

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**PROFESSIONAL ENGLISH**

(Common to All Branches)

Time: 3 Hrs

Max. Marks: 60

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

* * *

SECTION - I

1. (a) Describe different stages involved in satellite launching into space.
- (b) Rewrite the following statements by choosing the suitable analogy from shown brackets.
 1. Filament : bulb::----- (misunderstanding : conversation/ blade : propeller/ car : gearshift /outlet : economy)
 2. Story: novel:: -----(sea: ocean/ school: university/ book: dictionary/ poetry: drama)
 3. Athlete: fit ::-----chef : fat/ dog : energetic/ priest : religious/ dancer : intelligent
 4. Fascinating : interesting::----- amazing : incredible/ serious : funny/ crucial : important/ strange : weird
2. (a) Describe the structure of atom and explain how nuclear energy is generated.
- (b) Write the meanings and make the sentences by using the following homonyms:
 1. Beam / beam
 2. Gorilla/ guerrilla
 3. Naval/ navel
 4. Marital/ martial

SECTION - II

3. (a) Write the advantages and disadvantages of e-mail writing.
- (b) Write the meanings of the following idioms and use them in your own sentences.

(i) To judge a book by its cover	(ii) Ball is in your court
(iii) Cost an arm and leg	(iv) Many moons ago
4. (a) Write an e-mail format along with all parts of it.
- (b) Write the meanings of the following one word substitutes.

(i) Anthropology	(ii) Polygamy	(iii) Pandemic	(iv) Octagon
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SECTION - III

5. (a) Analyze the following issue.
" Covid-19 has brought revolutionary changes in online education"
- (b) Write the right words by using the following prefixes.

(i) Under-	(ii) Hyper-	(iii) Multi-	(iv) Bio-
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6. (a) Analyze the following argument.
Depending on Chinese products is a setback for the progress of Indian Economy. To make India strong, our government should encourage native companies.
- (b) Write the right words by using the following suffixes.
(i) -ism (ii) -ish (iii) -logy (iv) -ious

SECTION – IV

- 7 (a) What are the primary components of a research/ project proposal?
(b) Write synonyms to the following words.
(i) Crooked (ii) Gloomy (iii) Reverence (iv) Adequate
- 8 (a) You are planning to organize a seminar on 'Artificial Intelligence' in your institute. Prepare a seminar proposal (including budget, importance and proposed dates) to the Department of Science and Technology (DST)
(b) Write antonyms to the given words.
(i) Zenith (ii) Ambiguous (iii) Feeble (iv) Tremble

SECTION – V

- 9 (a) Explain different techniques of Note- Taking and Note- making.
(b) Write any eight words of your choice which are often confused.
- 10 (a) What are the steps involved in taking notes during a seminar on a technical topic?
(b) Write any eight words of your choice which are often confused.

SECTION – VI

- 11 (a) Discuss the important features in reviewing a Technical book.
(b) Complete the following sentences by choosing one from the given options.
1. It is _____ if we can organize another tournament this week.
(A) unsure (B) doubtful (C) impractical (D) unlikely
 2. The firefly and the cheetah are _____. They do not have much in common.
(A) strange (B) different (C) weird (D) odd
 3. The senator's plan was highly _____. Congress held intense debates about it for days.
(A) agreeable (B) optimistic (C) beneficial (D) controversial
 4. The fire caused ----- damage to the warehouse, which forced the owner to demolish the building.
(A) Sanctified (B) preliminary (C) irreparable (D) partial
- 12 (a) Write a review on any novel you have read recently.
(b) Complete the following sentences using appropriate forms of the words given in the brackets.
1. After Jose and Wendy get married, they are going to open a _____ (jointly) bank account so that they can share expenses.
 2. He always wins because he is very (industry).
 3. Because of the professor's reputation for being _____ (intelligence), the students in her class were surprised.
 4. The filter (pure) the drinking water.

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B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2020

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

Time : 3Hrs

Max. Marks : 60

Answer ONE question from each section
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* * *

SECTION - I

1. (a) Reduce the matrix $\begin{bmatrix} 0 & 1 & 2 & -2 \\ 4 & 0 & 2 & 6 \\ 2 & 1 & 3 & 1 \end{bmatrix}$ to normal form and hence find the rank

- (b) Show that the equations $x + y + z = 6$, $x + 2y + 3z = 14$, $x + 4y + 7z = 30$ are consistent and solve them.

2. Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$

SECTION - II

3. (a) Solve $\frac{d^3 y}{dx^3} - 6\frac{d^2 y}{dx^2} + 11\frac{dy}{dx} - 6y = e^{-2x} + e^{-3x}$

- (b) Solve $(D^2 - 4D + 3)y = \sin 3x \cos 2x$

4. Solve $(D^3 + 2D^2 + D)y = e^{2x} + x^2 + x + \sin 2x$

SECTION - III

5. (a) Obtain the Taylor's series expansion of $\cos x$ in powers of $x - \frac{\pi}{2}$

- (b) Find the maximum and minimum values of $xy + \frac{a^3}{x} + \frac{a^3}{y}$, $a > 0$

6. Find volume of the largest rectangular parallelepiped that can be inscribed in

ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

SECTION - IV

7 (a) Evaluate $\int_0^{\infty} \int_0^{\pi/2} e^{-r^2} r d\theta dr$

(b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz dx dy dz$

8 Change the order of integration and Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dx dy$

SECTION - V

9 Find the directional derivative of $\phi(x, y, z) = x^2 yz + 4xz^2$ at the point $(1, -2, -1)$ in the direction of the normal to the surface $f(x, y, z) = x \log z - y^2$ at $(-1, 2, 1)$

10 (a) If $F = xy^2 \mathbf{i} + 2x^2 yz \mathbf{j} - 3yz^2 \mathbf{k}$ then find curl F at the point $(1, -1, 1)$

(b) Prove that $r^n \bar{r}$ is Solenoidal if $n = -3$

SECTION - VI

11 Evaluate $\int_S \bar{F} \cdot \bar{n} ds$ where $\bar{F} = z\bar{i} + x\bar{j} - 3y^2 z\bar{k}$ and S is the Surface $x^2 + y^2 = 16$ included in the first octant between $z = 0$ and $z = 5$

12 Verify Stoke's Theorem for $\bar{F} = (2x - y)\bar{i} - yz^2\bar{j} - y^2 z\bar{k}$ over the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$ bounded by the projection

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2020

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B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**ENGINEERING CHEMISTRY**
(Common to EEE, ECE, CSE & IT)

Time : 3Hrs

Max. Marks : 60

Answer ONE Question from each section
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* * *

SECTION - I

1. (a) Write down the general form of the Schrödinger equation and define each of the terms in it.
(b) Define Bond order. Calculate the CO bond order.
2. (a) What are the differences between bonding and anti-bonding orbitals?
(b) List three rules for the linear combination of atomic orbitals.

