

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of First Year)

Paper - I : Mathematics - I

Time : 3 Hours

Maximum Marks: 75

Answer Question No.1 is compulsory

(15)

Answer ONE question from each unit

(4×15 = 60)

- 1) a) Define an ordinary differential equation.
- b) Solve $\frac{dy}{dx} = e^{x+y}$.
- c) Give Differential equation of a R, L series circuit.
- d) Write the condition for independency of two solutions.
- e) Define complete solution of a Differential equation.
- f) Find the complementary function of $(D^2 + 1)y = \sin x$.
- g) Define correlation.
- h) Define Laplace Transform.
- i) Find L $(\cos^2 2t)$.
- j) Find $L^{-1} \left[\frac{s+1}{(s+1)^2 + 2^2} \right]$.
- k) Find L $\left[\frac{1-e^t}{t} \right]$.
- l) Find order and degree of $\frac{\partial^2 z}{\partial x^2} + 2xy \left(\frac{\partial z}{\partial x} \right)^2 + \frac{\partial z}{\partial y} = 5$.
- m) Find the particular integral of $(D^2 + 4DD' - 5D'^2)z = \sin(2x + 3y)$.

n) Write the subsidiary equations of

$$x^2(y - z)p + y^2(z - x)q - z^2(x - y) = 0.$$

o) Find the complete solution of $2r + 5s + 2t = 0$.

UNIT - I

2) a) Solve $(1 - x^2) \frac{dy}{dx} - xy = 1$.

b) Solve $x \frac{dy}{dx} + y = x^3 y^6$.

OR

3) a) Find the orthogonal trajectories of the family of unfocal conics

$$\frac{x^2}{a^2 + \lambda} + \frac{y^2}{b^2 + \lambda} = 1, \lambda \text{ being parameter.}$$

b) Form a differential equation for R, L, C series circuit.

UNIT - II

4) a) Solve $\frac{d^2y}{dx^2} - 4y = x \sinh x$.

b) Solve by using the method of variation of parameters $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x \log x$.

OR

5) a) Solve by using Legendre's Linear equation $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = x^2$.

b) In a Normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and S.D. of the distribution.

UNIT - III

6) a) Find the Laplace transform of the function $f(t) = [t]$, where $[]$ stands for the greatest integer function.

b) Find $L[te^{-t} \sin 3t]$.

OR

- 7) a) State and prove convolution Theorem for Laplace transform.
- b) Solve $x \frac{d^2y}{dx^2} + \frac{dy}{dx} + xy = 0, y(0) = 2, y'(0) = 0$ by transform method.

UNIT - IV

- 8) a) Form the Partial Differential equation from $f(x^2 + y^2, z - xy) = 0$.
- b) Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$.

OR

- 9) a) Solve $z = p^2x + q^2y$.
- b) Solve $(D^2 + 2DD' + D'^2 - 2D - 2D')z = \sin(x + 2y)$.



B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

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Paper - II : MATHEMATICS - II

Time : 3 Hours

Maximum Marks: 75

Answer Question No.1 is compulsory

(15)

Answer ONE question from each unit

(4×15 = 60)

- 1) a) Determine the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$.
- b) Find the eigen values of $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.
- c) Define Skew Hermitian Matrix.
- d) State Rolle's Theorem.
- e) Find maximum value of $3x^4 - 2x^3 - 6x^2 + 6x + 1$ in $(0, 2)$.
- f) Define radius of curvature.
- g) Find c if $f(x) = x(x - 1)(x - 2)$, $a = 0$ & $b = 1/2$ in the mean – value theorem.
- h) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x dz dx dy$.
- i) Change the cartesian coordinates (x, y) to polar coordinates (r, θ) .
- j) Define Area of a Curved surface.
- k) Write the relation between Beta and Gamma function.
- l) Find a unit vector normal to the surface $xy^3z^2 = 4$ at the point $(-1, -1, 2)$.
- m) Define Curl of a vector point function F.

n) Show that $3y^4z^2 i + 4x^3z^2 j + 3x^2y^2 k$ is solenoidal.

o) Evaluate $\int_{t=2}^4 f(t) dt$

where $f(t) = (5t^2 - 3t) i + 6t^3j - 7t k$.

