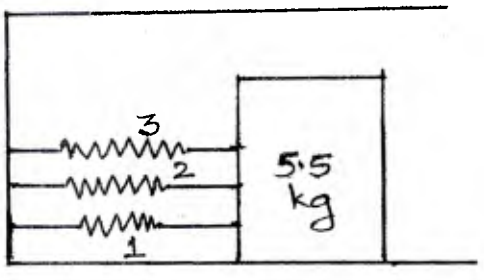
- **Solve any five main questions.**
- Start a new question on a new page and group all sub-questions together.
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum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

Q. No.			Points	CO	BL
1	a	Find the centroid with respect to the base for the cross-section shown in Figure 1  **Figure 1**	8	1	3
1	b	Calculate the moment of inertia of the shaded area about XX and YY as shown in Figure 2.  **Figure 2**	12	1	3
2	a	A particle travels along a path defined by $y = 0.5 x^2$. If the x component of velocity is $v_x = 6t$ m/s, determine the distance of the particle from the origin and its acceleration when t = 1 second, if at t = 0, x = 0 and v = 0.	12	2	3

2	b	A particle moves along X axis with an initial velocity of 50 m/s at the origin when t = 0. For the first 4 seconds, it has no acceleration and there after it is acted upon by a retarding force which gives constant retardation of 10 m/s^2. Calculate the velocity and position at t = 8 seconds, and t = 12 seconds. Also find the maximum positive coordinate.	 Figure 3	8	2	3
3	a	Two planes A and B are flying horizontally at the same altitude as shown in Figure 4. A is flying due west at a constant speed of 500 kmph and B is flying north east with constant speed of 350 kmph. Determine the displacement of B with respect to A after 1 ½ hours.	 Figure 4	6	2	3
3	b	A gunman standing on the ground fires from his gun to hit a disc flying at an altitude of 20 m from the ground. The angle of projection is 60° upwards with the horizontal. If the bullet hits the bird 2.5 seconds after the firing, find the velocity of the bullet when it leaves the gun. Also find the time it takes for the disc to reach the ground. Neglect the height of the gunman.	 Figure 5	8	2	3
3	c	Explain elastic, semi-elastic and plastic impact with examples.		6	3	1

P. T. O.

4	a	A collar A of 10 kg mass moves in a vertical guide as shown in Figure.6 Neglecting the friction between the guide and the collar, find its velocity when it passes through position 2 after starting from rest in position 1. The spring constant is 200 N/m and the free length of the spring is 200 mm.	 Figure 6	8	3	3
4	b	Block A has a mass of 30 kg and block B has a mass of 20 kg. $\mu_s = 0.2$ and $\mu_k = 0.15$. The arrangement of blocks is shown in Figure 7. Determine (i) the minimum force F that has to be applied on the block A to develop the impending motion and (ii) the acceleration of block A if applied force F = 400N	 Figure 7	12	3	3
5	a	Boy A throws a ball vertically up with a speed of 9 m/s from the top of a shed 2.5 m high. Boy B on the ground throws a ball vertically up with a speed of 12 m/s. Determine the time at which the two balls will be at the same height above the ground. What is the height?		10	2	3
	b	A car and a truck are both traveling with a constant speed of 45 kmph. The car is 10 m behind the truck. The truck driver suddenly applies his brakes, causing the truck to decelerate at a constant rate of 2 m/s^2. Two seconds later the driver of the car applies his brakes and just manages to avoid a rear end collision. Determine the constant rate at which the car decelerated.		10	2	3
6	a	A particle moves in the X-Y plane with an acceleration $\vec{a} = -3\vec{i} - (16t)\vec{j}$ m/s^2. If it starts at the origin with a starting velocity of 50 m/s directed at 30° to the X-axis, compute at t = 2 seconds, the radius of curvature of the path, tangential acceleration, and normal acceleration.		15	2	3
	b	Two balls having 20 kg and 30 kg masses respectively are moving towards each other with velocities of 10 m/s and 5 m/s respectively. If after the impact, the ball with 30 kg mass moves with velocity of 6 m/s to the right then determine the coefficient of restitution between the balls.		5	3	3

7	a	A 800 kg drop hammer of pile driver falls from a height of 1.0 m on top of a pile as shown in Figure 8. The pile is driven 70 mm into the ground. Assuming perfectly plastic impact, determine the average resistance of the ground to penetration. The mass of the pile is 2250 kg.	 Figure 8	12	3	3
	b	A block of mass 5.5 kg can slide without friction in a slot and attached to three springs as shown in Figure 9. The springs are initially unstretched when the block is pushes to the left 50 mm and released. Determine the maximum velocity of the block if $k_1 = 1$ kN/m, $k_2 = 2$ kN/m and $k_3 = 4$ kN/m. Also determine the velocity of the block when it is 20 mm from initial position.	 Figure 9.	8	3	3

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End Semester – July 2023 Examinations

