(DE 101)

B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end of First Year)

Paper I — MATHEMATICS – I

Time : Three hours Maximum : 75 marks

Answer question No.1 compulsorily and ONE question from each Unit.

All questions carry equal marks.

1. (a) Find the order and degree of the differential equation $y\frac{dy}{dx} = x\left(\frac{dy}{dx}\right)^2 + x$.

(b) Find the complementary function of $\frac{d^2y}{dx^2} - y = e^{3x}\cos 2x$.

(c) What is the form of exact differential equation?

(d) When do you say that two family of curves are orthogonal?

(e) When do you say that correlation is perfectly negatively correlated?

(f) State the legendre linear equation.

(g) Define regression.

(h) Define $L\{f(t)\}$.

(i) Find $L\{e^{at}\cos bt\}$.

(j) Define unit step function.

(k) Define first shifting property of laplace transforms.

(l) Define partial differential equation.

(m) Solve $\sqrt{p} + \sqrt{q} = 1$.

(n) Define non-homogeneous linear partial differential equation.

(o) Find the order of the partial differential equation $\frac{\partial^2 z}{\partial t^2} = a^2\frac{\partial^2 z}{\partial x^2}\ a$.

UNIT I

2. (a) Obtain the differential equation of all circles of radius a and centre (h, k).

(b) Solve $\left(x^2 + y^2 - a^2\right) x\, dx + \left(x^2 - y^2 - b^2\right) y\, dy = 0$.

Or

3. (a) Solve $\frac{dz}{dx} + \left(\frac{z}{x}\right) \log z = \frac{z}{x} (\log z)^2$.

(b) Solve $(x+1)\frac{dy}{dx} - y = e^{3x} (x+1)^2$.

UNIT II

4. (a) Using the method of variation of parameters, Solve $\frac{d^2y}{dx^2} + 4y = 4 \sec^2 2x$.

(b) Solve $\frac{dy}{dt} + 2x + 3y = 0,\ 3x + \frac{dy}{dt} + 2y = 2e^{et}$.

Or

5. (a) In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S-O of 60 hours. Estimate the number of bulbs likely to burn for

(i) More than 2150 hours

(ii) Less than 1950 hours and

(iii) More than 1920 hours and but less than 2160 hours.

(b) Find the correlation coefficient between x and y from the given data :

x :	78	89	97	69	59	79	68
y :	125	137	156	112	107	138	123

UNIT III

6. (a) Find the inverse Laplace transform of $\frac{1+2s}{(s+2)^2 (s-1)^2}$.

(b) Solve $\left(D^3 - 3D^2 + 3D - 1\right) y = t^2 e^t$ given that $y(0) = 1$, $y'(0) = 0$, $y''(0) = -2$, by using Laplace transforms.

Or

7. (a) State and prove convolution theorem.

(b) Find the inverse Laplace transform of $\frac{5s+3}{(s-1)\left(s^2 + 2s + 5\right)}$.

UNIT IV

8. (a) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = y \cos x$.

(b) Solve $z^2\left(p^2 x^2 + q^2\right) = 1$.

Or

9. (a) Solve $\left(x^2 - y^2 - z^2\right)p + 2xyq = 2xz$.

(b) Solve $\left(p^2 + q^2\right)y = qz$.

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B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end of First year)

Paper II — MATHEMATICS – II

Time : Three hours Maximum : 75 marks

Answer Question No. 1 compulsorily. $(15 \times 1 = 15)$

Answer ONE question from each Unit. $(4 \times 15 = 60)$

1. (a) What are elementary transformations? Do they alter the rank of a matrix when they are applied.

(b) Define the eigen value and the eigen vector of a matrix.

(c) State Caley-Hamilton theorem.

(d) Distinguish between a hermitian and Skew-hermitian matrices. Give one example to illustrate each.

(e) Define curvature of the curve and radius of curvature.

(f) State the Lagranges mean value theorem.

(g) State the Taylor's theorem for functions of two-variables.

(h) State a necessary and sufficient condition for a function $f(x,y)$ to have a maximum or minimum.

(i) Define a gamma function and a Beta function.

(j) Define the error function. State its importance.