UNIT - I

2) a) Reduce the following Matrix into its Normal form and hence find its rank.

$$A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

b) Find inverse of A by elementary transformations where

$$A = \begin{bmatrix} 2 & 2 & 2 & -3 \\ 3 & 6 & -2 & 1 \\ 1 & 1 & -3 & -4 \\ 2 & 1 & 5 & 1 \end{bmatrix}$$

OR

c) Investigate the values of λ and μ so that the equations $2x + 3y + 5z = 9$, $7x + 3y - 2z = 8$, $2x + 3y + \lambda z = \mu$ have an infinite number of solutions.

d) Find the characteristic equation of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$ and hence find its inverse.

UNIT - II

3) a) Prove that if $0 < a < b < 1$, $\frac{b-a}{1+b^2} < \tan^{-1}b - \tan^{-1}a < \frac{b-a}{1+a^2}$.

b) Using Maclaurin's series expand $\tan x$ upto term containing x^5 .

OR

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

- d) Find the maximum and minimum values of $3x^4 - 2x^3 - 6x^2 + 6x + 1$ in the interval $(0, 2)$.

UNIT - III

- 4) a) Evaluate $\iint_R x^2 dx dy$ where R is the region in the first quadrant bounded by the lines $x = y$, $y = 0$, $x = 8$ and the curve $xy = 16$.
- b) Calculate the area lying inside the Cardioid $r = a(1 + \cos\theta)$ outside the circle $r = a$.

OR

- c) Find the volume bounded by the cylinder $x^2 + y^2 = 4$ and the planes $y + z = 4$ and $z = 0$.
- d) Evaluate $\int_0^{\infty} e^{-ax} x^{m-1} \sin bx dx$ in terms of Gamma function.

UNIT - IV

- 5) a) Find the directional derivative of $\phi = x^2yz + 4xz^2$ at the point $(1, -2, 1)$ in the direction of the vector $2i - j - 2k$.
- b) Show that $\nabla^2(r^n) = n(n+1)r^{n-2}$.

OR

- c) Apply Green's Theorem, to evaluate $\int_C 2x^2 - y^2 dx + x^2 + y^2 dy$ where C is the boundary of the area enclosed by the x -axis and the upper half of the circle $x^2 + y^2 = a^2$.
- d) Evaluate $\int_S yzi + zyj + xyk \cdot ds$ where S is the surface of the sphere $x^2 + y^2 + z^2 = a^2$ in the first octant.



B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

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Paper - III : Physics

Time : 3 Hours

Maximum Marks: 75

Answer Question No.1 is compulsory

(15)

Answer ONE question from each unit

(4×15 = 60)

- 1) a) Write the characteristics of ultrasonics.
- b) Describe phenomenon of double refraction.
- c) Write the Faraday's laws of electromagnetic induction.
- d) Explain Heisenberg's uncertainty principle.
- e) Write about spontaneous emission and stimulated emission.
- f) Describe Kerr and Faraday effects.

UNIT - I

- 2) a) Explain the principle and working of Michelson interferometer and write about anti-reflection coatings.

OR

- b) Describe Magnetostriction and piezo-electric oscillator methods in production of ultrasonic waves.

UNIT - II

- 3) a) Obtain an expression for electric potential due to point charge and charged disc.

OR

- b) Write the Maxwell's equations. Obtain an expression for resonance frequency in a LCR series circuit.

UNIT - III

4) a) Write about G.M. Counter and scintillation counter.

OR

b) Distinguish between MB, BE and Fp statistics. Obtain expression for distribution function in FD statistics.

UNIT - IV

5) a) Write the construction and working of Ruby laser and He-Ne gas laser.

OR

b) Describe Messner effect. Write the applications of High temperature superconduction



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Paper - IV : Chemistry

Time : 3 Hours

Maximum Marks: 75

Answer Question No.1 is compulsory

(15)

Answer ONE question from each unit

(4×15 = 60)

- 1) a) Purification.
- b) Hardness of Water.
- c) Co-ordination number.
- d) Conductors.
- e) Elastomer.
- f) Polyester.
- g) Buna – N.
- h) Secondary batteries.
- i) Inhibitors.
- j) Ferric chloride.
- k) Semi conductors.
- l) Polymer.
- m) Tetra fluoro ethylene.

- n) Fuel cell.
- o) Vulcanization.

UNIT - I

- 2) a) Discuss the factors affecting sedimentation. What are the advantages of Chemically-assisted sedimentation over plain-sedimentation.
- b) Give an account of conditioning of water used in Boilers?

OR

- 3) Explain the following:
 - a) Coagulation.
 - b) Filtration.
 - c) Electrodialysis.

UNIT - II

- 4) a) Explain addition and condensation polymerization with suitable examples.
- b) Distinguish between thermoplastic and thermosetting polymers.

