

- Q.3 a) Draw an involute of a pentagon with each side of 15 mm length. Draw a normal and a tangent at any point 'P' on the curve. (06)
- b) A line AB 75 mm long is the second quadrant with end A in the HP and end B in the VP. The Line is inclined at 30° to the HP and at 45° to the VP. Draw the projections of AB. (09)
- Q.4 A pentagonal pyramid with base edges 40 mm and axis 75 mm has one of its corners of the base on the HP with triangular face opposite to it parallel to the HP. Draw the projections of the pyramid if the top view of its axis is perpendicular to the VP. (15)
- Q.5 The distance between the opposite parallel faces of a 50 mm thick hexagonal block is 75 mm. The block has one of its rectangular faces parallel to the HP and its axis makes an angle of 30° with the VP. It is cut by a section plane making an angle of 30° with the HP and normal to the VP and bisecting the axis. Draw its sectional top view and true shape of section. (15)
- Q.6 a) The cone of base diameter 50 mm and axis length 65 mm rests on its base with its axis perpendicular to the HP. A pentagonal hole of 20 mm sides is cut through the cone. The axis of the hole is coinciding with the axis of the cone. Draw the development of lateral surface of cone with hole, if one face of the hole is nearer and parallel to VP. (12)
- b) Draw neat proportionate free hand sketch of lock nut (Two Views) (03)
- Q.7 a) Draw neat proportionate free hand sketch of a Lewis Foundation Bolt. (One View Only) (03)
- b) Draw an Isometric View of the following object using Natural Scale. (12)

