Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination

F.E

JUNE-2024

ELECTRICAL/MECHANICAL/CIVIL **Duration: 03 Hours** 10/6/24

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

Course Name: FCDE **Semester: II**

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

Integral Calculus and 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 : $\int_0^\infty xe^{-x^8}dx \cdot \int_0^\infty x^2 e^{-x^4}dx = \frac{\pi}{16\sqrt{2}}$	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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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

Comm. 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 characterlstics 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 comprehenslon: 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 taa busy to listen ta their students' difficulties. Students find them preparing the next day's lecture, carrecting scripts, daing administrative jabs, or discussing callege problems with ather teachers.* *Geeta, an Engineering student finds herself appraaching her Head af Department, wha seldom encaurages students to discuss their persanal prablems ar any caurse related questians ar cancerns. The teacher brushes her off by painter her mistakes, shauting at her publicly and saying she is toa busy to deal with her problems.* ***Geeta:*** *Madam?* ***Ms. Sanika:*** *Yes?* ***Geeta:*** *Can I talk ta yau far a minute? I need yaur help.* ***Ms. Sanika:*** *Nat Naw Geeta, I am making papers and I have lat of papers to carrect. I am alsa busy with ather department related wark.* ***Geeta:*** *Madam then can I see yau after my class, Please?* ***Ms. Sanika:*** *No Not taday. I have to attend the faculty meeting and alsa have ta prepare far tomarrow's lectures. Why don't you approach Rita Madam?* ***Geeta:*** *Madam, I had actually first gane ta Rita Madam. She alsa tald me she is nat free. She toa was busy with same administrative work.* ***Ms. Sanika:*** *Yes, Geeta, we all are very busy till the end af this manth. And yes, attend lectures regularly so that yau da nat have ta come with prablems ta us.*	08 02 each questi on.	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 details 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 all 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 balance against you has been steadily increasing during the past 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 manth, and the first installment should reach us by the 7 July. Meanwhile, you shall to pay cash for all further gads; we are allowing you on extro 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 shall 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-II EXAMINATION JUNE 2024 14/6/24

Program: F.Y. B.Tech Mechanical Sem II **Duration:** 180 Min

Course Code: BS-BTM-102 **Maximum Points:** 100

Course Name: Engineering Chemistry **Semester:** II

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

Q.No.	Questions	Points	CO	BL	Mod. No.
Q1					
a	Explain differential aeration corrosion with suitable example	5	1	2	1
b	Write the difference between electrochemical and galvanic series	5	1	1	1
c	Explain dry corrosion with a suitable reaction, diagram, and mechanism	10	1	2	1
Q2					
a	Write difference between anodic and cathodic coating	5	1	1	2
b	Explain the sacrificial anode cathodic protection method for the protection of metal from the corrosion process	5	1	2	2
c	Explain different methods for the application of metal coating	10	1	2	2
Q3					
a	Explain gross and net calorific value of fuel sample	5	2	2	3
b	Write short note on octane value of petrol fuel	5	2	1	3
c	Explain determination carbon and hydrogen content ultimate analysis with its significance	10	2,4	2	3
Q4					
a	Write a short note on the acid value of lubricant with its significance	5	4,3	1	4
b	Define lubricant. Explain flash point and fire point with its significance	5	4	1	4
c	Describe the different types of solid, semisolid, and liquid lubricants with suitable examples	10	4,3	3	5

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END SEMESTER-II EXAMINATION JUNE 2024

Q5					
a	Explain advantages of catalytic cracking over thermal cracking process	5	1,2	3	3
b	why anodic coating is better than cathodic coating	5	1	1	2
c	Write factor affecting rate of the corrosion process	10	1	1	1
Q6					
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,	4	3
b	A coal sample subjected to ultimate analysis. 3.0 g of coal on combustion in bomb calorimeter gave 0.95g BaSO4. Calculate percentage of sulphur content in sample	5	2	4	3
c	3.2 gram of coal was heated in Kjeldahls flask and NH_3 evolved was absorbed in 40ml of 0.5N H_2SO_4. After absorption, the excess of acid required 16 mL of 0.5N of KOH for neutralization. Find out the percentage of nitrogen content in a coal sample (value of blank titration =40mL)	5	2	4	3
d	2.5 gram of vegetable oil was mixed with 50 mL 0.5N KOH solution and heated for 1 hour. The mixture required 26.4 mL of 0.5 N HCl. The blank titration reading was 49mL. find out the saponification value of an oil sample	5	4	4	4

