

B.TECH. DEGREE EXAMINATION, DECEMBER 2019

I B.TECH. I SEMESTER

FUNCTIONAL ENGLISH
(Common to All Branches)

Time : 3hrs

Max. Marks : 60

Answer **SIX** Questions, Choosing **ONE** Question from each section
All Questions carry equal marks

* * *

SECTION - I

1. (a) Write a paragraph in support of the following statement.
"College students should be encouraged to pursue subjects that interest them rather than the courses that seem most likely to lead to jobs."
- (b) Name the part of speech of each underlined word in the following sentences.
 1. We missed the last bus of the night, so we travelled to Vijayawada by taxi instead.
 2. My car gets thirty miles to the gallon.
 3. People say that too many young athletes today are selfish.
 4. The Hudson River in New York is not actually a river.
 5. He is cleverer than any other student in the class.
2. (a) Write a paragraph on "My favorite Subject".
- (b) Correct the errors in the given sentences by following the rules of subject- verb agreement and pronoun-agreement
 1. A bouquet of yellow roses lend color and fragrance to the room
 2. My aunt or my uncle are arriving by train today.
 3. The dog, who is chewing on my jeans, are usually very good.
 4. A theory of physics ascertain that a body in motion stays in motion
 5. Over the rainbow fly a bird.

SECTION - II

3. (a) Write a letter to Human Resource Manager of Bosch Company seeking employment opportunity.
- (b) Fill in the blanks with suitable articles.
 1. I ride a bicycle to ___ school every day and leave it in ___ care of doorkeeper.
 2. ___ European and ___ Indian visited my office this morning
 3. There was ___ storm this afternoon, so I took shelter at ___ bus stop near school
 4. ___ boiling water is converted into what is called ___ steam
 5. ___ dog is ___ useful animal
4. (a) Make a complaint to the Municipal Commissioner about the menace of stray dogs in your locality.

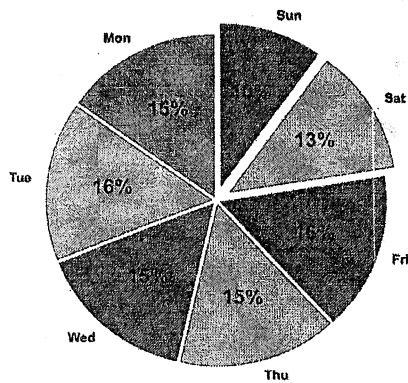
- (b) Fill in the blanks with suitable prepositions
1. He is working on his homework _____ the moment.
 2. I am glad to receive your letter _____ such a long time.
 3. Sonalika has been playing _____ two hours.
 4. Rajesh has to deliver these goods _____ 30th April.
 5. Isaac arrived _____ work early this morning.

SECTION – III

5. (a) Prepare a speech on “Effect of Population explosion in India”. Your speech should contain Greeting, Introduction, Main Points, Conclusion and Transitional phrases to connect one idea to another.
- (b) Fill in the blanks with suitable verb forms
Two drunk men (try) to find their way home, but they..... (lose). They (stagger) along a railway line. “This is a very long staircase,” said the first one. “My legs are killing me!”. The second drunk (hold) his back. “And the handrail is so low my back is killing me!”
6. (a) Imagine you are the Principal of the college. Draft a speech to address the gathering on Independence Day Celebrations.
- (b) Rewrite the following as directed.
1. Rachel will give you some advice. (Begin with “You”)
 2. The police officer showed us the way. (Begin with “The way”)
 3. A lied was told by her. (Begin with ‘She’)
 4. My father has written a poem. (Begin with “A poem”)
 5. The order has not been taken from us by the waiter (Begin with “The waiter”)

SECTION – IV

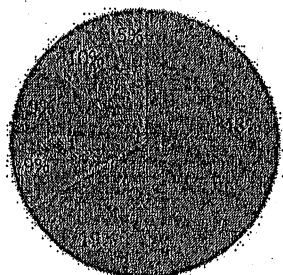
7. (a) The pie chart presents information about the accidents per day of the week. Interpret the chart in your own words..



- (b) Rewrite the following as directed:
1. He went to market to buy vegetables. (Add a question tag)
 2. Taj Mahal is one of the most wonderful monuments in the world.
(Convert the sentence into comparative degree)
 3. This videos clip has gone viral in social media. (Add a question tag)
 4. No other solutions is as good as this for the problem (Convert into Superlative degree)
 5. Martin is not so honest as his brother. (Convert into comparative degree)

8. (a) The following pie chart presents the information about expenditure on different areas. Interpret the given data in your own words.