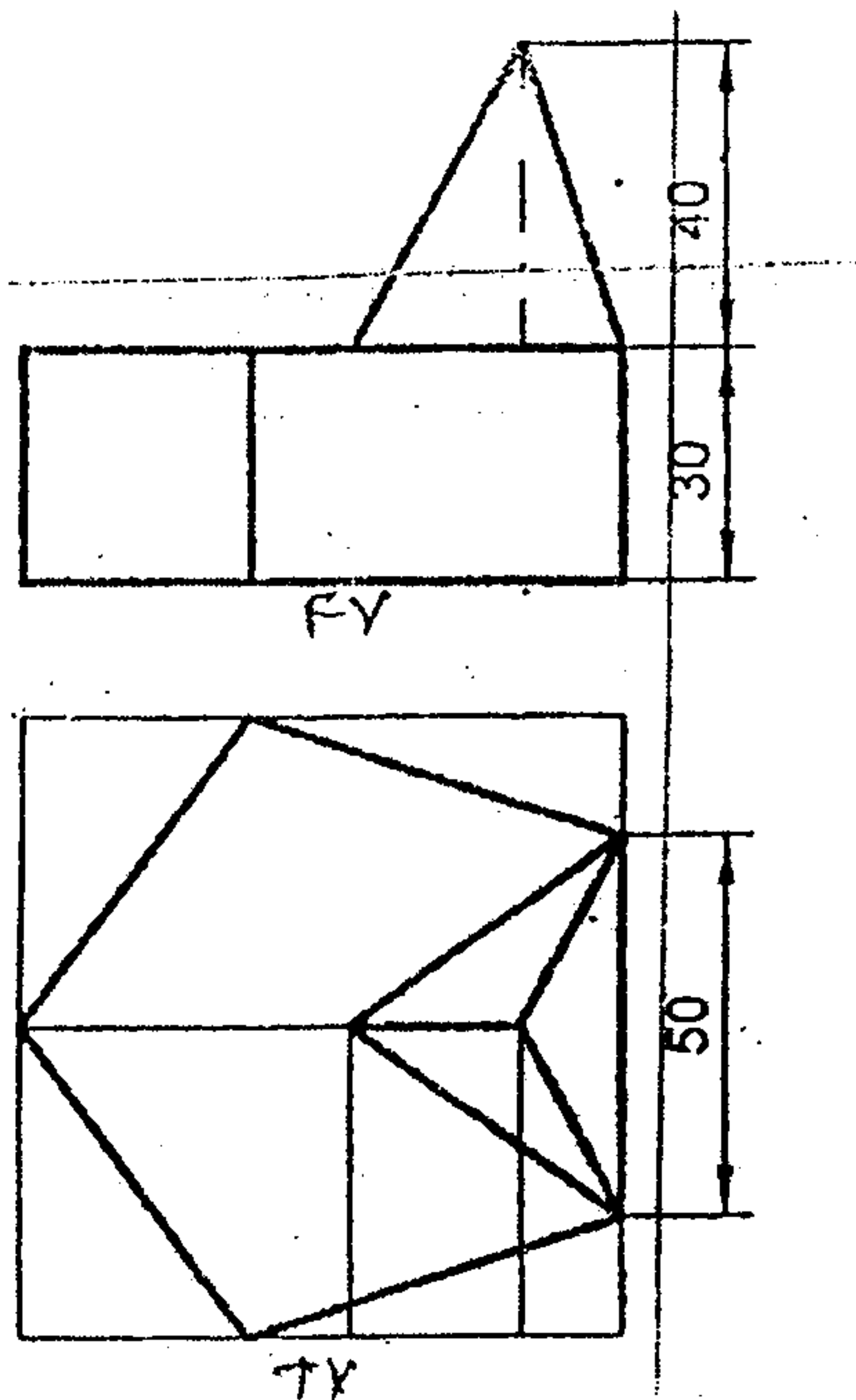


FIGURE : 03

10/05/2013

FE Sem - II (OLD)

VT-F.H.Exam. April(1)-13-93

App maths - II

Con. 6872-13.

GS-5265

(OLD COURSE)

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from remaining **six** questions.
 (3) **Figures** to the **right** hand side indicate marks.

1. (a) Solve $\frac{dy}{dx} = 2x - y$ with initial conditions $y_0 = 0$, at $x_0 = 0$ by Taylor series method. Obtain y for $x = 0.2$. 3
- (b) Solve $(D^3 - 3D^2 + 4)y = 0$. 3
- (c) Evaluate $\int_0^a \int_0^{\sqrt{a^2 - y^2}} \sqrt{a^2 - x^2 - y^2} \, dx dy$ 3
- (d) Evaluate $\int_0^{\log 2} \int_0^x \int_0^{x+y} e^{x+y+z} \, dx dy dz$ 3
- (e) Evaluate $\int_0^{\infty} 7^{-4x^2} \, dx$. 4
- (f) Use Euler's method to find an approximate value of y correct to 4 decimal places 4
 for $x = 2$ given by $\frac{dy}{dx} = x - y^2$ at $x = 0, y = 1$.
 Take $h = 0.02$.
2. (a) Prove that $\beta\left(n + \frac{1}{2}, n + \frac{1}{2}\right) = \frac{1}{2^{2n}} \frac{\Gamma\left(n + \frac{1}{2}\right)}{\Gamma(n + 1)} \sqrt{\pi}$ Hence deduce that - 6
 $2^n \Gamma\left(n + \frac{1}{2}\right) = 1 \cdot 3 \cdot 5 \dots (2n - 1) \sqrt{\pi}$
- (b) Use Runge-Kutta method of fourth order to find an approximate value of y when 6
 $x = 0.2$ given that $\frac{dy}{dx} = x + y$, when $y = 1$ at $x = 0$ and $h = 0.2$.
- (c) Solve $x \frac{dy}{dx} + y = x^3 y^6$. 8

