Chemistry

CHEMISTRY section –I
SYJC-preliminary exams
2016   35 Marks

Note :1) All question are compulsory.
2) Draw well labelled diagrams and write balanced equations
   Wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table is allowed.
5) Every new question must be started on a new page.

Q 1. Answer any SIX of the following: (12)
 i)Explain : why solid ice is lighter than water
ii)Why does fishes prefer to stay at lower level of water during
       summer season ?
iii) What does entropy measures?Give its units.
 iv) What is salt bridge?Define Faradays Ist law.
 v) what is Pseudo-first order reaction. Give one example.
 vi) Explain terms-I)Leaching II)Slag.
vii) Ammonia is highly soluble in water.Explain.
viii) What is the oxidation state of Nitrogen in N_2O_4?

Q2.Answer any THREE of the following: (9)

A)i) The radii of Zn^{+2} and S^{-2} ions are 72 and 184 pm respectively .
Predict the probable type of co-ordination number for Zn^{+2} ions.
ii) A solid is made up of two elements P and Q .Atoms Q are in FCC
arrangements,while atoms P occupy all the tetrahedral sites.
 What is the formula of the compound?

B) 45gm of ethylene glycol($C_2H_6O_2$) is mixed with 600 gm of water.Calculate
(i)The freezing point depression(ii)The freezing point of the solution. (Kf for
water = 1.86KKgmol^{-1}).

C) Calculate the entropy change in surroundings when 1mol of $H_2O(l)$ is
formed under standard conditions. H_f^0 = - 286KJmol^{-1}= -286000 Jmol^{-1}.Predict
weather the reaction is spontaneous or not at 25^{0}C ?.

D) The standard emf of the cell is 0.463V
Cu I Cu^{+2}(1M) II Ag$^+$(1M) IAg.
If the standard potential of Cu electrode is 0.337,what is the standard potential
of Ag electrode? Define cell constant.

Q3) Answer any ONE of the following. (7)

A) Consider the reaction 2A + B → 2C. Suppose that at a particular moment during the reaction, rate of disappearance of A is 0.076M/s. (a) What is the rate of formation of C? (b) What is the rate of consumption of B. (c) What is the rate of reaction? write any two uses of PH_3. Give relation between ΔH and ΔU. Under what circumstances $\Delta H = \Delta U$?

B) Explain calcination with one reaction. write ore of Fe.
H_3PO_4 is tribasic while H_3PO_3 is dibasic. Explain.
What happens when SO_3 gas passed through water.

Q4 Select and write the most appropriate answer from the given alternatives for each sub question. (7)

(i) Which of the following solutions will have maximum depression in freezing point (a) 0.5M Li_2SO_4 (b)1M KCl (c) 0.5M Al_2SO_4 (d)0.5M$BaCl_2$.

(ii) Percentage of free space in BCC unit cell is (a)34% (b)28% (c)30% (d)32%

(iii) The number of faraday required to produce 0.5 mol of free metal from Al^{+3} is (a)3 (b)2 (c)6 (d)1.5

(iv) Highest carbon content is (a)stainless steel (b)wrought iron (c)cast iron (d)mild iron

(v) $FeSO_4$ forms brown ring with (a)NO_3 (b)NO_2 (c)NO (d)N_2O

(vi) The unit of rate constant for first order reaction is
(a) min^{-2} (b)s (c)s^{-1} (d)min

(vii) For which of the following reactions Δs is negative
(a) $Mg(s)+Cl_2(g) \rightarrow MgCl_2(s)$
(b)$H_2O\ (l) \rightarrow H_2O(g)$
(c)$CaCO_3(s) \rightarrow CaO(s)+CO_2(g)$
(d)$I_2(g) \rightarrow 2I(g)$

****

S.Y.J.C. SCIENCE - CHEMISTRY PAPER   M.MARKS : 35 , TIME : 1 hour 30 mints

SECTION- II

Note : i) Attempt all the questions, all questions are compulsory.

ii) Figure to the right indicate full marks.

Q:5) Answer <u>Any Six</u> of the following.   (12)

(i) Classify the following into Mono, Oligo & Polysaccharide,

     a) Raffinose b) Lactose c) Stachyose d) Dextrose.

(ii) What are , (a) Preservatives & (b) Synthetic detergent.

(iii) Write the Name and formula of one Ore of each (a) Chromium & (b) Manganese.