Accounting



■ Rent	(48%)
■ Food	(19%)
■ Utilities	(9%)
■ Fun.	(9%)
■ Clothes	(10%)
■ Phone	(5%)

- (b) Fill in the blanks with suitable forms of verbs.
1. My wife always volunteers _____ cakes PTA meetings. (baking / to bake)
 2. Don't waste my time _____ about your salary. (complaining/ to complain)
 3. Rita is having trouble _____ on the exam. (concentrating / to concentrate)
 4. Please allow me _____ your Facebook page. (joining / to join)
 5. You won't forget _____ milk on your way home, will you?
(picking up /to pick up)

SECTION - V

9. (a) Write an essay on "Dowry System in India" in 200 words
- (b) Rewrite the following sentences in Direct Speech into Indirect Speech.
1. My friend said, "The plane will probably get in late"
 2. I said, "I can't understand those lessons at all."
 3. Jaipal said, "I certainly hope it won't rain tomorrow."
 4. He said, "Where did Miss Sathya go?"
 5. My mother said, "What time is your father coming back?"
10. (a) Write an essay in your own words on "Information and Technology Revolution" in 200 words
- (b) Identify the misplaced modifiers and use them in the correct place.
1. Eating bananas I observed monkeys.
 2. The fruit seller was hit by a car, sitting on the pavement.
 3. The pretty girl fast ran.
 4. Please go down to the main office and lying on the desk you will find a copy of manual.
 5. I moved back to Chicago at the age of 16.

SECTION – VI

11. (a) Read the following passage carefully and answer the questions given below

From the ever-evolving computer industry to the introduction and widespread popularity of the internet, from the various electronic cars to spacecraft, the world of technology is seemingly endless. Technology is a powerful tool in this modern era, and it has the capability to influence society for its betterment, as well as destruction. Terrorism, by far, is the worst reason for which technology can be utilized. Unfortunately, however, technology has helped terrorism to grow by leaps and bounds. It has helped terrorism in both actual and cyber terrorism. It takes only a glance at the complex making and build-up of an explosive or bomb to realize that yes; technology has had a worldwide impact on terrorism. Thus we know that, on one hand, in the long run, terrorism nowadays is based mainly on different types of technology, Manufacturing hi-tech gadgets illegally, that to on a daily basis, using the internet as hub to meet, discuss and plan attacks with fellow terrorists breaking (hacking) into government data systems to wreak havoc are only some of the ways in which terrorists utilize technology. Even now, every Indian shudders when the thought of the 26/11 attacks come to mind, when the whole Mumbai lost many of her loved ones, including army personnel, police officers, women and children. One question, keeps staring at us in the face-“How did a bunch of young boys keep an entire city under siege?” The answer lies only in one word – technology. By using sophisticated weapons and gadgets, even a dozen of young boys were able to terrorize us. Another example is of the train blasts that happened in Mumbai few years back. News reports state that the bomb inside the train was activated using a cell phone. Conversely, if advancing technology supports the growth of terrorism, it also means that the government has better ways to defend the country/state against terrorism. Hi-end security measures, such as CCTV cameras, infrared detection, video messages regarding solely for the purpose of reporting unidentified/suspicious objects, are all ways in which government can defend the country and combat terrorist by foiling their plans. Bomb-squads, Bullet-proof jackets are many other ways for police and law enforcement officers to fight terrorism effectively. Whether technology affects the future of terrorism in both the aforementioned ways, is quite clear. As technology advances it will propel the ways and means of terrorism. Nevertheless, it will also enable the government to take better, stringent measure to protect the people against terrorist. It simply is the question of who will prevail first. And that, in it's entirety, is a very scary thought.

1. Why is technology described as a powerful tool in the passage?
 2. How has technology helped terrorism?
 3. How do terrorists utilize technology?
 4. What are the good uses of technology?
 5. Give one word for: (a) Extensive far-reaching (b) Confusion and destruction
- (b) Correct and rewrite the following sentences.
1. Do you like to play games when you were a child?
 2. The Principal asked me what was my name.
 3. His father died from Dengue.
 4. The furnitures he brought is exquisite
 5. One of the windows are broken.
12. (a) What reading strategies do you follow to read an essay from unfamiliar area of study.
- (b) Write a note on Skimming, Scanning and Inferring.