(k) Find the directional derivative of $f(x,y,z)=xy^2+yz^3$ at the point (2, –1, 1) in the direction of $\bar{i}+2\bar{j}+2\bar{k}$.

(l) When do we say that a vector field is irrotatioal?

(m) If $\overline{A}$ and $\overline{B}$ are irrotational, show that $\overline{A}\times\overline{B}$ is solenoidal.

(n) State the Green's theorem in a plane.

(o) If $\overline{F}=3xy\,\bar{i}-y^2\,\bar{j}$ evaluate $\int_C \overline{F}\cdot d\overline{R}$ where C is the curve $y=2x^2$ from $(0,0)$ to $(1,2)$.

UNIT I

2. (a) Determine the rank of the matrix $A=\begin{bmatrix}2 & 3 & -1 & -1\\ 1 & -1 & -2 & -4\\ 3 & 1 & 3 & -2\\ 6 & 3 & 0 & -7\end{bmatrix}$.

(b) Solve the system of linear equations

$$x+y+z=6$$
$$x+2y+3z=14$$
$$x+4y+9z=36$$

by matrix inversion method.

Or

3. (a) Find the eigen values and the corresponding eigen vectors of the matrix $A=\begin{bmatrix}-2 & 2 & -3\\ 2 & 1 & -6\\ -1 & 2 & 0\end{bmatrix}$.

(b) Verify Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix}7 & 2 & -2\\ -6 & -1 & 2\\ 6 & 2 & -1\end{bmatrix}$ and find its inverse.

UNIT II

4. (a) Discuss the applicability of Lagranges mean value theorem for $f(x)=x(x-1)(x-2)$ on $\left[0,\frac{1}{2}\right]$.

(b) Find the Maclowins services expansion of $f(x)=\log(1+x)$ for all x such that $-1<x\leq 1$.

Or

5. (a) Discuss the maxima and minima of $x^2y^2(1-x-y)$.

(b) (i) Find the radius of curvature at the origin on the curve $x^3+y^3+2x^2-4y+3x=0$.

(ii) Show that the curvature of the curves $r=av$ and $rv=a$ are in the ratio 3:1 at their intersecting point.

UNIT III

6. (a) By changing the order of integration, evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2\,dx\,dy$.

(b) Find by double integration, the area lying between the parabola $y=4x-x^2$ and the line $y=x$.

Or

7. (a) Find the volume of the sphere $x^2+y^2+z^2=a^2$ cut by the cone $x^2+y^2=z^2$.

(b) Prove that

(i) $\int_0^1 \frac{x\,dx}{\sqrt{1-x^5}}=\frac{1}{5}\beta\left(\frac{2}{5},\frac{1}{2}\right)$.

(ii) $\int_0^1 \frac{dx}{\sqrt{1-x^4}}=\frac{\sqrt{\pi}}{4}\left[\Gamma\left(\frac{1}{4}\right)\Big/\Gamma\left(\frac{3}{4}\right)\right]$.

UNIT IV

8. (a) Show that

(i) $\nabla r^n=n r^{n-2}\overline{R}$ where $\overline{R}=x\bar{i}+y\bar{j}+z\bar{k}$.

(ii) $\nabla^2\left(r^n\right)=n(n+1)r^{n-2}$.

(b) (i) Prove that

$\nabla\times\left(\overline{F}\times\overline{G}\right)=\overline{F}\left(\nabla\cdot\overline{G}\right)-\overline{G}\left(\nabla\cdot\overline{F}\right)+$

$\overline{G}\cdot\nabla\overline{F}-\overline{F}\cdot\nabla\overline{G}$

(ii) A vector field is given by $\overline{F}=(\sin y)\bar{i}+x(1+\cos y)\bar{j}$ evaluate the line integral over the circular path $x^2+y^2=a^2, z=0$.

Or

9. (a) Verify Gauss divergence theorem for the function $\overline{F}=y\bar{i}+x\bar{j}+z^2\bar{k}$ over the cylindrical region bounded by $x^2+y^2=9, z=0$ and $z=2$.

(b) Verify Green's theorem for

$\int_c\left[\left(xy+y^2\right)dx+x^2\,dy\right]$ where C is bounded by $y=x$ and $y=x^2$.

