

JAYA ENGINEERING COLLEGE
THIRUNINRAVUR

QUESTION PAPER FOR STUDENTS' PRACTICE
PH6151 – ENGINEERING PHYSICS – I
(Common to all branches)

Year / Sem: I / I

Max marks: 100

Answer ALL questions.

Part - A

(10 × 2 = 20)

1. Name the seven crystal systems.
2. What are Miller Indices?
3. Draw the stress – strain diagram.
4. State Newton's law of cooling.
5. Find the change in wavelength of an X-ray photon when it is scattered through an angle of 135° by a free electron? (Given: $h=6.626 \times 10^{-34}$ Js; $m_0 = 9.11 \times 10^{-31}$ Kg; $C = 3 \times 10^8$ m/s.)
6. Compare Scanning electron microscope (SEM) and Transmission electron microscope (TEM).
7. State Weber-Fechner law.
8. In an acoustic grating, the wavelength of the light transmitted through the liquid is 6000 \AA . The first order angle of diffraction is 0.5° . Calculate the velocity of ultrasonic waves in the liquid if the frequency = 2 MHz.
9. For InP laser diode, the wavelength of light emission is $1.55 \mu\text{m}$. What is its band gap in eV?
Given: $h=6.626 \times 10^{-34}$ Js; $C = 3 \times 10^8$ m/s; $1\text{eV} = 1.602 \times 10^{-19}$ Joule.)
10. What is meant by attenuation?

Part - B

(5 × 16 = 80)

11. a) (i) Show that the atomic packing factor for a FCC and HCP structures are equal. (10)
 - (ii) Derive an expression for the inter planar spacing of (hkl) planes of a cubic structure. (6)
- (OR)
- b) (i) Explain the principle, construction and working of Czochralski and Bridgman technique for growing crystals. (12)

(ii) α -iron of atomic weight 55.85 solidifies into BCC structure and has a density 7870 kg m^{-3} . Calculate the radius of an atom. Avogadro number = $6.023 \times 10^{26} \text{ Kmol}^{-1}$. (4)

12. a) (i) Derive an expression for the internal bending moment of the beam in terms of radius of curvature. (6)

(ii) Derive an expression for depression at the free end of cantilever due to load. (10)

(OR)

b) Describe with theory the method of determining the thermal conductivity of a bad conductor by Lee's disc method. (16)

13. a) State Planck's hypothesis. Derive Planck's law for black body radiation and hence deduce Wien's displacement law and Rayleigh – Jean's law. (16)

(OR)

b) (i) Derive the time independent Schrödinger equation for a one dimensional case. (6)

(ii) Solve Schrödinger equation of a particle in a one dimensional box and obtain energy eigen values and eigen function. (10)

14. a) (i) Derive the Sabine's formula for the reverberation time of a hall. (14)

(ii) What are the factors affecting the acoustics of a building. (2)

(OR)

b) (i) Explain the production of ultrasonic waves by magnetostriction oscillator with a neat circuit. (10)

(ii) Describe the principle and working of ultrasonic flaw detector in reflection mode. (6)

15. a) (i) What are the vibrational modes of CO_2 molecule? Describe the construction and working of CO_2 laser with energy level diagram. Give its merits and demerits. (14)

(ii) Mention any two industrial and medical applications of Laser. (2)

(OR)

b) (i) Derive an expression for the acceptance angle and numerical aperture of an optical fiber.

(ii) Discuss the working of fiber optic communication system with a neat sketch.

(8+8)

***** ALL THE BEST *****

JAYA ENGINEERING COLLEGE
THIRUNINRAVUR

Question Paper (For Students' Practice)

Subject code: CY6151

Subject: Engg. Chemistry-I

Year/Semester: I / I

Branch/Section: Common to all

Part – A

Answer all the questions

1. Define degree of polymerization.
2. Mention any two uses of epoxy resins.
3. What is clausius inequality?
4. The equilibrium constant for a reaction is found to be 10,000 at 25°C. Calculate ΔG° for the reaction.
5. Write the statement of Grotthus-Draper law.
6. What is fingerprint region? Mention its important uses.
7. State phase rule.
8. What is meant by 18/8 stainless steel?
9. Mention the difference between nanorod and nanowire.
10. What are carbon nano-tubes?