[TURN OVER

3. (a) Solve $2(1 + x^2 \sqrt{y}) y dx + (2 + x^2 \sqrt{y}) x dy = 0$ 6
 (b) Solve by method of variation of parameters – 6

$$(D^2 - 6D + 9) y = \frac{e^{3x}}{x^2}$$
- (c) Show that $\int_0^{\pi/2} \frac{\log(1 + \sin \alpha \cos x)}{\cos x} dx = \pi \alpha$. 8
4. (a) Solve $(x^2 y - xy + y^2) dx - xy dy = 0$. 6
 (b) Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 5y = x^2 (\sin \log x)$ 6
 (c) Solve $(D^2 + 2) y = x^2 e^{3x} + e^{-x} - x^2 \cos 2x$. 8
5. (a) In a circuit of resistance R, self inductance L, current I is given by $L \frac{dI}{dt} + RI = E \cos pt$ 6
 where E and P are constants. Find current I at time t.
 (b) Change the order of integration $\int_0^4 \int_{y/2}^{9-y} f(x,y) dx dy$. 6
 (c) Evaluate $\iiint z^2 dx dy dz$ over the volume common to sphere $x^2 + y^2 + z^2 = a^2$ 8
 and cylinder $x^2 + y^2 + z^2 = ax$.
6. (a) Find the length of cardioid $r = a(1 - \cos \theta)$ which lies outside the circle 6
 $r = a \cos \theta$.
 (b) Change to polar coordinate and evaluate $\iint \frac{dx dy}{(1 + x^2 + y^2)^2}$ over one loop of 6
 the lemniscate $(x^2 + y^2)^2 = (x^2 - y^2)$.
 (c) Evaluate $\iint (x^2 + y^2) dx dy$ over the triangle whose vertices are (0 1), (1 1), (1 2). 8
7. (a) Change the order of integration and evaluate $\iint_R x^2 dx dy$ where R is region in 6
 the 1st quadrant by $xy = a^2$, $x = 2a$, $y = 0$ and $y = x$.
 (b) Find the mass of lamina bounded by the curves $y^2 = ax$, $x^2 = ay$ if the density of 6
 the lamina at any point varies as the square of its distance from origin.
 (c) Find the volume of region bounded by paraboloid $z = x^2 + y^2$ and plane $z = 2x$. 8

17/5/13

F.E. sem II (old) may - 2013

Sub. - Applied Physics - II

AGJ 1st half (b+) 43

Con. 6881-13.

(OLD COURSE)

GS-5292

(2 Hours)

[Total Marks : 75

- N.B. : (1) Question No. 1 is compulsory.
(2) Attempt any **four** questions from Question Nos. 2 to 7.
(3) **Figures** to the **right** indicate **full** marks.
(4) Use **suitable** data wherever **necessary**.

1. Solve any **five** of the following :- 15
- (a) Explain why the system of Newton's rings observed by transmitted light is complimentary to that observed by reflected light.
 - (b) What is Rayleigh's criterion of resolution of two point objects ?
 - (c) Distinguish between single mode and multimode fibre.
 - (d) State and explain Heisenbergs uncertainty principle.
 - (e) Define relative Permiability and Susceptibility. Write the relation between them.
 - (f) Calculate the de-Broglie wavelength of a proton with velocity equal to $(1/20)^{th}$ velocity of light (Mass of Proton = 1.6×10^{-27} kg)
 - (g) Discuss the conditions required for a thin Felm to act as antireflection coating.
2. (a) Explain the construction and working of Pirani Gauge. 7
- (b) What is de-Brogile concept of matter waves ? Derive one dimensional time dependent Schrodingers equation for matter waves. 8
3. (a) Derive the expression for numerical aperture of a step index fibre. Calculate the acceptance angle for the fibre in water of refractive index 1.33 and N.A. of core is 0.2 and cladding refractive index 1.59. 7
- (b) What is Holography ? Explain the process of recording and reconstruction of Hologram. 8
4. (a) Describe the construction of diffraction grating. What is grating element ? How do you determine wavelength of a spectral line in laboratory using plane transmission grating ? 5
- (b) A step index fibre has core diameter 29×10^{-6} m. The refractive indices of core and cladding are 1.52 and 1.5189 respectively. 5
- If the light of wavelength $1.3 \mu\text{m}$ is transmitted through the fibre, determine :-
- (i) normalized frequency of the fibre
 - (ii) The number of modes the fibre will support.
- (c) An electron is confined in a box of length 10^{-8} m. Calculate minimum uncertainty in its velocity. 5