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B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end of First Year)

Paper III — PHYSICS

Time : Three hours Maximum : 75 marks

Answer Question No. 1 compulsorily and ONE question from each Unit.

All questions carry equal marks.

1. (a) Explain the theory of Young's double slit experiment and obtain the expression for fringe width.

(b) Discuss Fraunhofer diffraction due to a single slit.

(c) Obtain an expression for the potential due to a point charge.

(d) Discuss Einstein's theory of photoelectric effect.

(e) How do you distinguish between a conductor, semi conductor and insulator? Explain using energy band diagrams.

(f) Explain the principle of holography. Mention a few applications of holography.

UNIT I

2. (a) Explain in detail the method of producing ultrasonic waves using magnetostriction method.

(b) Explain the theory of Newton's rings in the reflected light.

Or

(c) Discuss the theory of a plane diffraction grating and obtain an expression for its resolving power.

(d) How do you get plane polarized light using a Nicol prism? Give the relevant theory.

UNIT II

3. (a) Define and explain Gauss's Law. Mention its important applications.

(b) Explain Hall effect. How do you determine the nature of charge carriers using Hall effect?

Or

(c) State Faraday's Laws of electromagnetic induction. Explain their importance.

(d) Discuss electromagnetic oscillations in LC circuits, obtain an expression for the frequency.

UNIT III

4. (a) What is Compton effect? Explain its important features.

(b) Explain Davisson and Germen experiment and give its important conclusions.

Or

(c) Apply the Schroedinger equation to particle in a box and obtain expression for the energy.

(d) Explain the difference between MB, BE and FD statistics.

UNIT IV

5. (a) Differentiate between spontaneous and stimulated emission. Give the theory of GaAs laser.

(b) State and explain Meissner effect in super conductors. Mention a few applications of super conductors.

Or

(c) Explain the principle and operation of a photodiode. Give its characteristics.

(d) Explain the working of a solar cell. Obtain an expression for its efficiency.

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B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end of First Year)

Paper-IV — CHEMISTRY

Time : Three hours Maximum : 75 marks

Answer Question No. 1 compulsorily. $(15 \times 1 = 15)$

Answer ONE question from each Unit. $(4 \times 15 = 60)$

1. (a) Write the various impurities is water.

   (b) Explain coagulation.

   (c) What is reverse osmosis?

   (d) Describe Bragg's equation.

   (e) Define Metallic bonding.

   (f) What is a semiconductor?

   (g) Define polymerization.

   (h) Write the structures of Buna-S and GR-M rubber.

   (i) What is Nernst equation?

(j) What is a primary battery?

(k) Explain the fuel cell.

(l) Define corrosion.

(m) Explain water-line corrosion.

(n) What is cathodic protection?

(o) Explain what is electro plating.

UNIT I

2. (a) Explain the purification of water for municipal supply.

(b) Describe the terms sedimentation and coagulation.

Or

(c) Explain in detail about the hardness of water.

(d) Write a note on electrodialysis.

UNIT II

3. (a) Write a short note on corrdination number and shape of crystals.

(b) Discuss on Band theory of solids.

Or

(c) Define polymerization and explain different types of polymerization.

(d) Write a note on thermosetting plastics.

UNIT III

4. (a) Explain the calomel electrode.

(b) Explain the determination of pH of a given solution with glan electrode.

Or

(c) Explain the electro chemistry of lead acid battery.

(d) Write a note on Zinc-carbon battery.

UNIT IV

5. (a) Explain the electro chemical theory of corrosion.

(b) Write a short note on Galvanic corrosion and pittiry corrosion.

Or

(c) Write the different factors affecting corrosion.

(d) Explain the following materials used in information technology.

(i) Ferric chloride

(ii) Cadmium sulphide.

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B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end First Year)

Paper V – ENGLISH

Time : Three hours Maximum : 75 marks

1. Correct the errors in the following sentences: (15 × 1 = 15)

   (a) The audiences are requested to be in its seats.

   (b) The cattle is grazing in the field.

   (c) The sceneries of Kashmir are beautiful.

   (d) Riches has wings.

   (e) I is a teacher.

   (f) The quality y of mangoes are not good.

   (g) One of my teachers live next door to me.

   (h) The committee have submitted its report.

   (i) One must not boast of his own success.