(iv) Write IUPAC of the Complex Compound $K[AuCl_4]$ & Calculate the Oxidation no. of
the Central metal ion in $[Cr(NH_3)_3Cl_2]^+$.

(v) How is iodoethane prepared from ethyl alcohol ? How is iodoethane converted into
Ethyl magnesium iodide ?

(vi) a) How is ethylamine prepared from acetonitrile ?

    b) Give reaction of ethylamine with Nitrous acid ?

(vii) Give the preparation of the following,

    a) Ethanoic acid from acetonitrile ?   b) Ethanal from 1,1-dichloroethane ?

Q :6) Answer <u>Any Three</u> of the following.   (9)

(i) a) Alkyl halide are polar and miscible with water , explain .

    b) What is the action of $CH_3 CO - Cl$ on Chlorobenzene?

(ii) Give Mechanism of intramolecular dehydration of Alcohols.

(iii) What is the action of the following reagent on acetaldehyde,

    a) $Zn - Hg$ / Conc.Hcl   b) $[Ag(NH_3)_2]^+.OH^-$ &   c) 10% NaOH.

(iv) What are Synthetic polymer ? How is Buna – S prepared ? Give structure of
Acrylonitrile & ∈– caprolactum .

Q: 7) Answer <u>any One</u> of the Following .

(i) Write reaction of HNO_2 on primary nitroalkane   (2)

How is benzene diazonium salt converted into phenol & P-   (2)
hydroxylazobenzene?

What are biomolecules ? Explain with reaction the formation of peptide linkage
in protein.   (3)

(ii) Explain the causes of lanthanoid contraction.   (2)

What happens when , (a) SO_2 is bubbled through $K_2Cr_2O_7$ solution.   (2)

    (b) $KMnO_4$ is heated to red hot.

Write structure and IUPAC name of isomers of compound having Molecular
formula , C_2H_6O .   (2)

Explain crystal field splitting.   (1)

Q : 8) Select and write the most appropriate Answer from the given alternatives for each Each sub – questions. (7)

(i) Which among the following is not a complex compound,

(a) Chlorophyll (b) Haemoglobin (c) Vitamin B – 12 (d) fructose.

(ii) Which of the following is a natural polymer,

(a) Protein (b) Teflon (c) Dacron (d) Nylon.

(iii) Deficiency of Vitamin B – 12 causes ,

(a) Scurvy (b) Rickets (c) Anaemia (d) Night blindess.

(iv) The reagent used to convert Cyclopropane carboxylic acid into Cylcopropyl-methylalcohol,

(a) $KMnO_4$ (b) DIBAL – H (c) Na – Hg /H_2O (d) $LiAlH_4$ / H_3O^+ .

(v) Penicillin is an example of ,

(a) Tranquilizer (b) Antibiotic (c) Analgesic (d) enzyme.

(vi) When phenol is treated with Br_2 water the product obtained is/are,

(a) O – bromophenol (b) P – bromophenol

(b) 2,4,6 – tribromophenol (d) All of these.

(vii) $[Co(NH_3)_5Br]SO_4$ & $[Co(NH_3)_5SO_4]Br$ exhibit _____ isomerism,

(a) Linkage (b) ionisation (c) Co – ordination (d) Geometrical isomerism.

---------------*****--------XXXXX-------*****-----------*****

Page - 2

SYJC SCIENCE   MATHS   MARKS-80   TIME 3HRS

SECTION - I

Q.1A Select and write the most appropriate answer from the given alternatives.   [6]

I. The distance of origin to the plane $2x-y+2z-2=0$ is

(a)2/3   (b)3/2   (c)2/5   (d)1/9

2. The negation of $(\sim p \to \sim q)$ is

(a)$p \wedge q$ (b)$\sim p \wedge q$ (c)$\sim p \vee q$ (d) $p \vee q$

3. Combined equation of lines through the origin having slope 3 and 2 is

a. $6x^2 - 5xy + y^2 = 0$ b. $6x^2 + 5xy + y^2 = 0$ c. $6x^2 + 5xy - y^2 = 0$ d. $5x^2 + 6xy - y^2 = 0$

Q.1B Attempt any three of the following   [6]

I. Find the principal solution of $x = -\sqrt{3/2}$

2. Find a if the sum of slope of lines represented by $ax^2 + 8xy + 5y^2 = 0$ is twice their product.

3. Line passes through (2,4,5) and (6,-2,1). Find the equation of line in cartesian form.

4. Find the position vector of point which divide segment PQ internally in the ratio 1:2 where P (1,2,3) and Q (-2, 5, 3)