SECTION - II

3. (a) What is meant by Hardness of Water? What are the different units used to express hardness of water?
(b) Describe the permutit process for softening of water
4. (a) Explain the process of scale and sludge formation in boilers. How they can prevent?
(b) Describe the ion-exchange process for softening of water? What are its advantages and limitations?

SECTION - III

5. (a) Define reference electrode. Explain standard hydrogen electrode.
(b) Explain the Nernst equation for electrode potential.
6. (a) Describe the construction and working of calomel electrode.
(b) Write a short note on fuel cells.

SECTION - IV

7. (a) Explain the mechanism of corrosion when Two dissimilar metals are connected and exposed to electrolyte.
(b) Explain sacrificial anode method in detail.
8. (a) Give an account of oxidation corrosion with relevant chemical equations involved.
(b) Corrosion of a specimen can be controlled by using impressed current.

SECTION - V

- 9 (a) Explain the differences between thermoplastics and thermosetting plastics?
(b) What is bakelite? How is it manufactured? Mention its properties and uses.
- 10 (a) Distinguish between addition and condensation polymerization .
(b) Describe the preparation, properties and uses of Buna-N rubber.

SECTION - VI

- 11 (a) Explain the Bomb calorimeter for the determination of calorific value of a solid fuel.
(b) Write short notes on Proximate analysis of coal.
- 12 (a) What are the characteristics of good fuel?
(b) Describe the ultimate analysis of coal.

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R-19

Code : 19SH1202

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester

ENGINEERING PHYSICS

(Common to CE & ME)

Time : 3Hrs

Max. Marks : 60

Answer ONE Question from each section

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** * **

SECTION - I

1. (a) Explain interference of light by superposition of light waves.
(b) With necessary theory explain Fraunhofer diffraction due to single slit.
2. (a) Describe the construction and working of ruby laser.
(b) Mention Applications of LASER in Engineering field.

SECTION - II

3. (a) Explain Plank's quantum theory of black body radiation.
(b) What is Photon and mention its Properties?
4. (a) Deduce Schrodinger time independent wave equation.
(b) An electron is bound in a one – dimensional box having size of 4×10^{-10} m.
What will be its minimum energy. (Given $h=6.63 \times 10^{-34}$ J-S, & $m=9.1 \times 10^{-31}$ Kg)

SECTION - III

5. (a) Mention the success and drawbacks of classical free electron theory.
(b) Explain Classification of solids into conductors, semiconductors & insulators based on band structure.
6. (a) Explain Fermi –Dirac distribution function along with its temperature dependence.
(b) What is Hall effect? Mention its applications.

SECTION - IV

7. (a) Write a short note on ionic polarization of a dielectric.
(b) Deduce Clausius-Mossotti relation for a polarized dielectric.

- 8 (a) Explain the classification of Magnetic materials based on their magnetic properties.
(b) Distinguish between soft and hard magnetic materials.

SECTION – V

- 9 (a) Describe the analytical treatment of damped oscillations.
(b) Write a short note on free vibrations.
- 10 (a) Distinguish between damped and forced oscillations.
(b) Deduce the electrical analogy for an oscillator.

SECTION – VI

- 11 (a) Derive the expressions for Acceptance angle and Numerical Aperture of optical fibers.
(b) Identify the applications of optical fibers.
- 12 (a) Identify the change in mechanical properties of nanomaterials.
(b) Explain the synthesis of nanomaterials by Chemical vapour deposition method.

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I B.Tech. II Semester**CIRCUITS & NETWORKS**
(Electrical & Electronics Engineering)

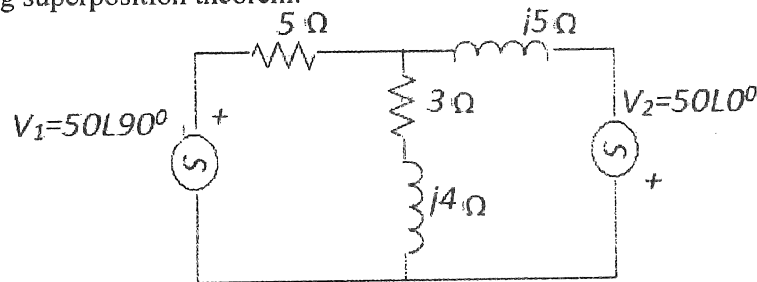
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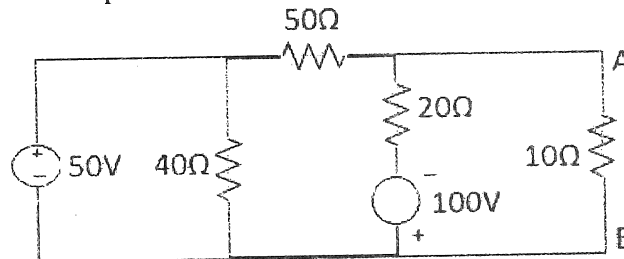
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SECTION - I

1. (a) State and explain Thevenin's theorem.
 (b) Determine the Current passing through $(3+j4)\Omega$ impedance shown in the network. By applying superposition theorem.



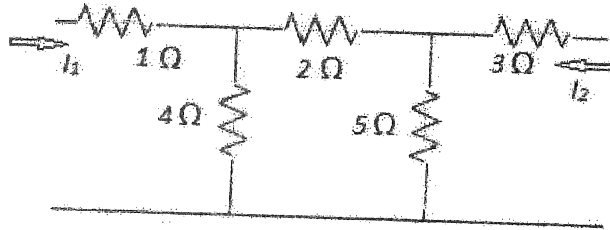
2. (a) State and explain compensation theorem.
 (b) Determine the Norton's equivalent across AB terminals shown in figure.

**SECTION - II**

3. (a) Explain Star Delta Transformation Technique.
 (b) Each phase of a balanced three phase delta connected load has a 0.5 Henry inductor in series with a parallel combination of a $7\ \mu\text{F}$ capacitor and 50 ohms resistances. If a 3-phase voltage of 230 V at a frequency of 400 rad/sec is applied to this load, find
 (i) phase current (ii) line current (iii) total power absorbed by the load
4. (a) Explain Two watt meter method using Phasor diagram.
 (b) A three phase, three wire symmetrical 440V source in supplying power to an unbalanced delta connected load in which $Z_{RY} = 20\ \angle 30^\circ\ \Omega$, $Z_{YB} = 20\ \angle 0^\circ\ \Omega$ and $Z_{BR} = 20\ \angle -30^\circ\ \Omega$. If the phase sequence is RYB, calculate the line currents.