OR

- 5) a) Define Bragg's equation for diffraction of X-rays by crystals?
- b) What is meant by co-ordination number in crystal structure?

UNIT - III

- 6) a) Natural rubber needs Vulcanization. Give reason.
- b) Give the preparation structure and uses of the following:
 - i) Buna – S
 - ii) Bakelite
 - iii) Polyurethane rubber

OR

- 7) a) Derive Nernst equation for single electrode potential and explain the terms involved in it. Write its applications.

- b) Explain the measurement of pH of solution using glass electrode. Mention the advantages of this electrode.

UNIT - IV

8) Explain the following:

- a) Intergranular corrosion.
- b) Thermo Galvanic corrosion.
- c) Pitting corrosion.

OR

- 9) a) Describe the principle, surface preparation and applications of Electroplating.
- b) Write the uses of Iron sulfide [FeS] and cadmium sulfide [CdS] in Information Technology.



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Paper - V : English

Time : 3 Hours

Maximum Marks: 75

All questions are compulsory

All questions carry equal marks

1) Correct the errors in the following sentences: (15)

- a) Rahul is my only one brother.
- b) It took me a hour to reach the station.
- c) Mahabharatha is an ancient epic.
- d) Either the boys or Jaya have broken the mirror.
- e) Much of our labour have gone waste.
- f) She is living in Madras since 1980.
- g) Let them lay there.
- h) The criminal was hung two days ago.
- i) When she will solve our problem?
- j) He went to market, is he?
- k) I avoid to speak to her.
- l) She agrees with my proposal.

- m) She told us that she is busy.
- n) The two sisters love one another.
- o) I suggest you to meet the doctor.

2) a) Read the following passage and answer the questions: **[10]**

Progress is being made in industrialised countries, where studies now report that girls are catching up with, and even passing, boys in terms of performance in maths and sciences. Following that trend, law schools and medical schools in Canada report that about half of their entrants are now women.

Culture is often used as an excuse for perpetuating both systematic inequality and blatant human rights abuses. Culture can be a strong force to socialise girls into passively accepting their lot in life, being “good wives” to men who are abusive, in the name of a belief system that demands female compliance.

- i) Where is progress made in girls’ education?
 - ii) In what subjects girls exceed boys?
 - iii) Which country has half of its students are women?
 - iv) How is culture a strong force?
 - v) What makes women ‘good wives’?
- b) Bring out the differences of meaning of any Five of the following pairs of words and use them in sentences of your own. **[5]**
- i) Adopt, adept
 - ii) Casual, causal
 - iii) Cheque, check
 - iv) Industrial, industrious
 - v) Judicial, judicious
 - vi) Coarse, course

vii) Negligent, Negligible

viii) Rise, raise

ix) Inquire, enquire

x) Antic, antique

3) a) Write paragraph on any ONE of the following: **[6]**

i) Mobile phones

ii) Internet

b) Write a letter to the R.T.O. complaining about the bad behaviour of a conductor.

OR

Write a letter to the editor of a news paper on the need for computer literacy in modern day. **[5]**

c) Give meanings and use them in sentences of your own on any EIGHT of the following idiomatic expressions: **[8 × ½ = 4]**

i) Find fault with

ii) Crocodile tears

iii) Black sheep

iv) White elephant

v) Tit for tat

vi) In a nut shell

vii) Hand and glove

viii) Take to heart

ix) Tooth and nail

x) Turn out

4) a) Write a brief report, as secretary of student's union of your college, to the principal about the need to improve the facilities for sports in your college. **[10]**

b) Give One-word substitutes for the following meanings: **[10 × ½ = 5]**

i) A place where grain is stored.

ii) One who eats human flesh.

iii) An error in reasoning.

iv) One who collects stamps.

v) Murder of a king

vi) Government of the wealthy

vii) The study of birds

viii) The face of a building

ix) Loss of memory

x) Goods carried out of a country

5) a) Write a small essay on ONE of the following: **[5]**

i) Advertisements

ii) Fashion Parades

b) Expand ONE of the following: **[5]**

i) Variety is the spice of life

ii) No pains, no gains

c) Write antonyms of the following words:

[5 × ½ = 2½]

- i) Diligent
- ii) Latent
- iii) Optional
- iv) Fertile
- v) Induce

d) Write synonyms of the following words:

[5 × ½ = 2½]

- i) Crafty
- ii) Gradual
- iii) Luminous
- iv) Morbid
- v) Salient



B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

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Paper - VI : Computer Programming

Time : 3 Hours

Maximum Marks: 75

Answer Question No.1 is compulsory

(15)

Answer ONE question from each unit

(4×15 = 60)

- 1) Explain the following:
- Initialization of variables.
 - Increment and decrement Operators.
 - Character arrays and pointers.