5. Find the converse of contrapositive of $q \to \sim p$

Q2.A. Attempt any two of the following   (6)

1. Find the vector equation of line passing through (2,4,-5) and parallel to the line $3x-1=2y+3=6z-3$

2. Find the truth table of $[(p \vee q) \wedge r] \to [(p \wedge q) \vee r]$

3. Show that $\sin\dfrac{(A-B)}{2} = \dfrac{(a-b)}{c} \cos C/2$

B. Attempt any two of the following   (8)

1. Solve the equation by method of reduction $2x-y+z=1$, $x+2y+3z=8$, $3x+y-4z=1$

2. Prove that homogenous equation of second degree $ax^2 +2hxy+by^2 =0$ represents two line passing

through origin.

3. If $\bar{u}=i-2j+k$, $\bar{v}=$ ___ $\bar{w}=j-k$ are given vector. Find $(\bar{u}+\bar{w}) \cdot [(\bar{u} \times \bar{v}) \times (\bar{v} \times \bar{w})]$
$\hat{v} = 3\hat{i} + \hat{k}$

Q3.A. Attempt any two of the following   (6)

1. Solve the equation by method of inversion $2x+3y=8$, $x+5y=11$

2. Find the angle between the line $\dfrac{x + 1}{2} = \dfrac{y}{3} = \dfrac{z-3}{6}$ and plane $10x +2y - 11z = 8$

3. Find the direction cosine of vector perpendicular to the two lines whose direction ratio are

-2, 1, -1 and -3, -4, 1

B. Attempt any two of the following   (8)

1. Find the value of $\tan^{-1}(1/5) + \tan^{-1}(1/7) + \tan^{-1}(1/3) + \tan^{-1}(1/8)$

2. By vector method prove that medians of triangle are concurrent.

3. Maximize $z = 6x + 2y$ subject to $5x + 9y \leq 90$, $x + y \geq 4$, $y \leq 8$, $x \geq 0$, $y \geq 0$

Section - II

Q4 (A) Select and write the correct answer from the given alternatives in each of the following: 06 marks

i)   If $x^m y^n = (x+y)^{m+n}$ then $dy/dx = ?$

   a) y/x b) $-y/x$ c) x/y d) $-x/y$

ii) $\int_{-2}^{2} \frac{x^5}{5 - x^2} \, dx = ?$

   a) 0   b) 1   c) -1   d) 2

iii) The order and degree of D.E $d^2y/dx^2 = [1 + dy/dx]^{2/3}$.

   a) 2, 3   b) 3, 2   c) 3, 3   d) 2, 2

(B) Attempt any three of the following   06 marks

i.) Find K from the following p.d.f

x	1	2	3	5	6
P(x)	2k	k	3k	5k	k

ii.) Find $\frac{dy}{dx}$ if $y = x^x$.

iii.) Examine the continuity of the following function at $x=0$

$$f(x) = \frac{4^x - 4^{-x} - 2}{x^2} \quad for\ x \neq 0$$
$$= \log 4 \qquad for\ x = 0$$

iv.) If $E(x) = 5$, $V(x) = 2.5$ and $x \sim (n, p)$ find n and p.

v.) Find the D.E equation $y = ae^{3x} + be^{-3x}$.

Q5 (A) Attempt any two of the of the following;   06 marks

i.) Evaluate $\int \cosec^3 x \, dx$

ii.) Evaluate $\int_0^{\pi/4} \frac{\sec^2 x}{(1+\tan x)(2+\tan x)} \, dx$

iii.) A lot of 100 items contains 10 defective items selected at random from the lot and sent to the retail store. What is the probability that the store will receive at most one defective item?

(B) Attempt any two of the following.   08 marks

i.) Prove that every differentiable function is continuous using counter example prove that converse is not true.

ii.) Find the maxima and minima value for $x \log x$.

iii.) $f(x) = \dfrac{\sin \pi x}{x-1}$ +a,   for x<1

   $= 2\pi$,   for x=1

   $= \dfrac{1+\cos \pi x}{\pi(1-x)^2} + b$ for x>1

   is continuous at x = 1. Find a & b.