SECTION - III

5. (a) Voltage V_1 and V_2 at the ports of a two port network are given by the equation.
 $V_1 = 60I_1 + 20I_2$
 $V_2 = 20I_1 + 40I_2$, Find the Z and Y parameters of the network.
- (b) Derive the relation between ABCD parameters and
(i) Z Parameters (ii) Y Parameters.
6. Obtain Transmission line parameter and h-parameters for the network shown in figure.



SECTION - IV

7. Write the necessary conditions for driving point functions & transfer function.
8. (a) What are the restrictions on the location of poles and zeros?
(b) Obtain the pole-zero diagram of the given function and deduce the time domain response.

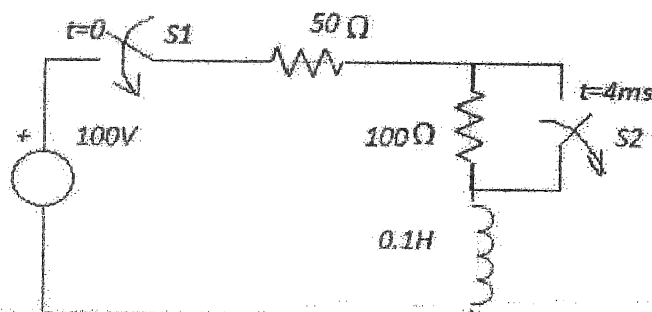
$$I(s) = \frac{3s}{[(s+3)(s^2+2s+4)]}$$

SECTION - V

9. (a) Find the response for the R-L series circuit, when it is excited by a constant voltage V . Assume that no current is passing through inductor initially.
(b) In a series R-L circuit, the steady state current is 10A, when it is energized by 100V DC. The time constant is 100ms. Determine the current at time 150ms after the switch is closed.
10. Find the response of RLC series circuit. When the switch 'S' is closed at $t=0$ and is excited by a constant voltage source V .

SECTION - VI

11. When RC circuit is excited with sinusoidal voltage at $t=0$, derive the current expression for $t > 0$.
12. The circuit shown in figure, the switch S_1 is closed at $t = 0$ switch S_2 is opened at $t = 4ms$ obtain current for $t > 0$ using Laplace transformations.



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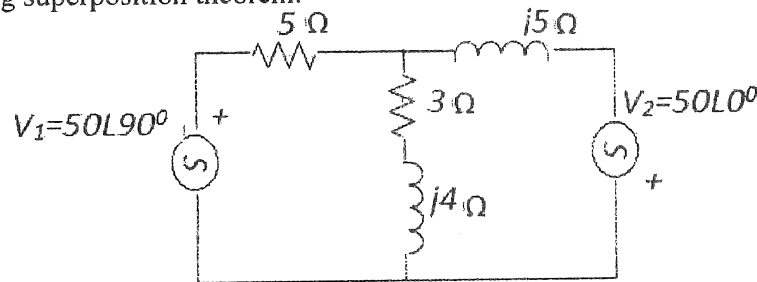
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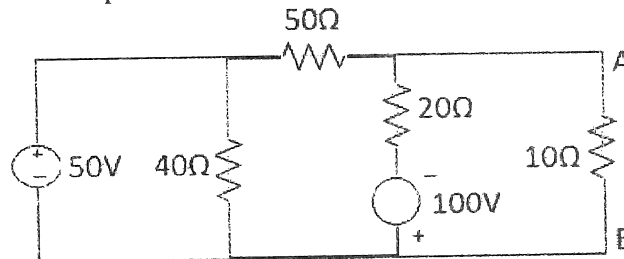
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1. (a) State and explain Thevenin's theorem.
(b) Determine the Current passing through $(3+j4)\Omega$ impedance shown in the network. By applying superposition theorem.



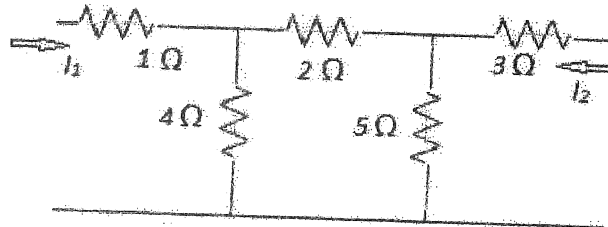
2. (a) State and explain compensation theorem.
(b) Determine the Norton's equivalent across AB terminals shown in figure.

**SECTION - II**

3. (a) Explain Star Delta Transformation Technique.
(b) Each phase of a balanced three phase delta connected load has a 0.5 Henry inductor in series with a parallel combination of a $7\ \mu\text{F}$ capacitor and 50 ohms resistances. If a 3-phase voltage of 230 V at a frequency of 400 rad/sec is applied to this load, find
(i) phase current (ii) line current (iii) total power absorbed by the load
4. (a) Explain Two watt meter method using Phasor diagram.
(b) A three phase, three wire symmetrical 440V source in supplying power to an unbalanced delta connected load in which $Z_{RY} = 20\ \angle 30^\circ\ \Omega$, $Z_{YB} = 20\ \angle 0^\circ\ \Omega$ and $Z_{BR} = 20\ \angle -30^\circ\ \Omega$. If the phase sequence is RYB, calculate the line currents.

SECTION - III

5. (a) Voltage V_1 and V_2 at the ports of a two port network are given by the equation.
 $V_1 = 60I_1 + 20I_2$
 $V_2 = 20I_1 + 40I_2$, Find the Z and Y parameters of the network.
- (b) Derive the relation between ABCD parameters and
(i) Z Parameters (ii) Y Parameters.
6. Obtain Transmission line parameter and h-parameters for the network shown in figure.



SECTION - IV

7. Write the necessary conditions for driving point functions & transfer function.
8. (a) What are the restrictions on the location of poles and zeros?
(b) Obtain the pole-zero diagram of the given function and deduce the time domain response.