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19/6/24

END SEMESTER EXAMINATION JUNE 2024

F.Y. B. Tech Sem II

Program: Mechanical Engineering **Duration: 3Hour**

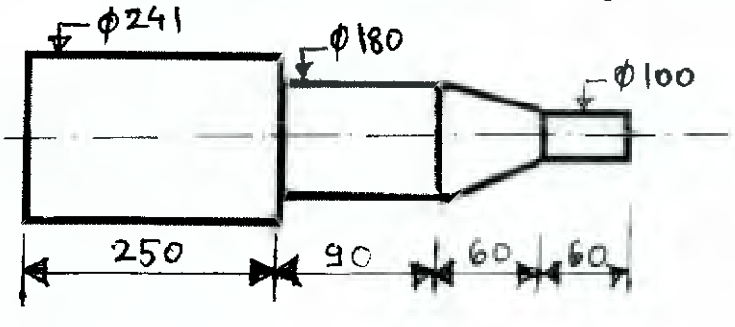
Course Code: PC BTM 201 **Maximum Points: 100**

Course Name: Manufacturing Processes **Semester: 2**

Note: 1) **Question no. 1 is compulsory**

2) *Solve any four questions out of remaining five questions*

3) Write solution point-wise.

Q.No	Questions	Pt	CO	BL	Module No.
Q1	**A]** Determine optimum dimensions and location of cylindrical riser to be used for casting as brass cuboid (100 mm * 80 mm * 60 mm). The volume shrinkage of the brass during solidification is 2%? [10M] **B]** Explain ring rolling process with reference to Advantage, Application and its Sketch? [5M] Give detailed explanation on gas metal arc welding (GMAW) and give its advantages over shielded metal arc welding? [5M]	20M	1,2	1,2	1,2
Q2	**A]** Calculate total machining time to turn "Al6160" solid cylindrical rod of diameter 251 mm X length 500 mm into finish component as shown in below figure? For, *straight O.D. turning and face turning* – Cutting velocity is 20 m/mn, feed is 0.25 mm/rev & depth of cut is 1 mm. For, *taper O.D. turning* – Cutting velocity is 25 m/min, feed is 0.2 mm/rev & depth of cut is 0.5 mm. [Note – i) For calculating machining time of each next pass of outer diameter (O.D) turning, consider existing diameter of work piece at that instant for cutting rotational speed (N_i rpm) calculations, ii) Work holding device will require 25 mm as grip length]? [10M]  **B]** What are the different special purpose lathe machine tools, give their applications? [5M] Draw neat labelled sketch of standard arbor used in milling machine and gang milling operation? [5M]	20M	1,2	1,3	3
Q3	**A]**	2	1,3	2,3	3,4

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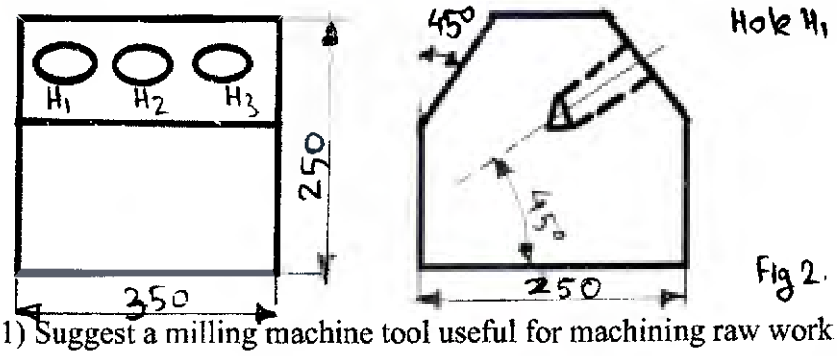
END SEMESTER EXAMINATION JUNE 2024