Part – B

Answer all the questions

11. a) (i) Differentiate between addition polymerization and condensation polymerization with examples. (8)
 - (ii) What is meant by addition polymerization? Describe the free radical mechanism of addition polymerization with suitable example. (8)
- (OR)
- b) (i) Define the following terms and mention their significance
 - a) Functionality of monomers b) Number average molecular weight of polymer (4)
 - (ii) Write the preparation of a) Nylon 6,6 b) Epoxy resin. (4)

- (iii) How the solution and emulsion polymerization are carried out? (8)
12. a) (i) Derive Gibb's Helmholtz equation and discuss its applications. (8)
- (ii) The equilibrium constant for a reaction at 500 and 700 °C are 1.64×10^{-4} and 0.64×10^{-4} respectively. Calculate the enthalpy of a reaction assuming it to be a constant over this temperature range. (8)

(OR)

- b) (i) Derive Van't Hoff isotherm? (8)
- (ii) Derive Clausius-clapeyron equation. Discuss its application. (8)
13. a) (i) State Beer-Lambert's law. Prove that absorbance is directly proportional to concentration. What are their limitations? (8)
- (ii) With Jablonskii diagram, explain radiative and non-radiative pathways for an electronic transition. (8)

(OR)

- b) (i) What is quantum yield? Explain the experimental determination of quantum yield. (8)
- (ii) Explain the principle and instrumentation of UV-Visible spectrophotometry. (8)
14. a) (i) State phase rule. Explain the terms involved in it with examples (8)
- (ii) What are non-ferrous alloys? Discuss the composition, characteristics and uses of non-ferrous alloy. (8)

(OR)

- b) (i) Draw a neat diagram and explain the lead-silver system? (8)
- (ii) Write note on heat treatment of steel. (8)
15. a) (i) Explain laser ablation and CVD with neat diagram. (8)
- (ii) Compare the properties of molecules, nanoparticles and materials. (8)

(OR)

- b) (i) How are carbon nano-tubes synthesized? Explain in detail. (8)
- (ii) Explain briefly the application of nano-materials in various fields. (8)

JAYA ENGINEERING COLLEGE
THIRUNINRAVUR

DEPARTMENT OF MATHEMATICS

MATHEMATICS - I

Question Paper for Student's Practice

PART - A

1. Find the sum and product of all the Eigen values of $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$

2. Give the nature of a quadratic form whose matrix is $A = \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 3 \end{pmatrix}$

3. Distinguish between a sequence and a series.

4. State the Integral test.

5. What is circle of curvature?

6. Find the envelope of $x \cos \theta + y \sin \theta = 1$, θ being a parameter.

7. If $u = x^2 + y^2$ and $x = at^2$, $y = 2at$, find $\frac{dy}{dt}$

8. State the conditions for maxima and minima of $f(x,y)$

9. Evaluate $\int_1^2 \int_1^3 \frac{1}{xy} dx dy$

10. Obtain the value of $\int_0^a \int_0^b \int_0^c dx dy$

PART B (ANSWER ALL THE QUESTION 5X16=80 MARKS)

11.a.i) Find the Eigen values and Eigen vectors of $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$

11.a.ii) $A = \begin{pmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{pmatrix}$, Verify Cayley – Hamilton theorem and hence find A^{-1} .

(or)

11.(b) Reduce the quadratic form $x^2 + 5y^2 + z^2 + 2xy + 2yz + 6zx$ in to canonical form and hence find its rank.

12. (a) (i) Using comparison test, examine the convergence or divergence of

$$\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \dots$$

12. (a) (ii) Using D'Alembert's ratio test, examine the convergence or divergence of $x + 2x^2 + 3x^3 + \dots$

(or)

12. (b).i) Test the convergence or divergence of $\frac{1}{1.2} - \frac{1}{3.4} + \frac{1}{5.6} - \dots$

12. (b) (ii) Test for absolute convergence for $1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$

13. (a) (i) Find the radius of curvature of $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$

13. (a).ii) Obtain the evolute of $x = a(\theta + \sin \theta)$, $y = a(1 - \cos \theta)$.

(or)

13. b.(i) Find the centre of curvature of $x^3 + y^3 = 6xy$ at $(3,3)$.

13. (b) (ii) Obtain the envelope of $\frac{x}{a} + \frac{y}{b} = 1$, if $a^2 + b^2 = c^2$.