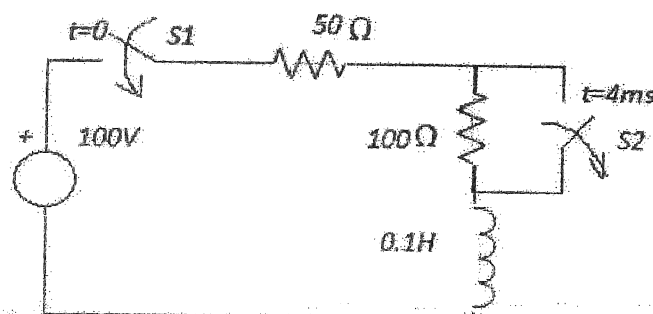
$$I(s) = \frac{3s}{[(s+3)(s^2+2s+4)]}$$

SECTION - V

9. (a) Find the response for the R-L series circuit, when it is excited by a constant voltage V . Assume that no current is passing through inductor initially.
(b) In a series R-L circuit, the steady state current is 10A, when it is energized by 100V DC. The time constant is 100ms. Determine the current at time 150ms after the switch is closed.
10. Find the response of RLC series circuit. When the switch 'S' is closed at $t=0$ and is excited by a constant voltage source V .

SECTION - VI

11. When RC circuit is excited with sinusoidal voltage at $t=0$, derive the current expression for $t > 0$.
12. The circuit shown in figure, the switch S_1 is closed at $t = 0$ switch S_2 is opened at $t = 4ms$ obtain current for $t > 0$ using Laplace transformations.



B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**ELECTRONIC DEVICES**
(Electronics & Communication Engineering)

Time : 3Hrs

Max. Marks : 60

Answer ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

1. (a) Summarize the types of semiconductors and mention the majority and minority carriers in it.
(b) Derive the expression for conductivity in case of intrinsic type semiconductors.
2. (a) Describe the mass action law for semiconductors and mention the applications of it.
(b) Determine the position of Fermi level lies in the case of intrinsic type semiconductor materials.

SECTION - II

3. (a) Define biasing and explain different biasing conditions in a P-N junction diode.
(b) Describe the V-I Characteristics of zener diode.
4. (a) Derive the expression for transition capacitance of a P-N junction diode.
(b) Mention various circuits that a Diode can be used as a circuit element.

SECTION - III

5. (a) Illustrate the operation, characteristics of photo diode.
(b) Describe the Tunnel effect, formation of peak and valley points in its V-I characteristics of Tunnel diode.
6. (a) Illustrate the operation and characteristics of LED.
(b) Describe the operation of Varactor diode.

SECTION - IV

7. (a) Draw the symbols of n-p-n and p-n-p transistors. Mention the name of each pin and describe the function of each pin for a n-p-n transistor.
(b) Define the current amplification factors α_{dc} , β_{dc} , γ_{dc} of a transistor and derive the relation between α , β and γ .

8. (a) Compare transistor CB, CE and CC configurations.
- (b) Define h-parameters of a transistor and sketch the h- parameter model for a transistor in CE-configuration.

SECTION - V

9. (a) Summarize the differences between BJT and FET.
 - (b) Describe the classifications of FET and sketch the symbols of various FETs.
10. (a) Describe the construction and operation of JFET.
 - (b) Derive the expression for trans conductance (g_m) of JFET.

SECTION - VI

11. (a) List out the difference between MOSFET and JFET.
 - (b) Construct two input NAND gate using CMOS logic.
12. (a) Expand full form of "MOSFET" and mention the differences between various types of MOSFETs.
 - (b) Explain the working of enhancement mode MOSFET.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**ELECTRONIC DEVICES**

(Electronics & Communication Engineering)

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B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Mechanical Engineering)

Time : 3Hrs

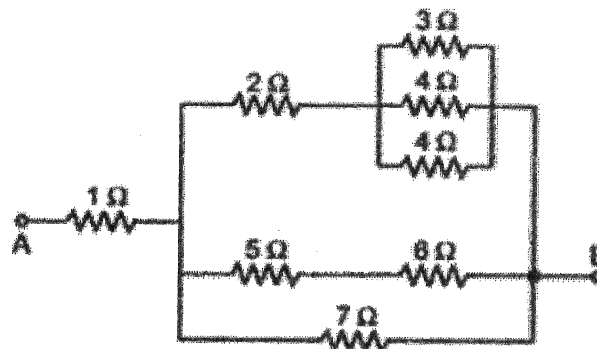
Max. Marks : 60

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

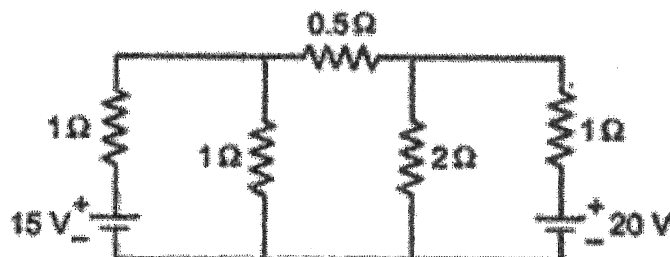
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SECTION - I

1. (a) Write the relationship the between voltage-current in Resistance, inductor and capacitor.
- (b) Find the equivalent resistance between the two points A and B of the circuit shown in figure.



2. (a) State and explain Kirchoff's laws, with an example,
- (b) Find the current through 0.5 ohms resistor of the circuit shown in the figure using nodal analysis

**SECTION - II**

3. (a) Show that current in pure inductive circuit lags the voltage by 90 degrees.
 - (b) Derive the RMS and Average values for Half wave rectifier voltage waveform.
4. (a) Explain RC series circuit in detail with phasor diagram.
 - (b) A resistance 50 Ω and inductance 0.1 Henry and a capacitance 50 μF are connected in series across a 230V, 50Hz supply. Calculate (i) the value of impedance (ii) current flowing and (iii) power factor

SECTION - III

5. (a) Define resonant frequency? List the characteristics of RLC series resonant circuits
(b) A series RLC circuit has $R=55\Omega$ and $L=0.01$ H and $C=0.04\mu\text{F}$. Find the resonant frequency, circuit impedance, current, voltage across the capacitance and inductance under resonance.
6. What do you mean by resonance? Derive an expression for resonant frequency of parallel L and C circuit. Let R_L and R_C are the internal resistance of the coil and the capacitor connected in series.

SECTION - IV

7. What is PN Junction? Explain the operation of reverse biased diode and draw its characteristics.
8. Draw and explain the characteristics of Zener diode. Also draw its equivalent circuit.

SECTION - V

9. Define rectification? Draw the circuit diagram of full-wave centre-tap rectifier and explain the operation with waveforms.
- 10 (a) Explain the necessity of filter at output of the rectifier. Give the list of different filters.
(b) Explain in brief the operation of capacitor input filter?

