

B.TECH. DEGREE EXAMINATION, MAY 2017

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

Time : 3 hours

Max. Marks :60

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

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SECTION – I

1. a) Determine the rank of the matrix $A = \begin{bmatrix} 0 & 1 & -3 & -1 \\ 0 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$, by normal form

b) Test for consistency and solve $x+2y+z=3$, $2x+3y+2z=5$, $3x-5y+5z=2$, $3x+9y-z=4$

2. a) Verify Cayley-Hamilton theorem for the matrix A and find its inverse,

$$\text{where } A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

b) Diagonalise the matrix $A = \begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$

SECTION – II

3. a) Verify Rolle's theorem for $f(x) = \frac{\sin x}{e^x}$ on $[0, \pi]$

b) Obtain Taylor's series expansion of $f(x) = \sin x$ in powers of $(x - \frac{\pi}{4})$

4. a) Find the maximum and minimum values of $f(x, y) = x^3 + y^3 - 3axy$

b) Divide 24 into three parts such that the continued product of the first, square of second and the cube of the third may be maximum.

SECTION - III

5. a) Find the radius of curvature of the curve $x^3 + y^3 = 3axy$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$

b) Find the evolute of the curve $x=a(\cos t + t \sin t)$, $y=a(\sin t - t \cos t)$

6. a) (i) Evaluate $\int_0^{\infty} e^{-x^2} dx$

(ii) Show that $\int_a^b (x-a)^m (b-x)^n dx = (b-a)^{m+n+1} \beta(m+1, n+1)$

b) Trace the curve $y^2(a-x) = x^3$

SECTION - IV

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

b) Change the order of integration $\int_0^1 \int_{x^2}^{2-x} xy dx dy$ and hence evaluate the same

8. a) evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x dz dx dy$

b) Find the area of a plate in the form of a quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

SECTION - V

9. a) Find the directional derivative of $f(x,y,z) = xy^2 + yz^3$ at the point $(2,-1,1)$ in the direction of the vector $i+2j+2k$

b) Show that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$, where $r=|R|$, $R = xi+yj+zk$

10. Verify Divergence theorem for $F = (x^2 - yz) i + (y^2 - zx) j + (z^2 - xy) k$ taken over the rectangular parallelepiped $0 \leq x \leq a$, $0 \leq y \leq b$, $0 \leq z \leq c$

Code : 13ME1001

B.TECH. DEGREE EXAMINATION, MAY 2017

I B.Tech.

**ENGINEERING GRAPHICS
(CIVIL ENGINEERING)**

Time : 3 hours

Max. Marks : 60

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

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SECTION - I

1. Two points A and B are 50 mm apart. Draw the curve traced out by a point P moving in such a way that the difference between its distances from A and B is always constant and equal to 20 mm.
2. A circle of 115 mm diameter rolls on another circle of 75 mm diameter with internal contact. Draw the locus of a point on the circumference of the rolling circle for its one complete revolution.

SECTION - II

3. A line AB, 65 mm long, has its end A 20 mm above the H.P and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and shows its inclinations with the H.P. and the V.P.
4. A line PQ, 100 mm long, is inclined at 45° to the H.P. and at 30° to the V.P. Its end P is in the second quadrant and Q is in the fourth quadrant. A point R on PQ, 40 mm from P is in both the planes. Draw the projections of PQ.

SECTION - III

5. A semi-circular plate of 80 mm diameter has its straight edge in the V.P. and inclined at 45° to the H.P. The surface of the plate makes an angle of 30° with the V.P. Draw its projections.
6. A pentagonal prism, base 28 mm side and height 65 mm has an edge of its base on the H.P. and the axis parallel to the V.P. and inclined at 60° to the H.P. A section plane, having its H.T. perpendicular to xy , and the V.T. inclined at 60° to xy and passing through the highest corner, cuts the prism. Draw the sectional top view and true shape of the section.

Code : 13SH1003

B.TECH. DEGREE EXAMINATION, MAY 2017

I B.Tech.