14.(a).(i) If $u = \log(\tan x + \tan y + \tan z)$, find $\sum \sin 2x \frac{\partial u}{\partial x}$

14.(a) (ii) Obtain the Taylor series of $x^3 + y^3 + xy^2$ in powers of $x-1$ and $y-2$

(Or)

14.(b)(i) Find the Jacobian of $u = x + y + z$, $v = xy + yz + zx$, $w = x^2 + y^2 + z^2$.

14.(b) (ii) Obtain the volume of the largest rectangular parallelepiped that can be inscribed in the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

15.(a) By Changing the order of integration, evaluate $\int_0^1 \int_y^1 \frac{x}{x^2 + y^2} dx dy$.

15.(b) (i) find the volume of $x^2 + y^2 + z^2 = r^2$ using triple integral.

(or)

15.(b).(i) Using double integration, find the area of $r = a(1 + \cos \theta)$.

15.(b) (ii) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{dz dy dx}{\sqrt{1-x^2-y^2-z^2}}$

JAYA ENGINEERING COLLEGE
THIRUNINRAVUR

Question Paper for Students' practice

Subject: COMPUTER PROGRAMMING
Yr/Sem: I/I

Subject Code: GE6151
Branch/Section: ALL

Marks: 100

PART A - (10 X 2 = 20)
(ANSWER ALL QUESTIONS)

1. Write a C Program for the following expressions:
 - i. $a = 5 <= 8 \&\& \quad 6 != 5$
 - ii. $a = b++ \quad + \quad ++b$ where $b = 50$
2. What is symbolic constant?
3. Differentiate between while and do while statement.
4. What is a pointer variable and what are the uses of pointer variable?
5. List the similarities and differences between structure and union.
6. Write a 'C' Program to implement the expression $((m+n)/p-m)+m$, where $m=4, n=6, p=0$.
7. What will be the output for the following program, when the value of i is 5 and 10 ?

```
void main()
{
int i;
scanf("%d", &i);
if(i=5)
printf("five");
}
```

8. What is the value of b[0] in the following program?

```
void main()
{
int a[5]={1,3,6,7,0};
int *b;
b=&a[2];
}
```

9. What are the operators exclusively with pointers?
10. What is 'STATIC' in C ?

PART B - (5 X 16 = 80)

- 11.(a) (i) Explain Various IF loops with example(8)
(ii) Write short notes on SWITCH CASE.(4)
(iii) Compare 'for', 'while' and 'do-while' loops.(4)

(or)

- 11.(b) (i) Explain multi-dimensional Arrays in detail with example (8)
(ii) Write a program with strlen(), strcmp(), strcpy()(8)
- 12.(a) (i) Write a C program to find the largest and smallest number in the given array. (8)
(ii) Write a C program that computes and prints a table of factorials for a given integer (8)
- (or)
- 12.(b) What do you mean by searching? Explain binary searching technique in detail(16)
- 13.(a) (ii) What do you mean by call by reference? Write a program in C to exchange the value of two variables using call by reference. (10)
(ii) Explain pointer to pointer. (6)
- (or)
- 13(b) Define Sorting? Explain selection sorting techniques in detail(16)
- 14(a) Define recursion in C. Explain the concept of recursion with example (16)
- (or)
- 14(b) Explain various types of function in C with example program(16)
- 15(a) (i) Explain the various storage classes in C (10)
(ii) Write short notes on pointer arithmetic (6)
- (or)
- 15(b) (i) List features of Union.(4)
(ii) Write a C program to accept records of 20 states using array of structures. The structure should contain name of the state and number of engineering colleges, medical colleges, management colleges, science colleges. Calculate and display the total colleges in each state and the state which is having highest number of colleges. (12)
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**JAYA ENGINEERING COLLEGE
THIRUNINRAVUR**

DEPARTMENT OF MECHANICAL ENGINEERING

Question Paper for Students' practice

Sub. Name : Engineering Graphics

Sub. Code : GE 6152

Year / Sem. : I / I

Branch/Section : Common to all

Date/Session :