Program: C/E/M

Course Code: ES-BT207

Course Name: Computer Programming

4/8/23

Duration: 2 hours

Maximum Points: 100

Semester: II

F.Y. B. Tech (E,I,M,E) Sem II

- **Attempt any 5 out of 7**
- **Make suitable assumptions wherever necessary**

Q.No.	Questions	Points	CO	BL
1a.	Write a program to print the following patterns. Use the concept of Nested loops. i. 1 2 3 4 5 6 7 8 9 10 ii. * * * * * *	10	1	3
1b.	Write a program to input three numbers and find the greatest amongst the three.	10	1	3
2a.	Write a program to input matrix A. Find the transpose of the same	10	2	3
2b.	Write a program to enter 100 integer numbers in an array of integers. Enter another number and search whether that number is present in the array or not. If it is present then display how many times it is present.	10	2	3
3a.	Explain the different Types of Inheritance. Write a program to illustrate single inheritance.	10	3	2
3b.	Explain the following with an example i. while loop ii. If-else statement	10	1	2

4a.	Write a program to add two complex numbers. Create a default constructor and a parameterized constructor for the same. The function which is performing the addition operation will except two objects as arguments and will not return anything.	10	2	3
4b.	Discuss i. Relational operators ii. Arithmetic operator iii. Logical operators	10	1	2
5a.	Discuss the salient features of OOPs. Write a program to explain the concept of classes and objects.	10	3	2
5b.	Write an algorithm and draw a flow chart to swap two numbers.	10	1	2
6a.	Explain the concept of local, global and static variables with an example.	10	2	2
6b.	What are high level and low level languages? Explain the function of Assembler, Compiler and Interpreter related to program execution.	10	1	2
7.	Write short note on any 2 i. Recursive functions ii. Function overloading iii. Call by value and call by reference	20	2	2

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END-SEMESTER EXAMINATION JULY-AUG.2023

Program: F.Y.B.Tech (~~A/B/C~~) (C, M, E) Sem II 7/8/23 **Duration: 3 Hrs**

Course Code-MC-BT001. **Maximum Points: 100**

Course Name: Constitution of India **Sem-II**

Instructions: 1) Attempt Any Five Questions 2) Label the answers with suitable articles.

Q. No.	Questions	Points	CO	BL	PI	Module No.
Q1A	Choose the correct alternatives from the following: 1) The constituent assembly of India was set-up on the recommendation of _____mission. a) Simon b) Hunter c) Cabinet d) Cripps 2) Right to education is provided in article _____. a) 50A b) 21A c) 39A d) 75 3) _ _____is an introduction to the constitution of India. a) Preamble b) Escheat c) Doctrine of severability d) Bill of Rights 4) Fundamental Rights are referred in article _____. a) 36-51 b) 352-360 c) 324-328 d) 12-35 5) Provisions of amendment are adapted from the constitution of _____. a) Germany b) Canada c) South Africa d) USA 6) The president of India is removed by _____ process. a) Impeachment b) Escheat c) Doctrine of lapse d) Doctrine of severability 7) Money bill is initiated only in _____at union parliament. a) Rajya sabha b) Lok sabha c) Vidhan Parishad d) Legislative council	10	3	5	6.1.1	3

END-SEMESTER EXAMINATION JULY-AUG.2023

	8) Provisions of Emergency are adapted from constitution of _____. a) USA b) England c) France d) Germany 9) Directive principles are referred in article_____. a) 14-18 b) 36-51 c) 51A d) 368 10) Fundamental Duties are inserted in article ____ a) 32 b) 39A c) 51A d) 352					
Q1B	Answer the Following:- 1) Explain the term Constitution 2) Define the term Justice. 3) What is meant by Preamble? 4) State the concept "Judicial review " 5) Explain the term Preventive detention?	10	3	5	6.1.1	1
Q2A	Explain the key words referred in the preamble to Indian constitution.	10	2	4	6.2.1	1
B	Describe the fundamental duties and its criticism.	10	3	2	6.1.2	5
Q3A	Explain the writs as referred in Article 32.	10	1	2	6.1.1	2
B	Describe the status and role of Rajya Sabha.	10	2	3	8.2.1	4
Q4A	Narrate the salient features of Indian constitution	10	3	4	6.1.1	2
B	Critically examine the Issue of Reservation.	10	2	3	6.2.1	5
Q5A	Write a note on Uniform Civil Code.	10	3	1	8.2.2	5
B	Describe the Federal and Unitary features of Indian Constitution.	10	2	3	6.2.1	4
Q6A	Analyze the Directive Principles of State Policy.	10	2	1	6.2.1	5
B	Explain the role and functions of Indian Parliament.	10	2	2	6.1.2	4
Q7A	Describe the Fundamental Rights and its features.	10	1	3	6.2.1	3
B	Describe the Composition and Workings of Constituent Assembly.	10	3	2	8.2.1	2