UNIT - I

- 2) Explain in detail about the preprocessor directives and input/output functions and other library functions.

OR

- 3) Discuss the Relational Operators, Boolean operators and expressions with an example.

UNIT - II

- 4) Explain while loop, For loop, Do-while loop with syntax and semantics.

OR

- 5) Write programming for sum of the digits of a given number and Image of a given number.

UNIT - III

- 6) What are character arrays and explain in detail about One-Dimensional character arrays?

OR

- 7) Describe Homer Method and write an interactive program to perform array operations.

UNIT - IV

8) What is sequential file processing? Explain in detail about it.

OR

9) Write and do a computer programming for sorting a list of birth records.



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Paper - VII : Engineering Mechanics

Time : 3 Hours

Maximum Marks: 75

Answer Question No.1 is compulsory

(15)

Answer ONE question from each unit

(4×15 = 60)

- 1)**
- a) What is meant by 'Free body Diagram'?
 - b) State 'Lami's theorem'.
 - c) State 'Newton's third law of motion'.
 - d) Define 'Cone of static friction'.
 - e) Explain the principle of Varignon's theorem.
 - f) State the 'D'Alembert's principle' with an example.
 - g) What is meant by 'Polar moment of inertia'.
 - h) What is meant by 'Coefficient of friction'.
 - i) Define 'truss'.
 - j) State perpendicular axis theorem.
 - k) What is the difference between 'centroid' and 'centre of gravity'?
 - l) Write down the 'principle of virtual work'.
 - m) What is the path traced by a projectile?

n) Draw the acceleration – time curve for linear motion.

o) What is 'Couple'?

UNIT - I

2) Determine the magnitude of the resultant of four forces concurrent at the origin as shown in figure 1.

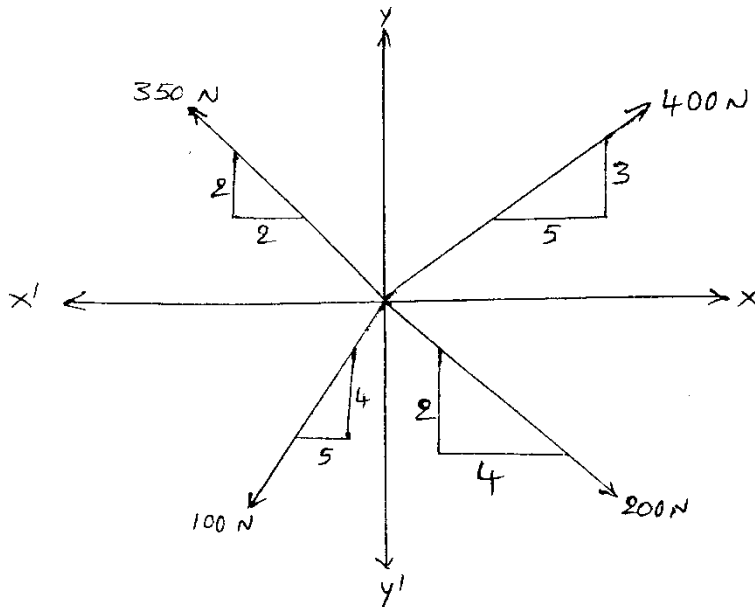


FIGURE 1

OR

3) Referring to figure 2, the coefficients of friction are as follows : 0.25 at the floor, 0.3 at the wall and 0.2 between blocks. Find the minimum value of a horizontal force P applied to the lower block that will hold the system in equilibrium.

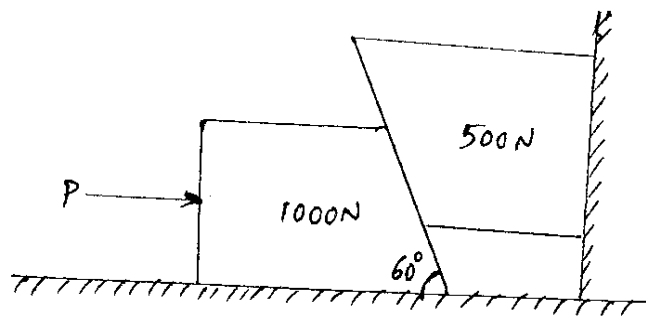


FIGURE 2

UNIT - II

- 4) Calculate the centroidal moment of inertia I_{xx} and I_{yy} of an I-section with the following dimensions.