Code: 19SH1103

B.TECH DEGREE EXAMINATION, DECEMBER 2019

I B.Tech. I Semester

ENGINEERING CHEMISTRY

(Common to CE & ME)

Time : 3Hrs

Max. Marks : 60

*Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION - I

1. (a) (i) Give the classification of hardness of water with some examples
(ii) Give an account on Scale and Sludge
(b) Explain Boiler troubles and Boiler corrosion
2. (a) Describe the ion exchange process for softening of hard water
(b) Explain
 - (i) Reverse Osmosis
 - (ii) Electro dialysis

SECTION - II

3. (a) (i) Derive Nernst equation for single electrode
(ii) Find the emf of the cell represented by the cell diagram
 $Zn/Zn^{2+}/H^+(1M)/H_2(1atm)/(Pt)$ given that the oxidation potential of Zn/Zn^{2+} is 0.7618Volts
(b) How hydrogen –oxygen cell will work? explain through diagram
4. (a) Discuss the types of corrosion and explain factors affecting the corrosion
(b) Give an account on Metallic coatings

SECTION - III

5. (a) Define Polymerization? Explain addition and condensation polymerization with examples
(b) Explain the preparation, properties and applications of Nylons
6. (a) Give an account plastomers and Thermoplastics

- (b) Discuss the preparation, properties and applications of Silicone rubber

SECTION - IV

7. (a) Define Calorific value? How to determine the calorific value of solid fuel using Bomb's calorimeter
- (b) A sample of coal contains C=92%, S= 1.5%, N₂= 0.8%, H₂= 6.2%, O₂= 9.2%. calculate gross and net calorific values of coal
8. (a) Give an account on Knocking and Anti- knocking agent with examples
- (b) Explain the methodology of analysis of the flue gas by Orsat's apparatus

SECTION - V

9. (a) Write short notes on
- (i) Neutralization number
 - (ii) Cloud and pour points
- (b) Define Refractories? Explain classification of refractories and its applications
10. (a) Give an account on
- (i) Hardening of Portland cement
 - (ii) Composition of cement
- (b) Explain classification of cement with some examples

SECTION - VI

11. (a) Explain the properties of Colloids
- (b) Discuss the coagulation of colloids
12. (a) Explain the limitations of BET equation
- (b) Write short notes on adsorption isotherm

APPLIED PHYSICS
(Common to EEE ECE, CSE & IT)

Time : 3Hrs

Max. Marks : 60

Answer *SIX* Questions, Choosing *ONE* Question from each section
All Questions carry equal marks

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SECTION - I

1. (a) Explain the formation of Newton's rings. Discuss why Newton's rings are circular.
(b) Newton's rings are observed normally in reflected light of wavelength 6000 \AA . The diameter of 10th dark ring and 6th dark ring is 0.5cm and 0.4cm. Find the radius of curvature of the lens
2. (a) Define spontaneous and stimulated emission. Why spontaneous radiation is incoherent.
(b) Explain the importance of optical resonator.

SECTION - II

3. (a) Define Miller indices. Describe the procedure to find the same.
(b) Find the perpendicular distance between the two planes having Miller indices (111) and (222) in a unit cell of a cubic lattice with lattice constant parameter a.
4. (a) Describe Laue's experiment for diffraction of X-rays.
(b) X-rays of wavelength $0.36 \times 10^{-8} \text{ cm}$ are diffracted by a Bragg's crystal spectrograph at a glancing angle of 4.8° . Find the inter-plane separation of atomic planes in the crystal.

SECTION - III

5. (a) What are matter waves? Find its wavelength.
(b) Explain the significance of wave function.
6. (a) What are the merits of quantum free electron theory over classical theory?
(b) Derive an expression for density of energy states in metals.

SECTION - IV

7. (a) What is Hall effect? Obtain an expression for hall coefficient.
(b) Explain Einstein relations.
8. (a) Write a short note on direct and indirect band gap semiconductors.
(b) Explain the construction and working of a solar cell.

SECTION – V

9. (a) Differentiate type I and type II superconductors. Mention few applications of superconductors.
- (b) A superconducting tin has a critical temperature of 3.7K at zero magnetic field and a Critical field of 0.036 Tesla at 0K. Find the critical field at 2K.
- 10 (a) Explain magnetic and optical properties of Nano materials.
- (b) Describe the chemical vapour deposition method used for nanoparticles synthesis.

SECTION – VI

- 11 (a) What is internal field? Derive necessary expression for it.
- (b) The dielectric constant of He at STP is 1.000074. Calculate the dipole moment induced in each helium atom when the gas is in an electric field of intensity $8 \times 10^4 \text{V/m}$.
- 12 (a) How the magnetic moment arises in magnetic materials.
- (b) State and explain hysteresis.