[TURN OVER

Con. 6881-GS-5292-13.**2**

5. (a) Explain Ohms Law for the magnetic circuit and hence derive a relation between magnetomotive force and magnetic field strength for Magnetic circuit due to solenoid. **5**
- (b) Show that the energy of the electron in the box varies as the square of natural numbers. **5**
- (c) In Newstons ring experiment the diameter of 4th and 12th dark ring are 0.4 cm and 0.7 cm respectively. Find the diameter of the 20th ring. **5**
6. (a) What are hard and soft magnetic materials ? Give their characteristics, properties and applications. **5**
- (b) Explain the construction of scanning electron microscope with proper diagram. Also explain the principle on which it works. **5**
- (c) Find the thickness of the soap film which appear yellow (5896 Å) in reflection when it is exposed to white light at an angle of 45° ($\mu = 1.35$). **5**
7. (a) Obtain the expression for the nth dark ring in case of Newtons ring experiment. Hence explain a suitable way to calculate refractive index of a liquid using same set up. **5**
- (b) Explain the diagram, construction and working of semiconductor diode laser. What serves the resonance cavity in semi conductor diode LASER ? **5**
- (c) Give a short note on account of Diamagnetic Paramagnetic and Ferromagnetic materials. **5**
-

Applied Chemistry - II (Old)
FC Sem - II
22/05/2013

94 : 1ST HALF-13 (r)-JP

Con. 6908-13.

(OLD COURSE)

GS-5319

(2 Hours)

[Total Marks : 75

- N.B.** (1) Question No. 1 is compulsory.
(2) Attempt any four question remaining six question.
(3) Figures to the right indicates full marks.
(4) Atomic weights :—

| | |
|---------|------------|
| H = 1, | Na = 23, |
| C = 12, | Mg = 24, |
| O = 16, | S = 32, |
| N = 14, | Cl = 35.5, |
| O = 16, | Ca = 40 |

1. Solve any five of the following :—

15

- Give the classification of composites.
- Galvanised steel is not used for storing foodstuffs. Explain.
- What is 'Trans-esterification' ? Explain giving its reaction.
- Give the composition, properties and uses of 'Duralumin'.
- 'Prevention of waste' is an important principle of Green chemistry. Explain.
- Define catalysis. List different types of catalysis with one example each.
- A coal sample contains C = 60%, O = 33%, H = 6%, S = 0.5%, N = 0.3%, ash = 0.2%. Calculate the gross and net calorific value of coal.

2. (a) Exactly 2.5 g of coal sample was weighed into a silica crucible. After heating for 1hr. at 110°C, the residue weighed 2.415 g, the crucible was next covered with a lid and strongly heated for seven minutes at 950°C ± 20°C. The residue weighed 1.528 g. The crucible was then heated without lid at 700°C until a constant weight was obtained. The last residue was found to weigh 0.245 g. Calculate the percentage result of the above analysis. 6

(b) Define paints. Explain the different constituents of paints with their functions. 5

(c) Explain the effect of the following alloying elements on steel :— 4

- | | |
|---------|----------|
| (i) Cr | (iii) W |
| (ii) MO | (iv) Ni. |

3. (a) Explain the effect of the following factors on the rate of corrosion :— 6

- relative area of anode and cathodic parts
- temperature ~~and cathodic parts~~
- position in galvanic series.

(b) Define cracking of petroleum. Explain fixed-bed catalytic cracking with a neat diagram. 5

(c) What is powder metallurgy ? List the steps involved in it ? Give the advantages of powder metallurgy. 4

[TURN OVER

Con. 6908-GS-5319-13.