SECTION - VI

- 11 (a) Explain the working of NPN transistor. Draw the standard symbol.
(b) List the comparisons between CB and CE configurations.
- 12 (a) State the important specifications of BJT
(b) Explain how h-parameter can be obtained from the transistor characteristics.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

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(Mechanical Engineering)

Time : 3Hrs

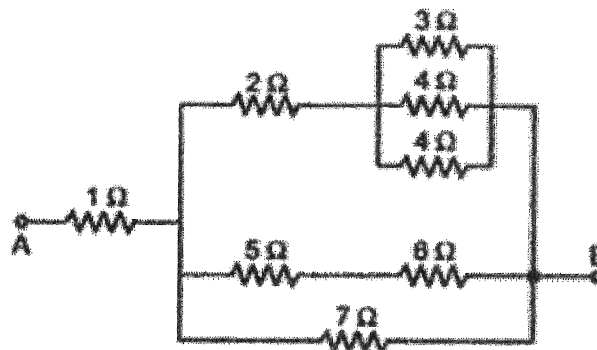
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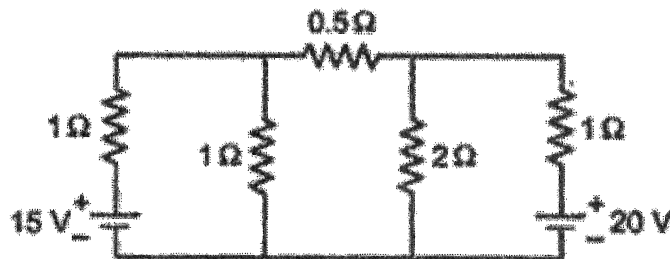
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B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester

**DATABASE MANAGEMENT SYSTEMS
(COMMON TO CSE & IT)**

Time : 3 hours

Max. Marks :60

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

** * **

SECTION - I

1. What are the different steps in data base design? Explain in detail.
2. What are the different types of database-system users? Explain in detail.

SECTION - II

3. Describe conceptual database design with ER Model.
4. How do you create schema diagram in DBMS. Explain the different types of schema.

SECTION - III

5. Explain the different set comparison operators with examples.
6. Discuss different types of aggregate operators with examples.

SECTION - IV

7. Describe about Atomic domain and first normal form.
8. With the relevant examples discuss the concept of Functional Dependencies.

SECTION - V

9. Describe in detail about how records are represented in a file and how to organize them in a file?
10. What is hashing technique? Differentiate static hashing and dynamic hashing.

SECTION - VI

11. With a neat sketch describe the states of transaction.
12. List the different types of Joins with examples.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

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B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**BUILDING MATERIALS & CONSTRUCTION
(Civil Engineering)**

Time : 3Hrs

Max. Marks : 60

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

* * *

SECTION - I

1. (a) How is artificial stone prepared? What are its different forms?
(b) Describe the tests performed to check the quality of bricks.
2. What are the desirable properties of glass? Discuss various varieties of glass and their use in building industry?

SECTION - II

3. (a) Explain the functions of cement ingredients.
(b) Describe the process of making lime mortar.
4. Give the four major types of mortar used in building construction. Briefly describe manual mixing and mechanical mixing of cement mortar.

SECTION - III

5. (a) Explain the situations in which the pile foundation is preferred.
(b) Write important points connected with the supervision of brick work.
6. Write a note on "method of construction" of cavity walls. What precautions do you observe in its construction?

SECTION - IV

7. (a) Discuss various cases of loadings transmitted to a lintel from the wall supported by it.
(b) Write a note on location of doors and windows.
8. (a) Briefly describe various types of stairs.
(b) What are the different types of timber floors? Explain any one type of timber floor in detail.

SECTION - V

9. List out different types of roof-covering materials commonly used for pitched roofs and explain any two methods in detail with the help of neat sketches.
10. (a) What are the requirements of good form work
(b) What do you understand by underpinning? When do you require it?

SECTION - VI

11. (a) Write a note on various types of special materials used in plastering.
(b) Explain how do you achieve thermal insulation of walls.
12. What do you understand by absorption of sound? Enumerate various absorptive surfaces.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**BUILDING MATERIALS & CONSTRUCTION
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B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**ENGINEERING MECHANICS – II (DYNAMICS)**
(Mechanical Engineering)

Time : 3Hrs

Max. Marks : 60

Answer ONE Question from each section
All Questions carry equal marks

* * *

SECTION – I

1. (a) The motion of a particle is described by the following equations:
$$x = t^2 + 8t + 4 \text{ and } y = t^3 + 3t^2 + 8t + 4.$$
Determine (a) initial velocity of the particle, (b) velocity of the particle at $t = 2 \text{ s}$ and (c) acceleration of the particle at $t = 2 \text{ s}$.
- (b) A stone is dropped from the top of a tower 50 m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 25 m/s . At what distance from the top and after how much time the two stones cross each other?
2. (a) A motor car takes 10 seconds to cover 30 meters and 12 seconds to cover 42 meters. Find the uniform acceleration of the car and its velocity at the end of 15 seconds.
- (b) The motion of a particle is defined by the equation $x = 2(t + 2)^2$ and $y = 2(t + 1)^{-2}$. Find the velocity and acceleration of the particle at $t = 0$.

SECTION – II

3. (a) A shaft is uniformly accelerating from 10 rev/sec to 18 rev/sec in 4 seconds. The shaft continues to accelerate at this rate for the next 8 seconds. Thereafter the shaft rotates with a uniform angular speed. Find the total time to complete 400 revolutions.
- (b) In a crank and connecting rod mechanism, the crank is 300mm long and the connecting rod is 1500mm long. If the crank rotates uniformly at 300 r.p.m., find the velocity of the cross head when the crank is inclined at 30° with the inner dead centre.
4. (a) A flywheel is rotating at 200 r.p.m. and after 10 seconds it is rotating at 160 r.p.m. If the retardation is uniform, determine the number of revolutions made by the flywheel and the time taken by the flywheel before it comes to rest from the speed of 200 r.p.m.
- (b) A projectile is fired with an initial velocity of 250 m/sec at a target located at a horizontal distance of 4 km and vertical distance of 700 m above the gun. Determine the value of the firing angle to hit the target. Neglect air resistance.

SECTION – III

5. Two blocks A and B are released from rest on a 30° incline plane when they are 18m apart as shown in Fig.1. The coefficient of friction under block A is 0.10 and that under block B is 0.30. In what time block A reaches the block B? After they touch and move as a single unit, what will be the contact force between them? Weights of the block A and B are 200N and 160N respectively.

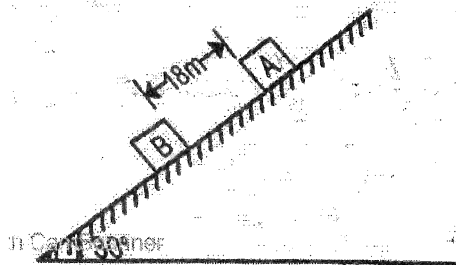


Fig.1.