	1) Suggest a milling machine tool useful for machining raw work piece (252 mm*252 mm*352 mm) into finished component as shown in above figure 2. Work holding device used for this operation is plain vice. Component to be manufactured in minimum number of set-up. 2) Give sequence of machining operations (Pre and final machining) in tabular form giving details of machined surfaces, milling cutter in a sequence? 3) Calculate time for pre-machining of all six plain faces only, refer following data; Cutting tool End mill cutter Dia 25.4 mm * Length 150 mm with 4 teeth Work holding device Plain vice Cutting velocity of cutter: 30 m/min and feed is 0.25 mm/tooth Approach and over-run distance are same and equal to 15 mm? **[10M]** **B]** Give material removal mechanism and applications of ultrasonic machining process? [5M] Draw neat schematic sketch of abrasive jet machining process set-up? [5M]	0 M			
Q4	**A]** Estimate best welding speed to be used for welding of 8 mm mild steel plates with an ambient temperature of 30° C with welding transformer set at 45 V and current passing is 300 A. Arc efficiency is 0.85 and possible travel speeds are 5 to 10 mm/s, limiting cooling rate for satisfactory performance is 6° C/s at a temperature of 600° C. Data- k= 0.028 J/mm.s.°C, R= 6° C/s, To = 30° C, Tc = 600° C, V= 45 V, I = 300A, ρ*c = 0.005 J/mm³°C. For thick plate, rate of cooling, $R = \frac{2\pi k(T_c - T_0)^2}{H_{net}}$ For thin plate, rate of cooling, $R = 2\pi k\rho c\left(\frac{h}{H_{net}}\right)^2 (T_c - T_0)^3$	2 0 M	2,3	1,3	1,2

END SEMESTER EXAMINATION JUNE 2024

	$\tau = h\sqrt{\frac{\rho c(T_c - T_0)}{H_{max}}}$ **B]** How to reduce roll force acting on the roll during rolling of plates [5M]? Draw near sketch of Injection molding process. Give it's working principle? [5M]				
Q5	**A]** Draw physical model grinding wheel showing its structure and grain wear pattern? What is lifecycle of abrasive grit [5M]? Draw neat sketch of vertical spindle rotary table grinding machine? Give its applications [5M]? **B]** Give conventional grinding wheel compositional alpha numeric specifications? Explain each in details? [10M]	20M	2,3	1,2	5
Q6	*Solve any four question:* **A]** Write short note on medium carbon steel material? **B]** Explain functions of computer numerical control machines in details pointwise? **C]** Draw neat sketch of radial drilling machine tool and list down difficulties in deep hole drilling operation? **D]** Write short note on hot rolling process with neat sketch? **E]** Write short note on Investment casting process along with its sketch? **F]** Draw neat labelled sketch of single point cutting tool used in lathe machine?	20M	1	1,2	3,4,1,2

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END sem Exam – June 2024

25/6/24

Program: FY MECH Sem II

Course Code: ES-BTM201

Course Name: Basic electrical and Electronics Engg

Duration: 3 hours

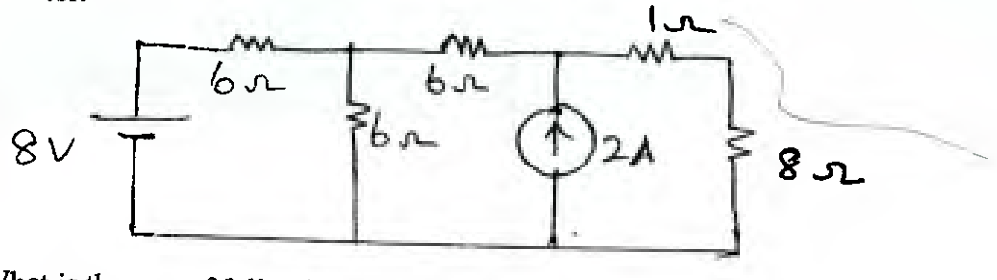
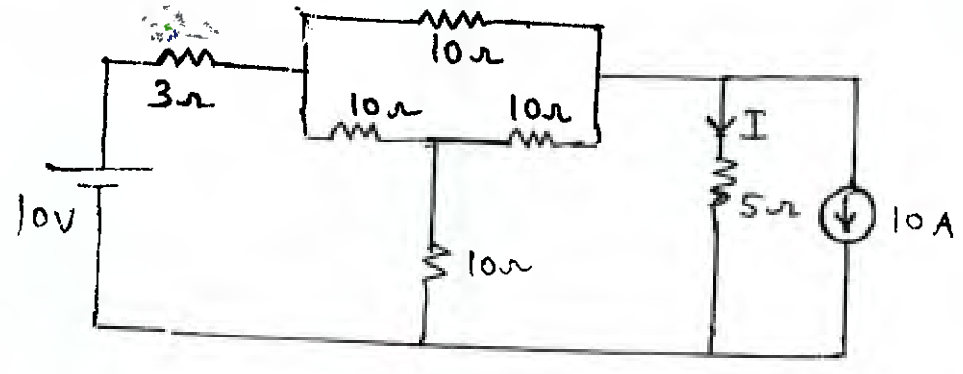
Maximum Points: 100