B.TECH. DEGREE EXAMINATION, DECEMBER 2019

I B.Tech. I Semester**ENGINEERING MATHEMATICS - I****(Common to All Branches)**

Time : 3Hrs

Max. Marks : 60

*Answer SIX questions choosing ONE from each section**All questions carry equal marks.*

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SECTION - I

1. (a) Solve $(1 + y^2)dx + (x - \tan^{-1} y)dy = 0$.
- (b) Solve $(x^2 y - 2xy^2)dx - (x^3 - 3x^2 y)dy = 0$
2. (a) Solve $\sec^2 y \frac{dy}{dx} + x \tan y = x^3$.
- (b) A body is heated to 110°C and placed in air at 10°C . After 1 hour its temperature is 60°C . How much additional time is required for it to cool to 30°C ?

SECTION - II

3. (a) Solve $\frac{d^2 y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x}$
- (b) Solve $(D^2 - 4D + 4)y = 8(e^{2x} + \sin 2x + x^2)$, where $D = \frac{d}{dx}$.
4. (a) Solve $(D^2 + 2)y = x^2 + x^3 + e^{-2x} + \cos 3x$, where $D = \frac{d}{dx}$.
- (b) Solve $(D^2 - 3D + 2)y = xe^{3x} + \sin 2x$, where $D = \frac{d}{dx}$.

SECTION - III

5. (a) Find (i) $L\{e^{2t} + 4t^3 - 2\sin 3t + 3\cos 3t\}$.
- (ii) $L\{e^{-2t} \sin 2t\}$
- (b) Find $L\{t^2 \cos at\}$
6. (a) Find $L\left\{\frac{e^{-at} - e^{-bt}}{t}\right\}$
- (b) Find the Laplace transform of $2t + \frac{\cos 2t - \cos 3t}{t} + t \sin t$.

SECTION – IV

7. (a) Find $L^{-1} \left\{ \frac{5s+3}{(s-1)(s^2+2s+5)} \right\}$
- (b) Find $L^{-1} \left\{ \frac{s^2}{(s^2+9)(s^2+16)} \right\}$, by using convolution theorem.

8. Solve the following differential equation by the transform method;

$$(D^2 + n^2)x = a \sin(nt + \alpha), \quad x = Dx = 0 \text{ at } t = 0 \text{ where } D = \frac{d}{dt}.$$

SECTION – V

9. (a) Reduce the matrix $A = \begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$ to Echelon form and Hence find its rank.

- (b) Test for consistency the following equations and solve them if consistent:

$$3x + 3y + 2z = 1$$

$$x + 2y = 4$$

$$10y + 3z = -2$$

$$2x - 3y - z = 5$$

10. Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.

SECTION – VI

11. (a) Using Maclaurin's series expand $\log(1+x)$ up to the term containing x^4 .
- (b) Using Taylor series express the polynomial $2x^3 + 7x^2 + x - 6$ in powers of $(x-1)$.
12. Find the maximum and minimum distances of the point $(3,4,12)$ from the sphere $x^2 + y^2 + z^2 = 1$ by Lagrangian method of multipliers.

Code :19CS1101

B.TECH. DEGREE EXAMINATION, DECEMBER 2019

I B.Tech. I Semester

PROGRAMMING FOR PROBLEM SOLVING

(Common to All Branches)

Time : 3Hrs

Max. Marks : 60

Answer SIX Questions, Choosing ONE Question from each section

All Questions carry equal marks

* * *

SECTION - I

1. (a) Define flowchart. Explain different types of symbols are used in design of flowchart. Draw the flow chart to find minimum among three numbers.
2. (a) Explain compile time reading and run time reading of different data type variables.
(b) Explain library functions pow() and sqrt() with suitable program

SECTION - II

3. How to perform input and output operations in C language? Explain with example program.
4. (a) What are the uses of relational operators in writing of C program? Explain.
(b) Define constant. What is the use of constant variable?

SECTION - III

5. (a) How the goto statement works like a loop? Explain
(b) Discuss about switch statement with example program.
6. (a) Write a C program to find the value of given series $1 - X + X^2/2! - X^3/3! + X^4/4! - X^5/5! + \dots + (-1)^n X^n/n!$
(b) Write a C program to read n numbers and find sum of only positive numbers without using arrays.

SECTION - IV

7. (a) What is an array? Explain declaration and initialization and list the characteristics of arrays.
(b) What is the use of static variables in C.

8. (a) How to perform matrix multiplication? Explain with C program.
(b) Explain comparison of two strings using strcmp() function.

SECTION - V

9. (a) Define a pointer. Explain features of pointers in C.
(b) How to handle strings using pointer array? Explain with suitable program.
10. (a) What are the differences between call by value and call by reference with suitable examples.
(b) How to perform looping statement by using recursion function? Explain with suitable program.