6. In what distance will body 1 shown in Fig.2. attain a velocity of 3 m/sec starting from rest. Take coefficient of friction between the blocks and the plane as 0.20. Assume pulley is smooth. What is the tension in the cord.

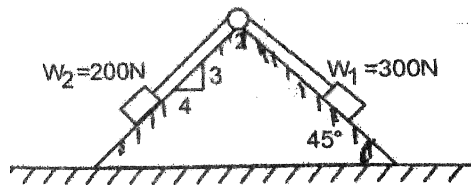


Fig.2.

SECTION – IV

- 7 (a) Define the principle of Impulse and momentum.
- (b) A ball of mass 100g is moving towards a bat with a velocity of 25 m/s as shown in Fig.3. When hit by a bat the ball attains a velocity of 40 m/s. if the bat and ball are in contact for a period of 0.015 sec, determine the average impulse force exerted by the bat on the ball during the impact.

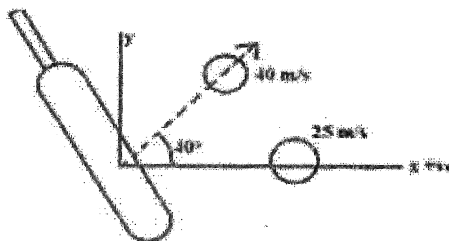


Fig.3.

- 8 (a) Define the co-efficient of restitution. Two bodies are having direct impact. Find the expression for the co-efficient of restitution in terms of initial and final velocities of the two bodies.
- (b) A ball of mass 20 kg moving with a velocity of 5 m/sec strikes directly another ball of mass 10 kg moving in the opposite direction with a velocity of 10 m/sec. If the co-efficient of restitution is equal to $\frac{5}{6}$, then determine the velocity of each ball after impact.

SECTION – V

- 9 A 500N block moves along the two inclines for which the coefficient of friction is 0.20 as shown in Fig.4. If the block starts from rest at A and slides 60m down the 30° incline, how far will it then move along the other incline? What will be its velocity when it returns to B.

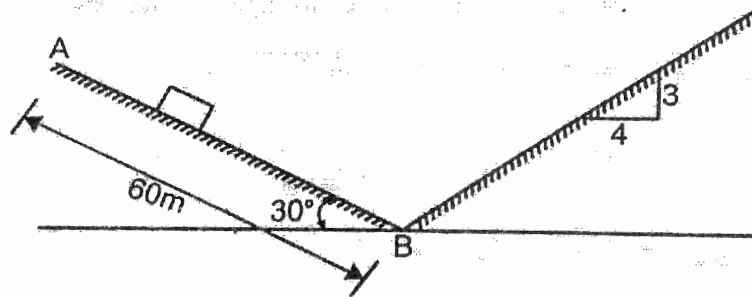


Fig.4.

- 10 (a) State the principle of virtual work. Explain it by giving a suitable example.
- (b) A simply supported beam AB of span 10m carries two point loads of 15 kN and 20 kN at 4m and 6m from the left support A. Determine the beam reactions by the principle of virtual work.

SECTION – VI

- 11 (a) Derive relationship between young's modulus and rigidity modulus.
- (b) A steel bar 300 mm long, 50 mm wide and 12 mm thick is subjected to an axial pull of 85 kN. Find the change in length, width, thickness and volume of the bar. Take $E_s=200$ GPa and Poisson's ratio = 0.32.
- 12 (a) A steel rod which tapers uniformly from 5cm diameter to 3cm diameter in length of 50cm, is subjected to an axial load of 6000N. If $E = 2 \times 10^5$ N/mm², find the extension of the rod.
- (b) A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200 mm is 0.09 mm and the change in diameter is 0.0039 mm. Calculate the Poisson's ratio and the values of the three moduli.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**ENGINEERING MECHANICS – II (DYNAMICS)****(Mechanical Engineering)**

Time : 3Hrs

Max. Marks : 60

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All Questions carry equal marks*

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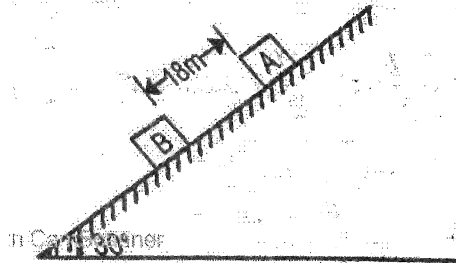


Fig.1.

6. In what distance will body 1 shown in Fig.2. attain a velocity of 3 m/sec starting from rest. Take coefficient of friction between the blocks and the plane as 0.20. Assume pulley is smooth. What is the tension in the cord.

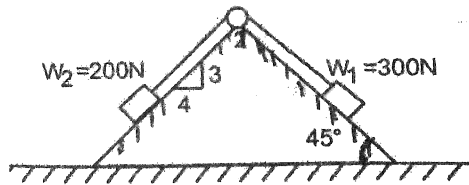


Fig.2.

SECTION – IV

- 7 (a) Define the principle of Impulse and momentum.
- (b) A ball of mass 100g is moving towards a bat with a velocity of 25 m/s as shown in Fig.3. When hit by a bat the ball attains a velocity of 40 m/s. if the bat and ball are in contact for a period of 0.015 sec, determine the average impulse force exerted by the bat on the ball during the impact.

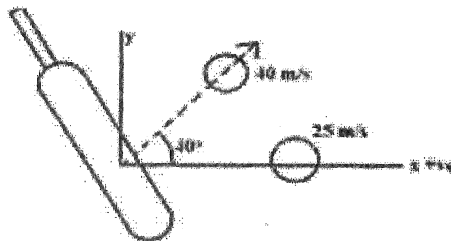


Fig.3.

- 8 (a) Define the co-efficient of restitution. Two bodies are having direct impact. Find the expression for the co-efficient of restitution in terms of initial and final velocities of the two bodies.
- (b) A ball of mass 20 kg moving with a velocity of 5 m/sec strikes directly another ball of mass 10 kg moving in the opposite direction with a velocity of 10 m/sec. If the co-efficient of restitution is equal to $\frac{5}{6}$, then determine the velocity of each ball after impact.

SECTION - V

- 9 A 500N block moves along the two inclines for which the coefficient of friction is 0.20 as shown in Fig.4. If the block starts from rest at A and slides 60m down the 30° incline, how far will it then move along the other incline? What will be its velocity when it returns to B.