Time duration : 3 Hours

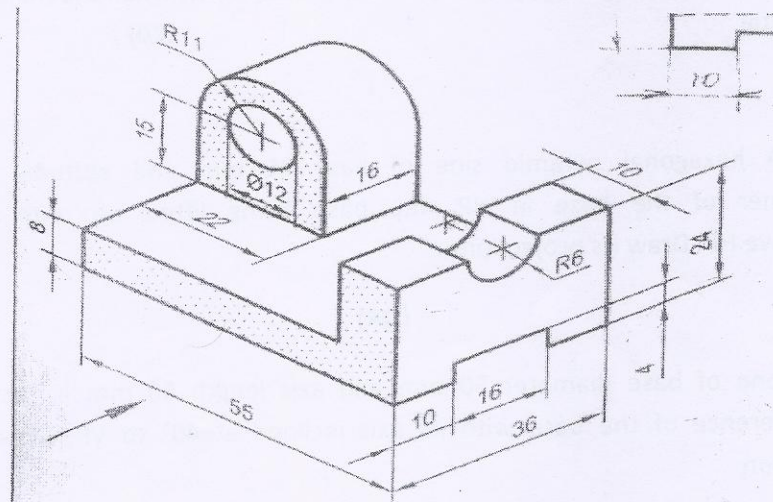
Max. Marks : 100

(Answer all the questions and use appropriate scale if necessary)

1 a i) Obtain the path traced by a rolling circle of diameter 50 mm without slip in the horizontal plane surface and draw the tangent and normal at any point on the path.
(10 Marks)

ii) Draw the Front and top views of the object shown in figure

(10 Marks)



(OR)

b i) Draw the projections of the following points on a common reference line.

Consider the distance between the projectors to be 30 mm.

- 1 Point P, 35mm above HP and 20 mm in front of VP.
- 2 Point B, 40mm below HP and 20mm behind of VP
- 3 Point S, 25mm below HP and in VP.
- 4 Point D, 70 mm in front of HP and in VP.
- 5 Point E, on both HP and VP.

(10)

ii) Construct a diagonal scale of R.F. = 1 : 32,00,000 to show kilometers and long enough to measure upto 400 km. Show distances of 287 km and 377 km on your scale.

(10)

2 a) The distance between the projectors of two points A & B is 70 mm. Point A is 10 mm above H.P and 15 mm in front of V.P. Point B is 50 mm above H.P and 40 mm in front of V.P. Find the shortest distance between A & B. Measure the true inclinations of the line AB with HP and VP. Also find traces.

(20)

(OR)

b) A circular plate of 50 mm diameter appears as an ellipse in the front view, having its major axis 50 mm long and minor axis 30 mm long. Draw the top view, when the major axis of the ellipse is horizontal.

(20)

3 a) A hexagonal pyramid side of base 25 mm and altitude 60 mm rests on one of its corner of the base in HP, the base being lifted up until the highest corner is 40mm above HP. Draw its projections.

(20)

(OR)

b) A cone of base diameter 50 mm and axis length 60 mm is resting on VP on a point on the circumference of the base with its axis inclined at 40° to VP. Draw its projections. Use Auxiliary Projection Method.

(20)

4 a) A pentagonal prism of base side 30 mm and axis length 60 mm is resting on HP on one of its rectangular faces, with its axis perpendicular to VP. It is cut by a plane inclined at 40° to VP and perpendicular to HP and passing through a point 25 mm from rear base of the prism. Draw its top view, sectional view and true shape of section. (20)

(OR)

b) A hexagonal prism, of base of side 25mm and altitude 60mm is on HP on one of its ends with a base edge parallel to VP and nearer to the observer. A square hole of side 25mm is drilled such that the axis of the hole is perpendicular to VP and bisects the axis of the prism with all the faces equally inclined to HP. Draw the development of the lateral surfaces of the prism showing the true shape of the hole on it. (20)

5a) A pentagonal pyramid, base 25 mm and height 65 mm stands with its base on HP. An edge of the base is parallel to VP and nearer to it. A horizontal section plane cuts the pyramid and passes through a point on the axis at a distance 25 mm from the apex. Draw the isometric view of the frustum of the pyramid. (20)

(OR)

b) A square prism of side base 30 mm and height 50 mm rest with its base on the ground and one of the rectangular faces inclined at 30° to the picture plane. The nearest vertical edge touches the PP. The station point is 45 mm in front of the PP, 60 mm above the ground and opposite to the nearest vertical edge that touches the PP. Draw the Perspective projection of the solid. (20)