   (j) Which is the best of the two.

   (k) He is the strongest of all other men.

   (l) Our teacher said that the earth moved round the sun.

   (m) They were punished for come late.

   (n) He will come back at present.

   (o) He might went there.

2. (a) Read the following passage and answer the questions that follow: (5 × 2 = 10)

   On a sunny afternoon, when the inmates of the bungalow were at their siesta, a cyclist rang his bell at the gate frantically and announced : "A big cobra has got into your compound. It crossed my wheel ". He pointed to its track under the gate, and resumed his journey. The family consisting of the mother and her four Sons assembled at the gate in great agitation. The old servant Dasa was sleeping in the shed. They shook him out of his sleep and announced to him the arrival of cobra.

   (i) Why does the cyclist ring the bell frantically?

   (ii) Who is Dasa?

   (iii) What is the meaning of the word 'siesta'?

   (iv) Write the antonym of Agitation.

   (v) Write a synonym for 'arrive'.

   (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 × 1 = 5)

   (i) Called — named.

   (ii) Human — humane.

(iii) Affect —effect.

(iv) Aural — oral.

(v) Break — brake.

(vi) Complement — compliment.

(vii) Currant — current.

(viii) Device — devise.

(ix) Die — dye.

(x) Hard — hardly.

3. (a) Write a paragraph on any ONE of the following: (1 ×6 = 6)

(i) Role of media in education.

(ii) Advantages of computers.

(b) (i) Write a letter to a Dentist, asking him for an appointment on a particular day. (1 × 5 = 5)

Or

(ii) Write a letter to your friend inviting him for your birthday celebrations.

(c) Give the meaning and use of them in your sentences any EIGHT of the following idiomatic expressions: (8 × ½ = 4)

(i) At aim's length.

(ii) Call it a day.

(iii) Get together.

(iv) From hand to mouth.

(v) Put out.

(vi) Look after.

(vii) Make both ends meet.

(viii) Take heart.

(ix) A black sheep.

(x) Acid test.

4. (a) Write a brief report on the reasons for the increase of pollution in your city. (1 × 10 = 10)

(b) Give one word substitutions for the following explanations. (10 × $\frac{1}{2}$ = 5)

(i) An unmarried man, especially one bound or resolved not to marry.

(ii) A woman who lives with a man without being lawfully married to him.

(iii) Central point of activity or importance.

(iv) A person who hates mankind or avoids society.

(v) A person who compiles a dictionary.

(vi) A person or thing that brings bad luck.

(vii) A side view of the human face.

(viii) Fit to be eaten.

(ix) A person who eats too much.

(x) Rules for sentence building.

5. (a) Write a small essay on any ONE of the following: $(1 \times 5 = 5)$

(i) Is science a boon or bane.

(ii) World peace.

(b) Expand ONE of the following: $(1 \times 5 = 5)$

(i) Actions speak louder than swords..

(ii) A stitch in time saves nine.

(c) Write antonyms of the following words: $(5 \times ½ = 2\ ½)$

(i) Fresh

(ii) Deep

(iii) Fruitful

(iv) Voluntary

(v) Help.

(d) Write synonyms of the following words: $(5 \times ½ = 2\ ½)$

(i) Base

(ii) Precise

(iii) Humble

(iv) Inanimate

(v) Mock

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B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end of First Year)

Paper VI — COMPUTER PROGRAMMING

Time : Three hours Maximum : 75 marks

Answer Question No. 1 compulsorily.

$(15 \times 1 = 15)$

Answer ONE question from each Unit.

$(4 \times 15 = 60)$

1. (a) What is character set?

   (b) What is variable?

   (c) What are the preprocessor directives?

   (d) What is an expression?

   (e) What is the purpose of using "Break" statement?

   (f) What is meant by multi-file conversion?

   (g) What is Recursion?

   (h) What is meant by sequential file processing?

   (i) What is meant by unsized array initialization?

(j) How the pointers are assigned?

(k) Distinguish between structure and union.

(l) What is meant by Dynamic memory allocation?

(m) What are the Boolean operators?

(n) What is meant by Type conversion?

(o) What do you mean by Type qualifiers?

UNIT I

2. (a) Explain different Data types and sizes in C language.