ENGINEERING MATHEMATICS - II
(Common to All Branches)

Time : 3 hours

Max. Marks : 60

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

SECTION - I

- 1 (a) Solve $(D^3 - 6D^2 + 11D - 6)y = e^{-2x} + e^{-3x}$
(b) Solve $\frac{d^2y}{dx^2} + 4y = x \sin x$
- 2 (a) Solve $\frac{d^2y}{dx^2} + a^2y = \tan ax$, by the method of variation of parameters
(b) Solve $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = \log x$

SECTION - II

- 3 (a) Find i) $L[\sin 2t \cdot \sin 3t]$ ii) $L[e^{-2t} \cdot \sin 4t]$
(b) Find $L\left[\frac{\cos 2t - \cos 3t}{t}\right]$
- 4 (a) Find $L[t^2 \cdot \cos at]$
(b) Find $L\left[\int_0^t e^{-t} \cos t dt\right]$

SECTION - III

- 5 (a) Find i) Inverse Laplace transform of $\frac{s^2 - 3s + 4}{s^3}$
ii) $L^{-1}\left[\frac{s^2 + s - 2}{s(s+3)(s-2)}\right]$
(b) Find $L^{-1}\left[\log \frac{s+1}{s-1}\right]$

6 Solve $y'' + 4y' + 3y = e^{-t}$; $y(0) = y'(0) = 1$, by Laplace transform

SECTION – IV

7 (a) Find the Fourier Series for $f(x) = e^{-x}$ over $0 < x < 2\pi$

(b) Develop $f(x)$ in Fourier Series in the interval $(-2, 2)$; if $f(x) = 0$; $-2 < x < 0$
 $= 1$; $0 < x < 2$

8 (a) Express $f(x) = x$ as a half-range sine series in $0 < x < 1$

(b) Find the complex form of the Fourier Series of $f(x) = e^{-x}$ in $-1 \leq x \leq 1$

SECTION – V

9 Find the Fourier transform of $f(x) = 1 - x^2$; $|x| \leq 1$
 $= 0$; $|x| > 1$

and hence evaluate $\int_0^{\infty} \frac{x \cos x - \sin x}{x^3} \cdot \cos \frac{x}{2} \cdot dx$

10 Find the Fourier Cosine transform of $f(x) = \frac{1}{1+x^2}$

I B.Tech.

ENGINEERING PHYSICS

(Common to All Branches)

Time: 3Hrs

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section

All Questions carry equal marks

SECTION - I

1. (a) State and explain de-Broglie's hypothesis of matter waves.
(b) Derive Schrodinger's one dimensional time independent wave equation for a free particle.
2. (a) Describe the motion of an electron in a periodic potential field using Kronig Penney model.
(b) Explain the origin of energy bands in solids with neat diagram.

SECTION - II

3. (a) Define Hall Effect in a semiconductor.
(b) Derive Einstein's relation for a semiconductor.
(c) Distinguish between direct and indirect band gap semiconductors.
4. (a) Describe the origin of magnetic moments in an atom.
(b) Explain soft and hard magnetic materials.

SECTION - III

5. (a) What are lattice parameters?
(b) Describe the crystal systems along with its lattice parameters.
(c) What is Miller indices and mention the procedure to find Miller indices of a crystal plane.
6. (a) State Bragg's Law used for X-ray diffraction technique.
(b) Describe crystal structure determination by powder method.

SECTION - IV

7. (a) Mention the role of population inversion in laser emission.
(b) With necessary theory and energy level diagram, explain the working of a Helium-Neon gas laser
(c) What is the need of optical resonator in laser device
8. (a) Describe the production of Ultrasonic waves by Piezoelectric Method.
(b) Mention the important applications of Ultrasonic waves.

SECTION - V

9. (a) What is an optical fiber?
(b) Describe optical fiber communication system with neat diagram.
(c) The numerical aperture of an optical fiber is 0.391. Find its acceptance angle.
10. (a) State and explain Meissner effect for a superconductor.
(b) Discuss type-I and Type-II superconductors.

I B.Tech.

**ENGINEERING CHEMISTRY
(Common to All Branches)**

Time : 3 hours

Max. Marks : 60

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

SECTION - I

- 1 a What is meant by single electrode potential? Explain.
- b What are secondary cells? Describe the construction of Ni-Cd cell. Write cell reactions and what are its applications?
- 2 a What is pilling bedworth rule? Explain the intensity of corrosion by formation of various kinds of oxide films
- b Explain the Nernst Equation for electrode potential.