JAYA ENGINEERING COLLEGE THIRUNINRAVUR

Question Paper for Students' Practice TECHNICAL ENGLISH- I

Sub. Code: HS6151

Marks :100

PART -A

Answer all the questions (10x2=20)

1. Give one word substitutes for the following.

- a. Original inhabitants of a country
i. Aborigines ii. Pagans iii. Theist iv. Optimist
- b. Not conforming to ordinary rules of behavior
i. Eccentric ii. Intrinsic iii. Obedient iv. Mischievous
- c. Free from infection
i. Healthy ii. Immune iii. Liberal iv. Strong
- d. One who talks continuously
i. Loquacious ii. Calm iii. Lunatic iv. Scornful

2. Fill in the blanks with appropriate word forms

Noun	Verb	Adjective
	Repeat	
Season		
	Invite	
		Reliant

3. Expand the following compound nouns

- a. Creativity workshop b. Dwarf planet c. Hand brake d. Grease gun

4. Define any TWO of the following in a sentence or two

- a. Catalyst b. Microphone c. satellite d. Wrench

5. Fill in the blanks with suitable prepositions

Positive health involves learning to listen _____ the finely tuned rhythms _____ us which can tell us _____ ourselves and our state _____ health.

6. Choose the correct verb and fill in the blanks with suitable tense form.

(protect, involve, allow, cling)

The acceptance of new ideas always _____ struggle. People _____ to notions they hold dear. In this way tradition _____ itself for providing a testing ground. It only _____ what is of some value to assert itself.

7. Choose the correct verb that agrees with the subject

- a. Neither Chander nor his brothers _____ (is/ are) likely to be selected.
- b. Joseph is the only one of those students who _____ (has/have) been selected.
- c. The Chairman, along with two assistants, _____ (plan/plans) to attend the meeting.
- d. Both the statues _____ (was/ were) broken.

8. Rewrite the following conversation in reported speech.

Teacher: have you submitted your assignment?

Student : No madam, I will submit it tomorrow.

9. Frame suitable questions to the following sentences.

- i. My friend came only at eight in the night.
- ii. I went to the post office to meet the manager.
- iii. No, I have never been to London.
- iv. I would like to stay in the hotel for five days

10. Edit the following by correcting the mistakes in spelling, punctuation and grammar.

The moon contain less than the eightieth part of the substance of the earth and so exert a gravitational pull which are much smaller than the earths- in fact it is only about a sixth. For this reason, we can carry extraordinary weights without fatigue, and as our bodies seem to weigh almost nothing we can jump to great heights.

PART-B

Answer all the questions

5x12=60

11. Read the following passage and answer the questions that follow

Ozone, a molecule made up of three atoms of oxygen, comprises a layer of the atmosphere that absorbs harmful ultraviolet radiation from the sun. Chlorine atoms, mainly from man-made chlorofluorocarbons or CFS, break apart ozone molecules.

Chlorine compounds used in human activities such as electronics, manufacturing and refrigeration are a primary cause of the ozone hole. A large area of intense ozone depletion occurs annually over Antarctica during late August through yearly October. The hole typically breaks up as ozone levels increase in late November.

The atmospheric ozone layer over Antarctica declined to record low levels this year due to the combination of an unusually cold winter and the continued presence of manmade chlorine chemicals reported by US scientists. The surface area covered by the so called 'ozone hole' in 1993 over 23 million square kilo metres or about twice of the Antarctica land mass, was nearly as large as the record 1992 ozone hole.

Instrument, a Russian satellite orbiting the earth, measured the concentration of ozone over a region near the South Pole at less than 100 Dobson units. This measurement made at the centre of the ozone hole was confirmed by balloon and ground based instruments.

A Dobson unit is a measure for the physical thickness of the ozone layer. The balloon-borne measurements also indicated that the Antarctica ozone layer was totally destroyed between the altitude of 13.5 and 19 kilo metres, creating an ozone void of 5.5 kilo metres thick.

Deep ozone holes will continue to form annually into the next century. 'Herman' an American scientist said, 'this situation will persist until the stratospheric chlorine levels decrease'.

The ozone layer is expected to heal itself and become thicker as a result of CFC cutbacks, mandated by an international treaty called the Montreal Protocol.