SECTION - VI

11. (a) Define a structure. Explain declaration and initialization of structures.
(b) What are the uses of structures in C?
12. Explain the following with suitable program:
i) fscanf() ii) fprintf() iii) ftell() iv) frewind() v) fseek()

Code : 19EE1101

B.TECH. DEGREE EXAMINATION, DECEMBER 2019

I B.Tech. I Semester

BASIC ELECTRICAL SCIENCES

(Common to EEE, CSE & IT)

Time : 3Hrs

Max. Marks : 60

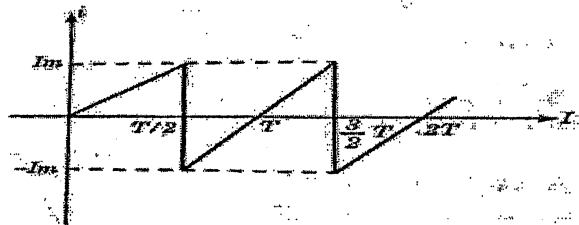
Answer **SIX** Questions, Choosing **ONE** Question from each section
All Questions carry equal marks

SECTION - I

1. (a) Explain the source transformation with examples.
(b) Derive the equivalent DELTA expressions for given STAR.
2. (a) Give V-I relationship for the following
(i) Resistance (ii) Inductance (iii) Capacitance
(b) Explain difference between ideal and practical sources.

SECTION - II

3. (a) Define Average value, RMS value, Form factor & Peak factor.
(b) Determine the form factor value of a half wave rectifier.
4. (a) Determine form factor for the given simple wave form?



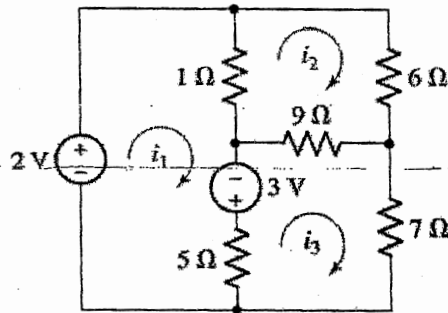
- (b) Convert (i) $2+j3$ into polar form (ii) $20 \angle 60^\circ$ into rectangular form

SECTION - III

5. (a) Define Active power, Reactive power, Apparent power and Power factor.
(b) Discuss the behavior of the inductive element connected to an AC source along with the waveform & phasor diagram.
6. (a) A circuit contains two impedances $Z_1 = (5 + j3)$ ohms and $Z_2 = (2 - j4)$ ohms in series and connected to 200V, 50 Hz supply. Determine the, (i) Equivalent impedance of the circuit (ii) current through the circuit (iii) Voltage drop in each impedance.
(b) Show that current lags voltage in RL series circuit.

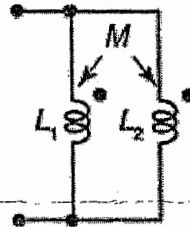
SECTION - IV

7. (a) Define the following terms with respect to Graph theory:
i) Branch, ii) Tree, iii) Node, iv) Tree link, v) Cut-set, and vi) Tie – set
(b) With the help of examples, define graph, sub graph, Tree and co-tree.
8. (a) Explain about super node and super mesh for DC excitation.
(b) Use mesh analysis to find currents in different resistances of the given circuit.



SECTION - V

9. (a) Explain dot convention in coupled coils.
(b) Two coupled coils of $L_1=0.5\text{H}$ and $L_2=0.3\text{H}$ are having a coefficient of coupling $K=0.9$. Then find the mutual inductance.
10. (a) State and explain Faraday's laws of electromagnetic induction.
(b) Determine the total inductance, if $L_1=50\text{mH}$, $L_2=200\text{mH}$ and $M=100\text{mH}$.



SECTION - VI

11. (a) Show that $Q_0 = \frac{\omega_0 L}{R} = \frac{f_0}{\text{BW}}$ for series RLC Circuit.
(b) A RLC series circuit of $8\ \Omega$ resistance should be designed to have a bandwidth of 50 Hz. Determine the values of L & C so that the system resonates at 250 Hz.
12. Explain how the current locus can be obtained for RL series circuit with neat diagram.

Code: 19ME1101

B.TECH. DEGREE EXAMINATION, DECEMBER 2019

I B.Tech I Semester

ENGINEERING MECHANICS- I

(Mechanical Engineering)

Time: 3 hours

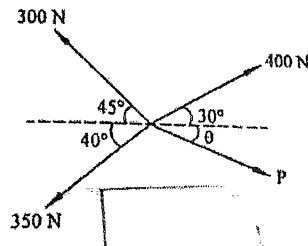
Max Marks: 60

Answer SIX Questions choosing ONE from each section

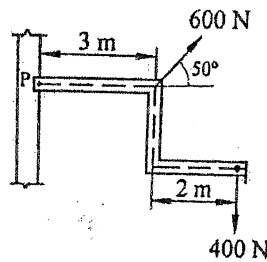
All questions carry equal marks.