SECTION - II

- 3 a Explain the importance of various gaseous insulators?
- b Write a note on electrical insulators
- 4 a What is pyrometric cone equivalent? How it is determined for a refractory
- b Describe thick film lubrication.

SECTION - III

- 5 a How do you synthesize petrol by Fischer-Tropsch process.
- b Discuss the ultimate analysis of coal with its significance.
- 6 a What are chemical fuels? How they are classified with suitable examples.
- b Briefly explain the proximate analysis of coal.

SECTION - IV

- 7 a What is meant by carbonate and non-carbonate hardness of water? What are different units used in expression .
- b Explain the caustic embrittlement and phosphate conditioning of water.
- 8 a How do you estimate the dissolved oxygen in water
- b Describe the ion-exchange processes for the softening of water? What are its advantages

SECTION - V

- 9 a What is meant by degree of polymerisation
- b Write briefly on compounding of rubber and vulcanization.
- 10 a Explain the procedure used in the processing of natural rubber
- b What are synthetic rubbers? Explain preparation, properties and uses of Thiokol and neoprene rubbers

I B.TECH DEGREE EXAMINATION, MAY 2017

ENGLISH
(Common to All Branches)

Time : 3 hours

Max. Marks : 60

Answer **FIVE** questions, choosing **ONE** question from each section
All questions carry equal marks

SECTION - I

- | | | | |
|----|-----|--|-----|
| 1. | (a) | What are the usual measures to check soil erosion? | 6 M |
| | (b) | What lesson did young Washington learn during his stagecoach travels? | 6 M |
| 2. | (a) | What are Kalam's thoughts on education system? | 6 M |
| | (b) | What did God consider to be the most precious things in the city? Why? | 6 M |

SECTION - II

- | | | | |
|----|-----|---|-----|
| 3. | (a) | Write an application for the advertisement: Wanted an experienced office assistant with a good knowledge of English, Hindi and Marathi. Contact Box no. 9876, c/o The Times of India, Mumbai - 400001 | 7 M |
| | (b) | Write a short dialogue for the following situation:
Karuna runs into her cousin Mukund in a shopping mall. Write the conversation between the two. | 5 M |
| 4. | (a) | Write a letter to your friend about your trip to Delhi and Agra | 5 M |
| | (b) | Imagine that you are promoting a new kitchen appliance in the market. Prepare a presentation consisting of five charts or slides to present in your class. | 7 M |

SECTION- III

- | | | | |
|----|-----|---|-----|
| 5. | (a) | Write a report on social media, its advantages and disadvantages | 7 M |
| | (b) | Fill up the blanks with suitable articles: | 5 M |
| | | 1. He reads Bible every day. | |
| | | 2. He was hour late. | |
| | | 3.Ganges is sacred river. | |
| | | 4. Have you seenone-rupee note? | |
| 6. | (a) | Write a report on the road accidents and suggest how to avoid them. | 7 M |
| | (b) | Fill up the blanks with suitable prepositions: | |
| | | 1. Rana has known Sumit three years. | 5 M |
| | | 2. Ali prefers to go car. | |
| | | 3. The boys jumped the river. | |
| | | 4. I have been waiting here 6 o' clock for you. | |
| | | 5. Shikha spent a day her aunt. | |

SECTION - IV

7. Correct the errors in the following sentences and rewrite any **Twelve** of them: 12 M
1. Grandmother lost her reading glass.
 2. My father bought new furnitures.
 3. Manoj read a old tale about an unicorn.
 4. Five hundred rupees are a big amount.
 5. I am your friend, am I?
 6. Panini was an Indian grammarian who live around 400B.C.
 7. My cousin is having a hearing problem.
 8. Please divide this among the two of you.
 9. Either you or she are presenting a paper.
 10. I have completed the record yesterday.
 11. Though the flat was small, but it was comfortable.
 12. Mother plans to work late in the office, didn't she?
 13. Can I have a peace of cake, please.
 14. I didn't find anyone in the office on Sunday.
 15. This is a two-ways street.
 16. Either you or she are presenting a paper.