2

4. (a) By kjeldahle's method, 2.3 g of coal sample was analysed for nitrogen content. The liberated ammonia was neutralised by 12.5 ml of 0.5N H₂SO₄ solution. The same weight of sample gave 0.64 g of BaSO₄ precipitate. Calculate the % of nitrogen and sulphur in the sample. 6
- (b) What are composite materials ? Explain the structural composites with appropriate diagrams. 5
- (c) Calculate the % atom economy for the following reaction with respect allyl chloride :— 4
- $$\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{Cl}_2 \longrightarrow \text{Cl} - \text{CH}_2 - \text{CH} = \text{CH}_2 + \text{HCl}$$
5. (a) Define Catalyst. What are the types of catalysts ? What are the characteristics of a catalyst. 6
- (b) Define corrosion. What is the principle of Cathodic Protection method ? Explain the sacrificial anode cathodic protection. 5
- (c) Explain the powder injection moulding method used for compaction in powder metallurgy. 4
6. (a) Givng conventional and greene route for the production of adipic acid, explain related Green chemistry principle in this case. 6
- (b) Explain the Adsorption theory of heterogenous catalysis. 5
- (c) Explain stress corrosion with appropriate diagram. 4
7. (a) Write notes on :— 6
- (i) Pillard clays
- (ii) Activation energy.
- (b) A coal sample has the following composition by weight : 5
- C = 84, H = 6%, S = 1%, O = 8% and remaining being ash. Calculate the minimum quantity of air required both by weight and volume for complete combustion of 2 kg of the fuel. (mol. wt. of air = 28.94)
- (c) Write note on fibre reinforced composites. 4
-

Con. 6914-13.

GS-5346

(OLD COURSE)

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No.1 is compulsory.
 (2) Attempt any four out of remaining six questions.

1. (a) Explain object oriented features of Java. 5
 (b) Explain different types of operators in Java with example. 5
 (c) Write a program in Java to accept two integer numbers using command line arguments and print result of addition of both numbers. 5
 (d) Explain difference between string and string Buffer. 5
2. (a) Write a program to determine sum of the series : 10

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n}$$

 (b) Write a program to find sum of digits of a user entered number and print the sum. 10
3. (a) What are vectors ? Explain any four methods of vectors. 10
 (b) Write a program to find transpose of a matrix, and print the transposed matrix. 5

$$\text{If matrix } A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}, \text{ the transpose of } A = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{bmatrix}$$
- (c) Explain Interfaces. Write a program to create and implement interfaces. 5
4. (a) Write a program to find count of occurrences of a given character in a given line of text. e.g. if the line of text is "All the best", and given character is 't', the count of t is 2. 10
 (b) Write a program to create a class Account with data members customer. ID, customer-name, account-no, account-type (saving and current) and balance. Write methods get-Account () to take input from users and display-Account () to show account details. 10
5. (a) Explain exception handling using try-catch-finally blocks. 10
 (b) Explain life cycle of an Applet. 10
6. (a) What are Packages ? Explain steps to create a package and add a class to it. 10
 (b) Explain different types of Inheritance with examples. 10
7. (a) Explain life cycle of Thread. 10
 (b) Write short note on :- 10
 (i) ToString ()
 (ii) Wrapper class ()

Library copy FE II (old)
Communication skills 01/06/13

D : PH (April Exam) 318

Con. 6899-13.

GS-5373

(OLD COURSE)

(2 Hours)

[Total Marks : 75

- N.B. (1) Question No. 1 is compulsory.
(2) Answer any **four** out of the **remaining six** questions.
(3) Answers to **all** sub-questions should be grouped **together**.
(4) **Figures to the right** indicate **maximum** marks.

1. (a) Answer briefly :-

10

- (i) Explain with an example, any **one** Psychological barrier.
(ii) Explain the importance of feedback in the communication cycle.
(iii) Construction work going on nearby makes it difficult for the teachers to teach in their classes. Identify the barrier and give the solution.
(iv) How can you improve your speaking skills ?
(v) Create a complete letterhead for your University.