SECTION-I

1. Find the magnitude and direction of the force 'P' so that the system of forces shown figure is equilibrium.

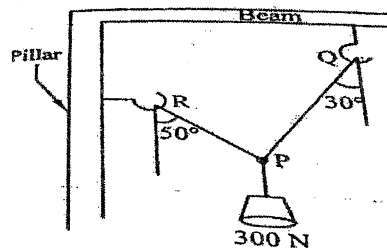


2. (a) State law of transmissibility.
(b) A rigid body is acted upon by two forces as shown in figure. Determine the moment of the forces p.



SECTION-II

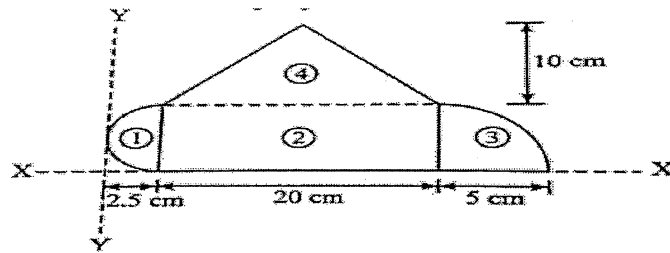
3. (a) State Lami's theorem.
(b) A temple bell weighing 300 N is hung by using two ropes PP and PQ. The rope PR is tied to a hook fixed to a pillar and the rope PQ is tied to a hook fixed to the roof of the beam as shown in figure. Find the magnitude of the forces in the ropes.



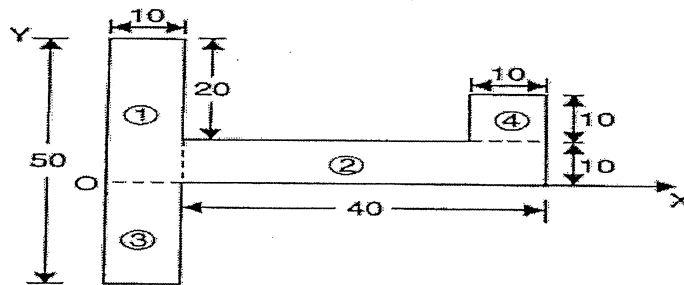


SECTION-V

9. Find the Centroid of the following figure.

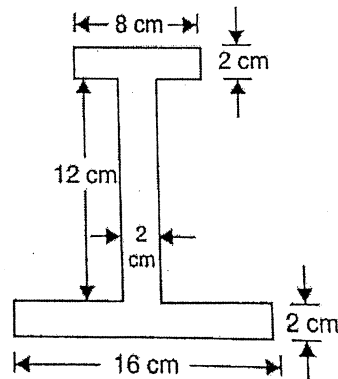


10. Locate the Center of gravity of the body shown in figure with respect to coordinate axes. All dimensions are in mm.



SECTION-VI

11. (a) Define radius of gyration.
 (b) For the I-section shown in figure, find the moment of inertia about the centroidal axis X-X perpendicular to the web.



12. (a) Differentiate moment of inertia and Mass moment of inertia.
 (b) Find the mass moment of inertia of a concrete column of diameter 30 cm and height 3 meters about its axis. The mass density of the concrete is 2400 kg/m^3 .



I B.Tech. I Semester**ELEMENTS OF ELECTRICAL & ELECTRONICS ENGINEERING
(Civil Engineering)**

Time: 3Hrs

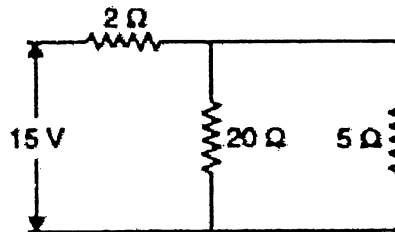
Max. Marks: 60

Answer *SIX* Questions, Choosing *ONE* Question from each section
All Questions carry equal marks

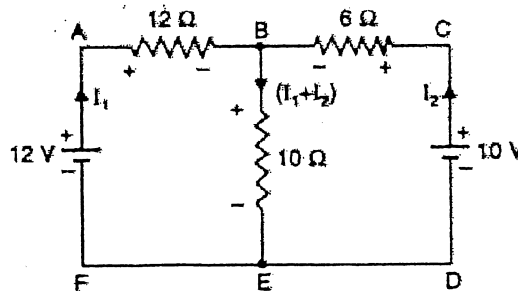
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SECTION - I

1. (a) What are the active and passive circuit elements? Explain the voltage current relationships with examples
- (b) In the circuit shown in figure, find the total resistance and current flowing through the circuit.