SECTION - V

8. (a) Read the following passage and answer the questions: 7 M
- In some interviews they ask 'puzzle questions' such as, "Why are manhole covers round?" or "How would you design Bill Gates' bathroom?" instead of asking standard, technical questions. Interviewers who ask such questions say that these help to gauge resourcefulness, intelligence or outside-the-box thinking needed in today's hypercompetitive world. This is first popularized by Bill Gates' Microsoft Corporation. The website of the company states, "We look for original, creative thinkers and our interview process is designed to find them."
1. Why do interviewers ask 'puzzle questions'?
 2. Why are manhole covers round? Give a suitable answer.
 3. Name the software company which popularized this type of questioning.
 4. Who is Bill Gates?
 5. 'Hypercompetitive' means,
 - a. There is very little competition,
 - b. There is a lot of competition,
 - c. There may not be any competition
 - d. None of the above
- (b) Rewrite any **Five** of the following as directed: 5 M
1. A tailor can repair the tear in the costume. (Begin with "The tear").
 2. The hotel was being renovated. (Begin with "They").
 3. The flu left me..... (Choose the right option weak, week.)
 4. The boy..... feverishly on his bed now. (Use the correct form of 'toss')
 5. You are a student here. (Add question tag)
 6. She said, "I am very poor." (Change into indirect speech).
 7. Ashok is the tallest boy in the class. (Change it into Positive Degree)

Code : 13EE1001

B.TECH. DEGREE EXAMINATION, MAY 2017

I B.Tech.

BASIC ELECTRICAL SCIENCES

(Common to EEE, ECE & CSE)

Time : 3Hrs

Max. Marks : 60

Answer FIVE Questions, Choosing ONE Question from each section

All Questions carry equal marks

SECTION - I

- 1 a Define the following (i) resistance (ii) inductance (iii) capacitance and also give V-I relationship for the above elements.
- b Convert the current source of 50A with an internal resistance of 10Ω to the equivalent voltage source.
- 2 a Derive the relationship to express three delta connected resistances into equivalent star
- b A current $i=10e^{-t}$ is applied to 2H inductor. What is the voltage across the inductor?

SECTION - II

- 3 a Show that the average power consumed by pure inductor and capacitor is zero.
- b Define the following terms (i) admittance (ii) conductance (iii) susceptance
- 4 a Define RMS, Average value and form factor of an alternating quantity.
- b The voltage of a circuit is $v = 200\sin(\omega t + 30^\circ)$ and the current $i = 50\sin(\omega t + 60^\circ)$. Calculate (i) active power, reactive power and apparent power (ii) find circuit elements if $\omega=100\pi$ rad/sec.

SECTION - III

- 5 a Prove that resonant frequency is the geometric mean of two half power frequencies.
- b A series RLC circuit $R=10\Omega$, $L=0.01H$ & $C=0.01\mu f$. Find resonant frequency, Q-factor and bandwidth.

[P.T.O]

- 6 a A series RL circuit having a resistance of 4Ω and inductive reactance of 3Ω is connected to 100V, 50HZ. Find current, power drawn by the circuit and power factor
- b A voltage of 220V at 50HZ is applied across a non-inductive resistor connected in series with a capacitor. The current in the circuit is 2.5A. The power loss in the resistor is 100 Watts and that in the capacitor is negligible. Calculate the resistance and capacitance.

SECTION - IV

- 7 a Describe the forward and reverse states of a PN junction diode with neat characteristics
- 8 Write short notes on following
(a) Zener diode (b) LED Vs LCD (c) photo diode

SECTION - V

- 9 Explain CE configuration of a BJT and discuss its input and output characteristics.
- 10 Explain in detail about working of PNP and NPN transistors.

B.TECH. DEGREE EXAMINATION, MAY 2017

I B.Tech.

**ENGINEERING GRAPHICS
(MECHANICAL ENGINEERING)**

Time : 3 hours

Max. Marks : 60

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

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SECTION - I

- 1 Draw a cycloid for one complete revolution of a circle having a 50 mm diameter. Draw a tangent and normal to the curve at a distance of 35 mm above the line.
- 2 Construct an ellipse when the distance of the focus from directrix is equal to 70 mm and eccentricity is $3/4$. Also draw a tangent and normal to this ellipse at a point 50 mm from directrix .