Top Flange : 100 mm × 20 mm

Web : 20 mm × 100 mm

Bottom Flange : 150 mm × 30 mm

OR

- 5) The lines of action of three forces concurrent at the origin O passes respectively through A, B and C having coordinates (1, 2, 4), (3, 0, 3) and (2, 2, 4) respectively. The magnitude of the forces are $F_A = 40$ kN, $F_B = 40$ kN and $F_C = 30$ kN. Find out the magnitude and direction of the resultant force.

UNIT - III

- 6) Determine the reactions R_A and R_B developed in the simply supported beam as shown in figure 3.

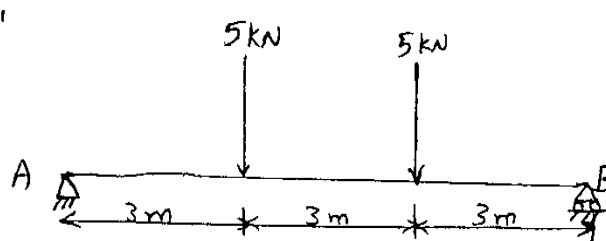


FIGURE 3

OR

- 7) Two stations P and Q are 5.2 km apart. An automobile starts from rest from the station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at the station Q with a uniform retardation 1m/s^2 . Determine the total time required to cover the distance between these two stations.

UNIT - IV

- 8) a) State the advantages of work-energy theorem?
- b) A flywheel starting from rest, rotates at uniform angular acceleration, and after having rotated 500 revolutions, its angular velocity is 800 rpm. Find the angular acceleration and the interval of time taken to complete 500 revolutions.

OR

- 9) a) A car is travelling with a speed of 'V' on banked track of radius 'r'. Find the angle of banking so that the reactions at the outer and inner wheels are equal.
- b) A truck of weight 20 kN is travelling at 45 kmph on a level road. It is brought to rest in 20 metres, what is the average force of resistance acting on the truck.



(DE 108)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of First Year)

MECHANICAL ENGINEERING

Paper - VIII : Engineering Graphics

Time : 3 Hours

Maximum Marks: 75

Answer Question No.1 is compulsory

(15)

Answer ONE question from each unit

(4×15 = 60)

UNIT - I

- 1) A circle having a 50 mm diameter rolls within a circle with a 150mm diameter with internal contact. Draw the locus of a point lying on the circumference of the rolling circle for its complete turn. Name the curve. Also draw a tangent and a normal to the curve, at a point that is 40mm from the centre of the bigger circle.

OR

- 2) Construct a scale of 1:4 to show centimeters and long enough to measure upto 5 decimetres.

UNIT - II

- 3) A line EF 85 long has its ends 25mm above HP and 20mm in front of V.P. The top and front views of the line have lengths of 55 mm and 70 mm respectively. Draw the projections of the line and find its true inclinations with the V.P. and H.P.

OR

- 4) An isosceles triangular plane ABC with a 70 mm base and altitude 80 mm has its base in the H.P. and inclined at 45° to the V.P. The corners A and C are in the V.P. Draw its projections and determine the inclination of the plane with H.P.

UNIT - III

- 5) A pentagonal prism, base 25 side and axis 60 long is lying on the ground on one of its faces with the axis parallel to the V.P. Draw its projections.

OR

- 6) A hexagonal pyramid, base 50 side and axis 100 long in lying on the ground on one of its triangular faces with the axis parallel to the V.P. A vertical section plane, the H.T. of which makes an angle 30° with the reference line, passes through the centre of the base and cuts the pyramid, the apex being retained. Draw the top view, sectional front view and true shape of the section.

UNIT - IV

- 7) A right circular cone of 75 diameter and 100 length of axis rests on ground on its base. A point 'P' initially situated at the extreme right end of the base moves around the surface of the cone and finally comes back to the starting point. Find the length of the shortest path, the point 'P' will take in covering the distance along the surface of the cone. Also show the path, in front view and top view.

OR

- 8) A cylindrical pipe of 30mm diameter has a similar branch of the same size. The axis of the main pipe is vertical and is intersected by that of the branch at right angles. Draw the projections of the pipes, assuming suitable lengths, when the two axes lie in a plane parallel to the V.P. Develop the surfaces of the two pipes.

UNIT - V

- 9) Draw the isometric projection of four spheres of diameter 40 which are arranged in a tetrahedral form so that each sphere touches the other three.

OR

- 10) Draw the front views, side view and top view for the following figure.