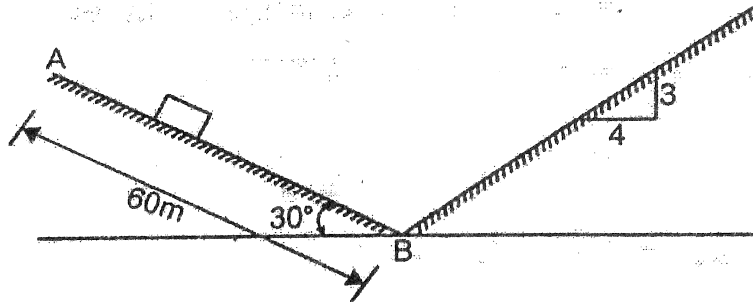


Fig.4.

- 10 (a) State the principle of virtual work. Explain it by giving a suitable example.
- (b) A simply supported beam AB of span 10m carries two point loads of 15 kN and 20 kN at 4m and 6m from the left support A. Determine the beam reactions by the principle of virtual work.

SECTION - VI

- 11 (a) Derive relationship between young's modulus and rigidity modulus.
- (b) A steel bar 300 mm long, 50 mm wide and 12 mm thick is subjected to an axial pull of 85 kN. Find the change in length, width, thickness and volume of the bar. Take $E_s=200$ GPa and Poisson's ratio = 0.32.
- 12 (a) A steel rod which tapers uniformly from 5cm diameter to 3cm diameter in length of 50cm, is subjected to an axial load of 6000N. If $E = 2 \times 10^5$ N/mm², find the extension of the rod.
- (b) A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200 mm is 0.09 mm and the change in diameter is 0.0039 mm. Calculate the Poisson's ratio and the values of the three moduli.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**ENGINEERING MECHANICS****(Civil Engineering)**

Time : 3Hrs

Max. Marks : 60

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

* * *

SECTION - I

1. Two forces equal to $2P$ and P act on a particle. If the first force be doubled and the second force is increased by 15kN , the direction of their resultant remains unaltered. Find the value of P .
2. A simply supported beam 6m long carries a uniformly varying load over its entire length which varies from 25kN/m at the right hand end to 225kN/m at the left hand end. Determine the support reactions.

SECTION - II

3. (a) What do you mean by friction? What is limiting friction?
(b) Define the following with the help of neat sketches :
(i) Angle of friction (ii) Cone of friction
4. A body is on the point of sliding down an inclined plane of inclination 15° to the horizontal. If the body weighs 25kN and the plane is raised up to a slope of 40° to the horizontal, find the pull applied at an angle of 30° to the inclined plane that will just move the body up the plane.

SECTION - III

5. Determine the centroid of a T section having the following dimensions:
Flange – $180\text{mm} \times 10\text{mm}$
Web – $240\text{mm} \times 10\text{mm}$
6. An I section with equal flanges has the following dimensions:
Flanges – $150\text{mm} \times 10\text{mm}$
Web – $280\text{mm} \times 10\text{mm}$
Over all depth of the section – 300mm
Determine moment of inertia of the I – section about two centroidal axes at right angles to each other.

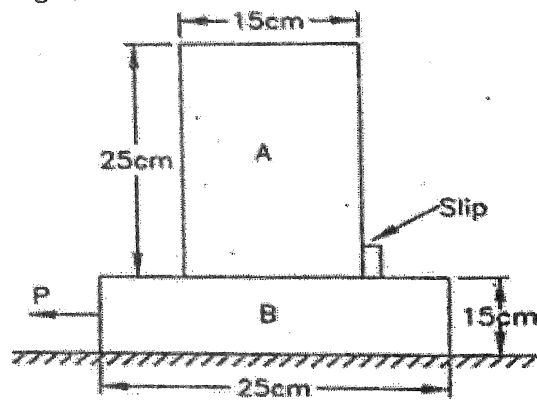
SECTION - IV

7. (a) What is the difference between speed and velocity?
(b) A motor car A stays for 10 minutes at a petrol pump after car B passes at an average speed of 20m/s . If the car A moves at an average speed of 25m/s , how long will it take to overtake the car B.?

8. A particle starts from a point O with a uniform velocity of 4 m/s. After 2 seconds another particle leaves O in the same direction with a velocity of 5 m/s and with an acceleration of 5 m/s^2 . Find when and where it will overtake the 1st particle.

SECTION - V

9. A tower is 88.29m high. A body is dropped from the top of the tower and at the same instant another body is projected vertically upward from the bottom of the tower and the two bodies meet half way up. Find the initial velocity of the body projected vertically up and its velocity when it meets the descending body.
10. In Fig.01 shown below, blocks A and B weigh 160N each. A small strip is nailed to block B to prevent block A from sliding when a force P applied horizontally to block B accelerates the system to the left on a smooth horizontal plane. Determine the maximum value of P such that block A will not tip. If the system was moving initially with a velocity of 2 m/s to the right, what will be its velocity after moving through 8m?



SECTION - VI

11. Use method of joints to determine forces in the members AB, BC, CD, DE and EF, of the truss supported and loaded as shown in Fig.02.

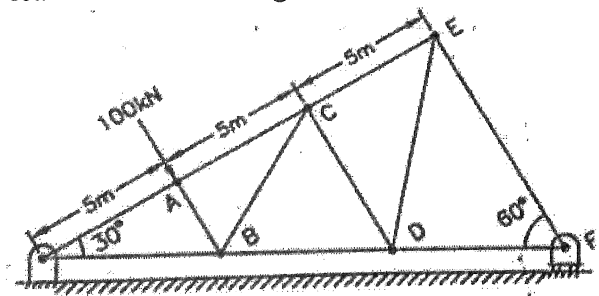


Fig.02

12. A particle is in simple harmonic motion. It has a velocity of 0.6m/sec when it is 0.2 m from its static equilibrium position and has a velocity of 0.35m/sec when it is 0.3m from the equilibrium position. Determine the maximum velocity, maximum acceleration and the frequency of vibration.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester**ENGINEERING MECHANICS****(Civil Engineering)**