SECTION - II

- 3 A line AB 80 mm long has its end A 20 mm above HP and 25 mm in front of VP . The line is inclined at 45° to HP and 35° to VP . Draw its projections and mark the traces.
- 4 A line AB has its end A 20 mm above HP and 25 mm in front of VP . The other end B is 45 mm above HP and 40 mm in front of VP . The distance between the end projectors is 60 mm. Draw its projections, also find the true length and true inclinations of the line with HP and VP and mark the traces

SECTION - III

- 5 Draw the projections of a regular pentagon of side 40 mm which has its surface inclined at 30° to VP and a side parallel to VP and inclined at 60° to HP .
- 6 Draw the projections of a cone, base 50 mm ϕ and axis 65 mm long, when it is resting on the ground on a point on the base circle with axis making angle 30° with the $H.P.$ and 45° with the $V.P.$

SECTION - IV

- 7 A square (side 40 mm) pyramid (height 70mm) stands on its base on H.P. and all the base sides are equally inclined to the V.P. A section plane (\perp to V.P. and inclined at 45° to H.P.) bisects the axis of pyramid. Draw sectional top, sectional side view and true shape of the section.
- 8 A hexagonal prism, edge of base 20 mm and axis 50 mm long, rests with its base on H.P. such that one of its rectangular faces is parallel to V.P. It is cut by a plane perpendicular to V.P, inclined at 45° to H.P and passing through the right corner of the top face of the prism. Draw the sectional top view and develop the lateral surface of the truncated prism

SECTION - V

- 9 The Pictorial view of an object is shown in Fig.1. Draw the a) Elevation in the direction of arrow and b) Plan.

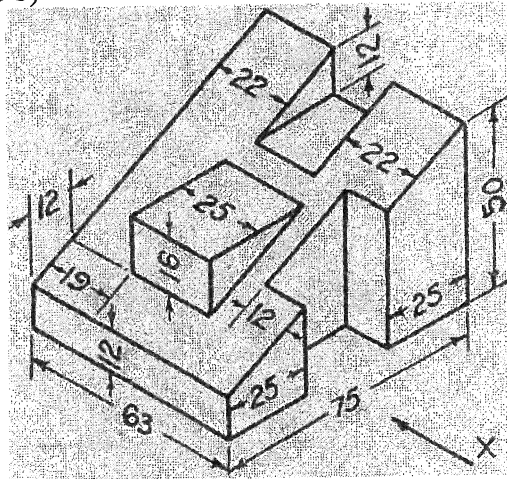


Fig. 1

- 10 Draw the isometric projection for the Fig.2.

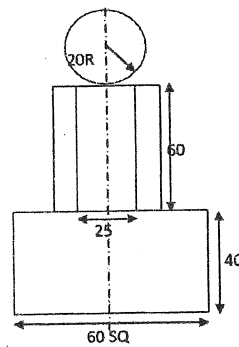


Fig.2.

B.TECH. DEGREE EXAMINATION, MAY 2017
I B. Tech
C PROGRAMMING AND DATA STRUCTURES
(Common to All Branches)

Time: 3 hours

Max Marks: 60

Answer FIVE Questions, Choosing ONE question from each section

All Questions carry equal marks

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SECTION-I

- 1.(a) What is Flowchart? List various symbols used in flowchart.
(b) Explain various operators in C with example
- 2.(a) Explain 'switch' statement with an example.
(b) Write a C program to read a number to check whether it is Armstrong number or not.

SECTION-II

3. Explain the following
i) Multidimensional Arrays ii) Recursion iii) Actual and Formal arguments
4. Write a C program to read two strings and perform the following operations without using standard string functions
i) String lengths ii) Compare two Strings iii) Concatenate them if they are not equal.

SECTION-III

- 5.(a) Explain various storage classes in C with examples.
(b) Write a C program using pointers to implement addition of two matrices.
- 6.(a) Distinguish between malloc () and calloc () functions.
(b) Write short note on Command Line arguments and Bit Fields.

SECTION-IV

- 7.(a) What are merits of linked stacks and linked queues over their sequential counterparts.
(b) How to implement Queue as a linked list.
8. Explain with an example how to convert a given infix expression to postfix expression.

SECTION-V

- 9.(a) Write recursive procedure to perform Inorder, Preorder and Postorder traversals of a binary tree.
(b) Construct a binary tree using the following traversals
Inorder: E,A,C,K,F,H,D,B,G.
Preorder: F,A,E,K,C,D,H,G,B
10. Write a C program to implement Binary search and find the time complexity of Binary search.