(b) Match the following :-

3

| A | B |
|---------------------------|------------------------|
| (i) Accent problem | (1) Mixed punctuation |
| (ii) Courtesy in a letter | (2) Mechanical barrier |
| (iii) Full block | (3) XB 3045/tz |
| (iv) Semi-block | (4) Salutation |
| (v) Reference line | (5) Semantic barrier |
| (vi) Computer breakdown | (6) Open punctuation. |

(c) Choose the correct alternative from the brackets :

2

(instrument, tool, appliance, apparatus, machine, process, mechanism)

- (i) A voltmeter is a/an -
(ii) A metal file is a/an -
(iii) A beaker is a/an -
(iv) Welding is a/an -

2. (a) Explain advantages and disadvantages of oral communication.

6

(b) You have set up "XYLO ADS", a new advertising agency in Navi Mumbai, and wish to furnish your office with office furniture. Write a letter to "Modern Furniture", giving details about your requirement and asking for quotations. Use modified block.

9

3. (a) You had ordered books, novels and magazines for your library. However, on arrival, you find some of the books missing, some damaged in transit, and some other than the ones ordered. Write to the book store, asking for suitable compensation. Use complete block.

9

(b) Write a note on "listening".

6

[TURN OVER

4. (a) What is the two-way communication cycle ? Explain, with the help of a diagram. 5
 (b) Write a technical description of any one :- 6
 (i) thermometer
 (ii) electric bulb.
 (c) Identify the following from the options in brackets : 4
 (Caution, precaution, warning, ^{danger}damages, note)
 (i) Do not open the lid when the machine is in motion ; it will harm the machine.
 (ii) Wear gloves before mixing cement.
 (iii) Beware of dog
 (iv) Add a pinch of sugar for better flavour.
5. (a) Write a note on three methods of non-verbal communication. 5
 (b) Explain the principles of business communication. 5
 (c) Rewrite the following instructions as a report : 5
 Switch on the power supply and let the soldering iron get hot. Keep the soldering iron on the metal to be used for the soldering. When the metal melts, transfer it to the part to be soldered. Allow the soldered part to cool. Switch off the power supply.
6. (a) Write instructions on the process of titration, using two liquids, A and B, and indicator C. 5
 (b) What is 'Grapevine' ? How does it function, and how can it be used ? 5
 (c) Write a note on some methods of external communication. 5

7. Read the passage and answer the questions given below :

Advertisements are very much part of our lives today. As we travel to collage or work we see large ~~boards~~boardings by the road-side. There are posters on walls, in trains and buses and other public places, giving us information about different things. Banners are put up at prominent places, and at night, we see neon lights flashing on top of buildings and other selected sites, advertising different products. Progrmmes on radio and TV are full of advertisements. We will hardly find a single magazine without advertisements. And there is no doubt that these influence our lives greatly.

The one important function of an advertisement is to give the public information about a certain product. It tells us how a certain product is superior to another product of a similar type. Advertisements thus influence our day to day choices. They can help us to decide which shirt to buy, which fashions are best suited to us, what we should eat, which scooter is better, and so on. These advertisements also reflect the standard of living of a locality, state or nation.

Advertisements also make us more product conscious and status conscious. We become very materialistic, and judge our selves and others according to the type of products we use in our houses. Children, especially very small ones, are the worst victims. Sometimes, even their food habits depend upon the advertisements they watch. In Western countries, advertisement aimed at children are censored before being shown on TV or magazines.

Advertisements shown can sometimes go against our culture or traditions. When this happens, people object to it, and sometimes, the offending advertisement is withdrawn. But the best advertisements are those which are for the good of society. Agencies have come up with excellent advertisements to promote the ban on tobacco and drugs, and to make people aware of the need of giving children polio drops. Such advertisements are very useful to society. Thus we have to be careful about what we choose. Advertisements will try to persuade us, but we should know our values and remain firm to our ideals.

Questions :

- (a) Where do we see advertisements ? 2
 - (b) Give four uses of advertisements. 2
 - (c) How are children affected ? How can we prevent the bad influence on them ? 2
 - (d) Name the advertisements that are beneficial to society. 2
 - (e) Write a summary in 125 words and give a suitable title. 7
-