I. State whether the following statements are True or False (7x1=7)

- (i) Ozone is helpful in the process of absorbing certain radiation creating bad effect - True
- (ii) Ozone depletion never takes place in the universe - False.
- (iii) The 1993 Ozone hole is considered to be the largest as per the world record - True.
- (iv) Dobson units are used for measuring the effects of danger of ozone - False.
- (v) The formation of ozone holes is due to the fact that the stratospheric chlorine levels come down - True.
- (vi) It is preconceived that the ozone layer would be made alright in future - True
- (vii) Ozone depletion occurs annually over Antarctica during late June through yearly October - False.

II. Read the passage carefully and then choose the responses which best reflect the meanings of the text (5x1=5)

1. Ozone layer is found

- (i) Near the north pole
- (ii) Near the south pole
- (iii) As a sheet of the atmosphere
- (iv) At both south pole and north pole

2. The ozone molecules break apart due to

- (i) The ultra violet radiation
- (ii) The heat of the sun.
- (iii) The planetary movements
- (iv) The chemicals made by man.

3. Ozone depletion occurs annually

- (i) In many places in the world
- (ii) Only in certain places
- (iii) In the coastal areas

- (iv) Near forest areas
- 4. As per the latest record pertaining to the ozone layer this year
 - (i) The levels are high
 - (ii) The levels are low
 - (iii) The levels have functions
 - (iv) The levels are intermediary
- 5. The formation of the ozone hole
 - (i) is yet to be proved
 - (ii) has been proved
 - (iii) cannot be proved
 - (iv) can be proved only after sometime.

III. Choose the meaning which best fits the following words as they are used in the text
(4x1=4)

- 1. radiation
 - (a) gathering b) spreading out (c) accumulating (d) penetrating
- 2. Depletion
 - (a) Production (b) removal (c) Moisturisation (d) reduction
- 3. Decline
 - (a) becoming weaker (b) becoming thicker (c) Becoming stronger (d) becoming rough
- 4. Attitude
 - (a) length (b) breadth (c) height (d) Circumference.

12.a. Assume that a book exhibition is organized in the town where you study. You plan to visit the book fair. Draft an e-mail to your father who is working abroad about the books that you intend to buy, their usefulness and also request him to send adequate money to buy those books.

(or)

b. Write a letter to the editor of a newspaper expressing your deep concern about the sufferings of the commons in the seasonal rain in your locality. Add necessary details and suitable recommendations to your letter.

13.a. Write a set of eight instructions to be followed at the time of emergencies / natural calamities like floods.

b. Write a set of eight recommendations for energy efficiency.

14. a. Write an autobiographical essay assuming yourself to be a scientist. (Or)

b. Write an essay of 300 words on the positive and negative impact of electronic media on youth.

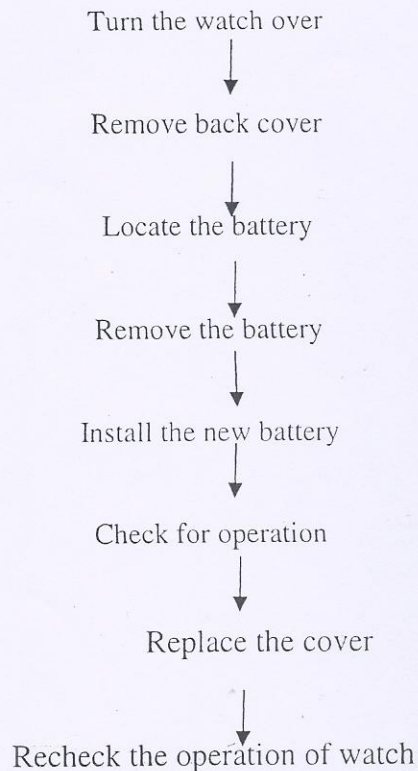
15. Rearrange the jumbled sentences given below in a coherent order

a. i) If the latter are reluctant, start with the former.

- ii) Mix the quick ones with the slow ones.
- iii) Call for reports after a few minutes of discussion.
- iv) The quick learners, spread over the class, can guide this discussion.
- v) Then gradually move to the latter, drawing them out of their shells.
- vi) The discussion can be in pairs or in groups.
- vii) The discussion provides a meaningful context to use English to communicate orally.
- viii) Please encourage discussion among your learners especially the weak ones.

OR

b. Interpret the following flowchart on changing the battery of a watch in about 150 words



*****ALL THE BEST*****