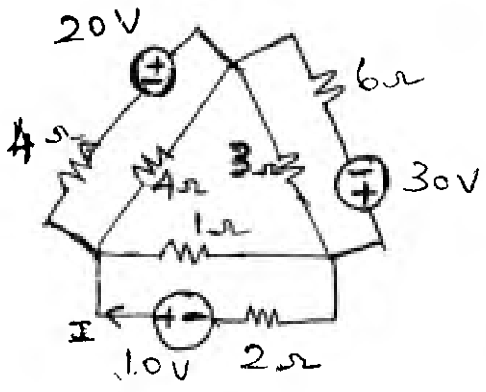
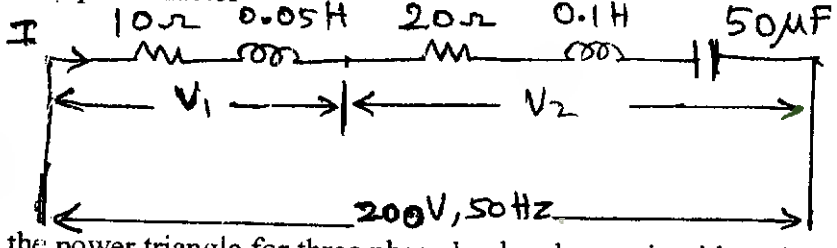
Semester: II

Attempt any FIVE questions out of SEVEN questions.

Answers to all sub questions should be grouped together.

Figures to the right indicates full marks.

Q. No	Questions	Points	CO	BL	Module
Q1a	Explain the working principle of a transformer with a neat diagram.	4	2	1,2	3
b)	What is the use of a filter in a power supply circuit? Which elements are used as filters .why?	4	3	2	4
c)	**Using source transformation** find the value of current flowing through the 8Ω resistor. 	8	1	3	1
d)	What is the use of following devices- a) Bourdon tube b) strain gauge c) Thermocouple d) Tachometer.....	4	1	3	2
2a)	By applying Thevenins theorem find the current in the 5Ω resistor of the circuit . 	10	1	3	1

b)	Calculate the current in the 2 Ω resistor of the network using mesh analysis. 	10	1	3	1
Q3a	A metal filament lamp rated at 750W,100V is to be connected in series with a capacitor across a 230V,50Hz supply. Calculate the capacitance required and phase angle between current and the supply voltage	6	1	3	2
3b)	Draw the phasor diagram for the circuit shown. Find the value of 1)current ii)V_1 and V_2 and iii) power factor 	8	1	3	2
3c)	Draw the power triangle for three phase load and name its sides with formula and units.	4	1	2	2
4a)	Explain the construction and working of LVDT with neat diagrams.	10	4	2	5
b)	A series combination of 3Ω resistance and a796.18μF capacitor in each branch forms a three phase star connected balanced load which is connected to a 415V,three phase,50Hz ac supply. i) Calculate the power consumed and the current drawn by the load. ii) If the same load is now connected as delta ,find the power consumed and the current drawn by the load.	10	1	3	2

Q5. a	Derive the emf equation of a transformer .Explain the losses that takes place in a transformer .	4+4	2	2	3
b)	Why single phase induction motors are not self starting. Explain the two types of single phase induction motors with neat circuit and phasor diagrams.	12	2	2,3	3
Q6. a	Fill the table .	10	3	1,2	4
b.	Draw the circuit diagram showing experimental setup for of common emitter configuration of an bipolar junction transistor in common emitter configuration .Plot input and output characteristics for common emitter configuration	6	3	1,2	4
c	Explain Zener diode as a voltage regulator.	4	3	1,2	4
Q7a	Derive the relation between line current and phase current, line voltage and phase voltage, in three phase circuit when load is connected in Delta configuration ,with neat circuit and phasor diagrams.	8	1	2,3	2
b)	List the differences between sensors and transducers.	6	4	1.2	5
c)	Explain the working principle of a Transducer .List 4 of them.	6	4	1,2	5

Parameters	Half Wave Rectifier	Center tapped FWR	Bridge FWR	Marks
Circuit diagram				4
Input and output waveforms				1
Idc				1
Vdc				1
Irms				1
Ripple factor				1
Rectification Efficiency(ŋ)				1