(b) Write a C program for the computation of Income Tax.

Or

3. (a) Explain preprocessor directives and also discuss briefly about the Input/output functions.

(b) Write a C program for has conversion of lower case character to its upper case.

UNIT II

4. (a) Explain storage classes and also discuss the Recursion procedure with an example.

   (b) Write a C program for printing the prime numbers and Fibonacci numbers in a given range.

Or

5. (a) Explain scope Rules and Multi-File compilation.

   (b) Write a C program for counting the number of characters, words and lines in a given text.

UNIT III

6. (a) Explain the purpose of pointers. And also discuss the command-lines arguments.

   (b) Write a C program for the product and sum of Matrices.

Or

7. (a) Explain two dimensional arrays with an example.

   (b) Write a 'C' program for sorting of names using point arrays.

UNIT IV

8. (a) Explain sequential file processing.

(b) Write a 'C' program for matrix operations with size of the matrix as a structure.

Or

9. (a) Compare the structures and unions.

(b) Write a 'C' program for student marks processing using structures.

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B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end of First Year)

Paper VII — ENGINEERING MECHANICS

Time : Three hours Maximum : 75 marks

Answer Question No. 1 compulsorily.

$(15 \times 1 = 15)$

Answer ONE question from each Unit.

$(4 \times 15 = 60)$

1. (a) What is the differences between the collinear forces and coplanar parallel forces?

(b) State 'Newtons first law of motion'.

(c) What is meant by Equilibriant?

(d) State 'Lamis theorem'.

(e) What is meant by a couple?

(f) What is meant by principle of 'Transmissibility'?

(g) Define 'Angle of Repose'.

(h) Define deficit frame and redundant frame.

(i) Write differences between centre of gravity and centroid.

(j) State 'Perpendicular axis theorem'.

(k) Write down the statement of 'Pappus thorem'.

(l) State ' D Alemberts Principle.

(m) The angle of rotation of a body is given by the equation $\theta = 2t^3 - 5t^2 + 8t + 10$ where θ is expressed in radians and t in seconds. Determine the angular velocity when t = 4 seconds.

(n) What is the moment of inertia of a rectangular section of width 'B' and depth 'D´about its base?

(o) State the conditions for equilibrium of a rigid body subjected to a system of coplanar forces.

UNIT I

2. (a) An Electric light fixture weighing 15 Newton's hangs from a point 'C', by two strings Ac and BC. AC is inclined at 60° to the horizontal and BC at 45° to the vertical as shown in fig (i) using Lami's theorem or otherwise determine the forces in the strings AC and BC.

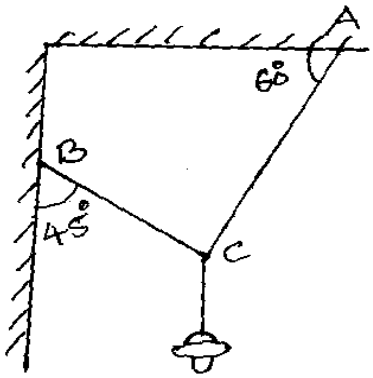

Fig (i)

Or

(b) Two cylinders A and B rest in a channel as shown in fig (ii). 'A' has a diameter of 100mm and Weighs 240N. 'B' has a diameter of 180mm and Weights 600N. The channel is 1800mm. Wide at the bottom with one side vertical and other side at 120° as shown in fig (ii). Determine the reactions at all the four points of contact.

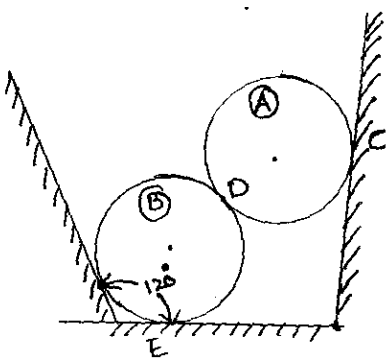

Fig (ii)

UNIT II

3. (a) Derive the Expressions for moment of inertia of

(i) Triangle about centroidal axis x-x parallel to the base

(ii) Quarter of a circle about centroidal axis x-x parallel to base.

Or

(b) Determine the moment of inertia and product of inertia of the section shown in fig (iii) with respect of centroidal x and y axes.