Time : 3Hrs

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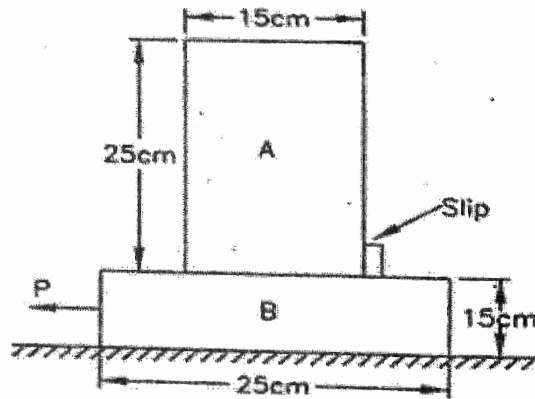
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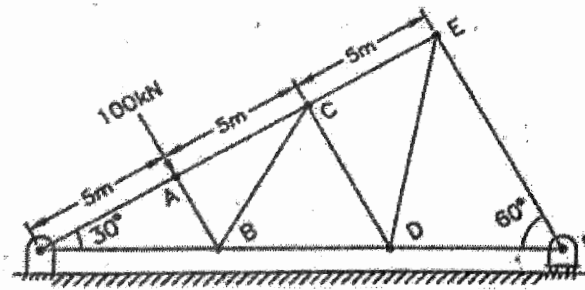


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R-19

Code : 19CS1202

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester

DATA STRUCTURES

(Common to EEE & ECE)

Time : 3Hrs

Max. Marks : 60

Answer ONE Question from each section

All Questions carry equal marks

** * **

SECTION – I

1. a) Define array. Describe in detail about the representation of stacks using arrays.
b) Write about the applications of stacks.
2. a) Write a C program to convert a decimal number into a binary number using stack.
b) What are the advantages and disadvantages of stacks.

SECTION – II

3. Define queue? Write a program to perform the operations on circular queue such as enqueue, dequeue and display with suitable diagrams.
4. Explain in detail about Round Robin algorithm with an example.

SECTION – III

5. Write a program that demonstrates insertion, deletion and traversing of singly linked list.
6. Describe in detail about double linked list insertion algorithm along with node diagrams.

SECTION – IV

- 7 a) Explain various methods in which a binary tree can be represented.
b) Discuss in detail about the advantages and disadvantages of tree data structures.
- 8 Describe in detail about the various operations that can be performed on set with examples.

SECTION – V

- 9 a) Describe in detail about graph terminologies with examples.
b) Explain about Warshal algorithm with an example.
- 10 a) What are the various applications of graphs?
b) Explain about Kruskal's algorithm with an example.

SECTION – VI

- 11 a) Write the time complexities for various sorting and searching techniques.
b) Write a program to sort the given elements using bubble sort.
- 12 a) Write a program that implements insertion sort and display the largest element.
b) Write a function for search operation in binary search tree.

R-19

Code : 19CS1202

B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

I B.Tech. II Semester

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(Common to EEE & ECE)

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PYTHON AND DATA STRUCTURES
(Common to CSE & IT)

Time : 3Hrs

Max. Marks : 60

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

* * *

SECTION - I

1. (a) Discuss about operators precedence in Python with example.
(b) What are regular expressions? How to find whether an email id entered by user is valid or not using Python 're' module.
2. (a) What is a string? Explain the basic string operations.
(b) Discuss the type conversion functions in python.

SECTION - II

3. (a) What type of parameter passing is used in Python? Justify your answer with sample program.
(b) Write a Python function that prints all factors of a given number.
4. (a) Demonstrate the different types of functions in python.
(b) Illustrate the various operations on Lists.

SECTION - III

5. (a) Explain about built-in functions of tuple.
(b) Write a Python program to illustrate the comparison operators in tuple.
6. Discuss the following :
a) Dictionaries b) Sets

SECTION - IV

7. Write an algorithm for bubble sort.
Sort the following list of elements by using bubble sort.
45, 26, 37, 18, 29, 56, 76, 87, 35
8. Write short notes on binary search and insertion sort with an example.

SECTION - V

9. Explain the following operations in a singly linked list.
(a) Insert an element (b) Delete an element (c) Reverse the list
10. What is a binary tree? Demonstrate the binary tree traversals with an example.

SECTION - VI

11. Explain the procedure to evaluate postfix expression.
Evaluate the following postfix expression: 6 2 3 + - 3 8 2 / + * 2 / 3 +.
12. What is a Queue? Discuss the implementation and operations of a Queue.

PYTHON AND DATA STRUCTURES

(Common to CSE & IT)

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Time : 3Hrs

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* * *

SECTION - I

1. (a) Evaluate $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dx dy$

(b) Evaluate $\int_0^{\pi/4} \int_0^{a \sin \theta} \frac{r}{\sqrt{a^2 - r^2}} dr d\theta$

2. Change the order of integration and evaluate $\int_0^1 \int_{x^2}^{2-x} x y dx dy$

SECTION - II

3. (a) Evaluate $\int_0^1 \int_y^1 \int_0^{1-x} x dz dx dy$

(b) Evaluate $\int_0^{\infty} \sqrt{x} e^{-x^2} dx$

4. State and prove Relation between Beta and Gamma functions.

SECTION - III5. (a) Find the directional derivative of $f = 2xy + z^2$ at $(1, -1, 3)$ in the direction of the vector $\bar{i} + 2\bar{j} + 3\bar{k}$.(b) Show that $\nabla(r^n) = nr^{n-2} \bar{r}$ 6. (a) Show that $\text{curl}(r^n \bar{r}) = 0$ (b) Find $\text{div } \bar{F}$ and $\text{curl } \bar{F}$, where $\bar{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$

SECTION - IV

- 7 Evaluate $\int \bar{F} \cdot \bar{n} ds$ where $\bar{F} = z\bar{i} + x\bar{j} - 3y^2z\bar{k}$ and S is the surface $x^2 + y^2 = 16$ included in the first octant between $z = 0$ and $z = 5$.
- 8 Evaluate $\int_C [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$ where C is the region bounded by $x = 0$, $y = 0$ and $x + y = 1$ by Green's Theorem.

SECTION - V

- 9 Expand the function $f(x) = x^2$ as a Fourier series in $[-\pi, \pi]$ and hence deduce that
- (i) $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$
- (ii) $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \frac{\pi^2}{6}$
- 10 Find the Fourier expansion of $f(x) = x \cos x$, $0 < x < 2\pi$.

SECTION - VI

- 11 Using Fourier integral, show that $\int_0^{\infty} \frac{\lambda \sin \lambda x}{(\lambda^2 + a^2)(\lambda^2 + b^2)} d\lambda = \frac{\pi(e^{-ax} - e^{-bx})}{2(b^2 - a^2)}$ $a, b > 0$
- 12 Find the Fourier transform of $f(x)$ defined by $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$ and hence evaluate

(a) $\int_0^{\infty} \frac{\sin p}{p} dp$

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B.TECH. DEGREE EXAMINATION, NOVEMBER 2020

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

Time : 3Hrs

Max. Marks : 60

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

* * *

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