2. Determine current in each resistor by applying Kirchhoff's voltage law for circuit shown figure.

**SECTION - II**

3. (a) Derive RMS and Average values for full wave rectifier voltage wave form.
- (b) Prove the power consumed in a pure capacitor is zero, when connected to sinusoidal voltage source. Draw the waveforms for voltage, current and power.
4. (a) A series RC circuit consists of 200 ohms resistor and capacitor of 40 μ F, this circuit is supplied by 200V, 50Hz supply. Calculate (i) Impedance (ii) total current (iii) voltage across each element
- (b) Mention the advantages of three phase system over single phase system.

SECTION - III

5. (a) Explain the working principle of alternator.
(b) List the applications of alternator.
6. Explain the construction and working principle of Capacitor start and run single phase induction motor

SECTION - IV

7. With neat sketch, explain the construction details of a single phase core type transformer.
8. (a) Enumerate the various losses in a transformer. How these losses can be minimized.
(b) What do you understand by efficiency of single phase transformer? Mention the condition for maximum efficiency.

SECTION - V

9. Write short notes on the following.
 - (a) Wiring Accessories
 - (b) Types of conductors
10. (a) What are the types of wiring? Explain anyone of them.
(b) What is electric earthing? Explain plate earthing with a neat diagram

SECTION - VI

11. Define transducers? Illustrate the working Principle of piezoelectric transducer with neat sketch.
12. Describe the various types of Arc welding techniques

B.TECH. DEGREE EXAMINATION, DECEMBER 2019

I B.Tech. I Semester**ELECTRICAL CIRCUITS**
(Electronics & Communication Engineering)

Time : 3Hrs

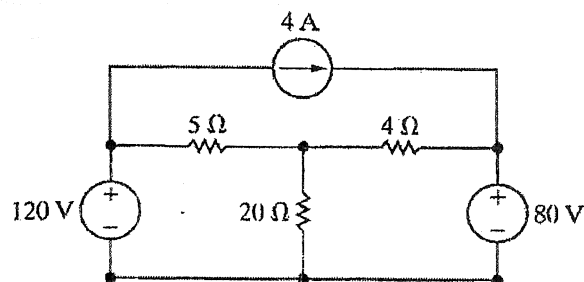
Max. Marks : 60

Answer *SIX* Questions, Choosing *ONE* Question from each section
All Questions carry equal marks

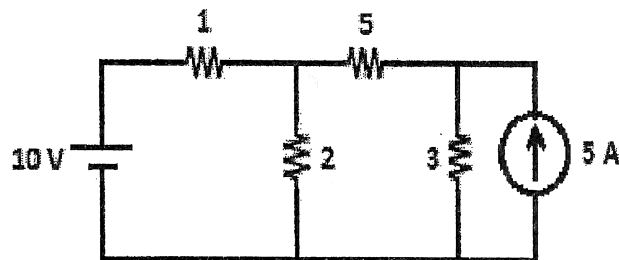
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SECTION - I

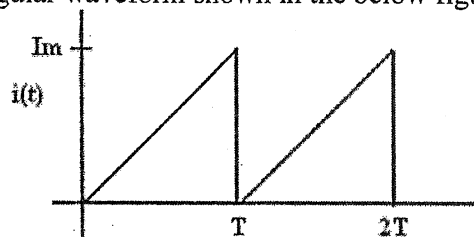
1. (a) Obtain the expressions for star-delta equivalence of resistive network.
(b) Use the node-voltage method find the voltage across 20 Ohm resistor in the circuit shown below.



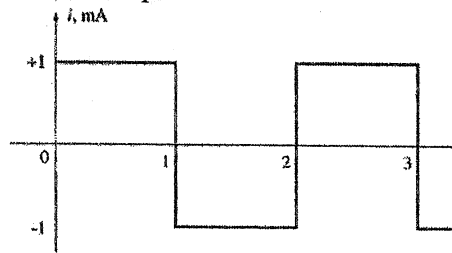
2. (a) Explain voltage division and current division rule with an example for each.
(b) Using mesh method, obtain the current through 1Ω resistor in the network shown in figure. (All Resistances are in ohms)

**SECTION - II**

3. (a) A series combination of $R = 10$ Ohms and $L = 20$ mH has a current $i = 5.0 \cos(500t + 10^\circ)$ A. Obtain total voltage v and the angle by which i lags v and also sketch the phasor diagram.
(b) Find form factor of triangular waveform shown in the below figure.