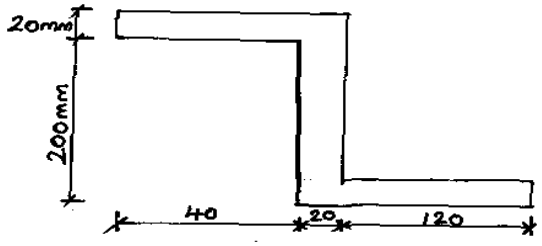

Fig (iii)

UNIT III

4. (a) Determine the sections in the overhanging beam as shown in fig (iv).

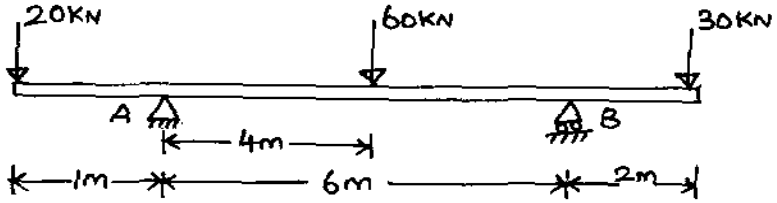

Fig (iv)

Or

(b) A uniform ladder of weight 300N rests against a smooth vertical wall and a rough horizontal floor making an angle of 60° with the horizontal. Find the force of friction at the floor using the method of virtual work.

UNIT IV

5. (a) A bullet of mass 25gm, moving horizontally with a velocity of 600m/s strikes a wooden block of mass 5kg resting on a rough horizontal surface. The bullet after striking the block remains buried in the block and both travel a' distance of 90cm, before come to rest.

Determine

(i) Average resistance between block and horizontal surface.

(ii) Co-efficient of friction between block and horizontal surface.

Or

(b) Determine the moment of inertia of a solid sphere of 'R' about its diametral axis.

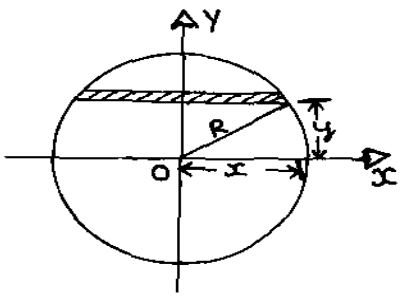

Fig (v)

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B.Tech. DEGREE EXAMINATION, MAY 2011.

(Examination at the end of First Year)

Paper VIII — ENGINEERING GRAPHICS

Time : Three hours Maximum : 75 marks

Answer any FIVE questions selecting ONE from each Unit.

All questions carry equal marks.

UNIT I

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

Or

2. Inscribe two parabolas in a rectangle of sides 100 and 50 with their axes perpendicular to each other. Determine the focus and the directrix for each (scale 2 : 1).

UNIT II

3. The front view of line inclined at 30° to the V.P. is 65 long. Draw the projections of the line when it is parallel to and 40 above the H.P., its one end being 30 infront of the V.P.

Or

4. Draw the projections of a regular pentagon of 40 side, having its surface inclined at 30° to the H.P. and a side parallel to the H.P. and inclined at an angle of 60° to the V.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 square pyramid of base 50 side and axis 75 long, rests on the ground on one of its triangular forces and with its axis parallel to the V.P. It is cut by a horizontal section plane, bisecting the axis. Draw the front view and the sectional top view.

UNIT IV

7. A pentagonal prism 20 side of base and 45 height stands vertically on its base with two of its rectangular faces equally inclined to the V.P. The V.T. of the cutting plane inclined at 45° to the axis of the prism, passes through the left corner of the top face of the prism develop the lower portion of the lateral surface of the prism.

Or

8. A square pipe of 50 mm side has a similar branch of 30 mm side. The axis of the main pipe is vertical and is intersected by the axis of the branch at an angle of 45°. All the faces of both the pipes are equally inclined to the V.P. Draw the projections of the pipes, showing lines of intersection. Also develop the surfaces of both the pipes.

UNIT V

9. Draw in isometric projection of frustum of a pentagonal pyramid with its base and top surfaces as pentagons of sides 40 and 25 respectively and height being 45. Use Box method.

Or

10. Draw the front view, left side view and top view for the following figure.