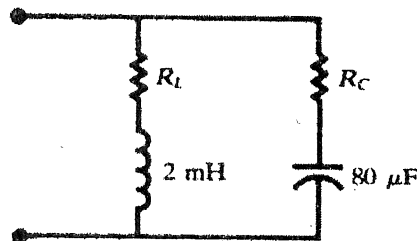


4. (a) A series RLC circuit, with $R = 15 \text{ Ohms}$, $L = 80 \text{ mH}$, and $C = 30 \text{ } \mu\text{F}$, has a sinusoidal current at angular frequency 500 rad/s . Determine the phase angle and whether the current leads or lags the total voltage.
- (b) Find RMS and average values of the periodic waveform shown in the below figure.



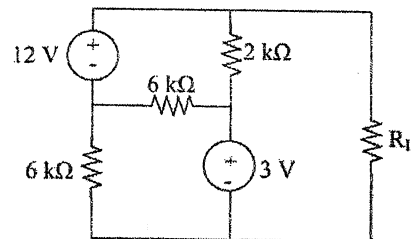
SECTION - III

5. (a) Define the Q-factor and derive an equation showing the relation between Q-factor, Band width and resonant frequency at resonance.
- (b) A series RLC circuit has $R=20 \text{ Ohms}$, $L=0.005 \text{ H}$ and $C = 0.2 \times 10^{-6} \text{ F}$. It is fed from a 100V variable frequency source. Find i) frequency at which current is maximum ii) impedance at this frequency and iii) voltage across inductance and capacitance at this frequency.
6. (a) Two impedances Z_1 and Z_2 are connected in parallel. The branch Z_1 takes a leading current of 16 A and has a resistance of 5Ω . The branch Z_2 takes a lagging current of 0.8 power factor value. The total average power supplied being 5 kW , applied voltage being $(100+j200) \text{ V}$, obtain the values of Z_1 , Z_2 and the total circuit current.
- (b) What must be the relationship between the values of R_L and R_C if the network shown in figure is to be resonant at all frequencies?



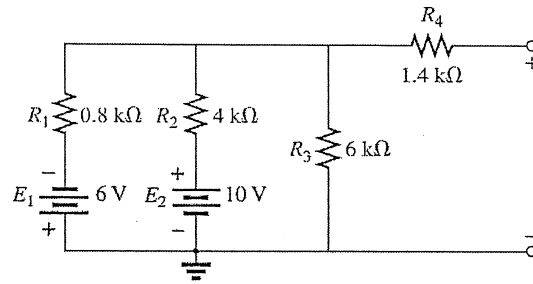
SECTION - IV

7. (a) State and explain Norton's theorem.
- (b) For the network shown in figure, find the value of R_L for maximum power transfer. Also find the maximum power transferred to R_L .



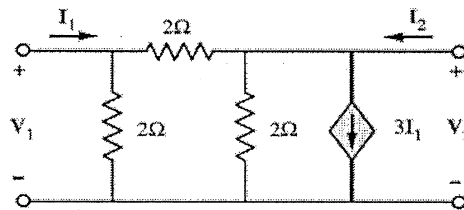
8. (a) State and explain the superposition theorem and enumerate the procedural steps involved to find the response if the circuit consists of both voltage and current sources.

- (b) Determine the Norton's equivalent circuit for the circuit shown in the figure.



SECTION - V

9. (a) Define reciprocity and symmetry for a generalized two port network and derive the conditions for reciprocity and symmetry in terms of ABCD parameters.
 (b) Z-parameters for a two port network are given as $Z_{11}=25$, $Z_{12}=Z_{21}=20$, $Z_{22}=50$. Design an equivalent T-network for the given parameters.
10. (a) Express ABCD parameters in terms of admittance parameters for a generalized network.
 (b) Determine the admittance parameters for the network shown in figure. Investigate whether the network is symmetrical and reciprocal.



SECTION - VI

11. (a) What do you mean by initial conditions and justify its importance in transient analysis?
 (b) A series RLC circuit, with $R=200$ Ohms, $L=0.1$ H, and $C=100$ μ F, has a voltage source of 200 V applied at $t=0$. Find the current transient, assuming zero initial charge on the capacitor.
12. (a) Explain the steady state and transient behavior of a capacitor.
 (b) The switch in the circuit in figure has been closed for a long time. At $t=0$, the switch is opened find $v_o(t)$ and $i_o(t)$ for $t>0$ using Laplace transformation method.