Q6 (A) Attempt any two of the of the following;   06 marks

i.)   Evaluate $\int \frac{1}{\cos a + \cos x} \, dx$.

ii.)   Prove that $\int \sqrt{a^2 + x^2} \, dx = \frac{x}{2} \sqrt{a^2 + x^2} + \frac{a^2}{2} \cdot \log \left| x + \sqrt{x^2 + a^2} \right| + c$.

iii.)   Evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{1 + \sqrt{\tan x}} \, dx$.

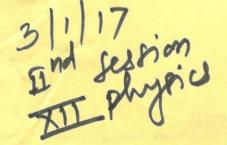**(B) Attempt any two of the following   08 marks**

i.) Solve the D.E $(1 + e^{x/y}) dx + e^{x/y} \left(1 - \frac{x}{y}\right) dy = 0$.

ii) Find the C.D.F, F(X) associated with following p.d.f f(x)

$$f(x) = \quad 3(1 - 2x^2), \quad 0 < x < 1$$

$$= 0 \qquad , \quad \text{otherwise}$$

Find $p\left(\frac{1}{4} < x < \frac{1}{3}\right)$ by using p.d.f.

iii)   The surface area of a spherical balloon is increasing at the rate of 2cm²/sec. At what rate is the volume of balloon is increasing when the radius of balloon is 6cm.

— ✗ — ✗ — ✗ — ✗ —

SECTION-II

Q.5 Select and write the most appropriate answer from the given alternatives for each sub question: (7)

(1) A ray of light of frequency n and wave-length λ travelling with velocity c in air enters a glass of refractive index μ. The frequency and wavelength in glass will be........

(a) n, 2λ (b) n, $\frac{\lambda}{\mu}$ (c) $\frac{n}{\mu}$, $\frac{\lambda}{\mu}$ (d) n, $\frac{\mu}{\lambda}$

(2) Cyclotron is a device generally used to ....
   (a) accelerate heavy positively charged particles.
   (b) accelerate light negatively charged particles.
   (c) accelerate electrons.
   (d) accelerate neutral particles.

(3) The quantity generally increased in a step-down transformer is ....
   (a) Power   (b) Voltage   (c) Current   (d) Frequency

(4) Wave numbers of spectral lines in hydrogen atom are $\frac{1}{\lambda} = R \left[\frac{1}{p^2} - \frac{1}{n^2} \right]$

The value for n for shortest wavelength line is
   (a) n = ∞ for all series   (b) n = 4 only for Paschen Series
   (c) n = 2 for Balmer series   (d) n = 3 for Balmer Series

(5) The power gain of a transistor is highest when it is used in
   (a) Common collector configuration   (b) Common base configuration
   (c) Common emitter configuration   (d) Oscillator mode

(6) In amplitude modulation
   (a) The amplitude of carrier wave is varied according to the amplitude of the modulating signal.
   (b) Phase shift of carries wave is varied according to modulating signal.
   (c) The amplitude of carries wave is varied according to frequency of the modulating signal.
   (d) Modulating frequency lies in the range of 20 Hz to 20 KHz.

(7) If σ is the surface charge density, then electric field at a point near the surface of a charged conductor is ....

(a) $E = \frac{\sigma}{K\epsilon_0}$ (b) $E = \frac{\sigma}{2K\epsilon_0}$ (c) $E = \frac{2\sigma}{K\epsilon_0}$ (d) $E = \frac{\sigma}{K\epsilon_0 r}2$

Q.6. Attempt any SIX of the following: (12)
(i)   State any two sources of errors in meter bridge experiment. Explain how they can be minimized.
(ii) A point is situated at 6.5 cm and 6.65 cm from two coherent sources. Find the nature of

P.T.O.

(3)

the illumination at the point, if wavelength of light is 5000 A⁰.

(iii) Four resistances of 4, 4, 4 and 12 ohm form a wheatstone's network. Find the resistance which when connected across the 12 ohm resistance balances the network.

(iv) Write a short note on space wave propogation.

(v) Find the ratio of diameter of the first Bohr orbit to that of the 4th Bohr orbit of hydrogen atom.

(vi) State Faraday's laws of electromagnetic induction.

(vii) Define, thereshold frequency and photoelectric work function.

(viii) The photoelectric work function of tungsten is 4.5 eV. Calculate its threshold wavelength.
(Given: $h = 6.63 \times 10^{-34}$ J-s, $c = 3 \times 10^{8}$ m/s)

Q.7. Attempt any THREE of the following: (9)

(i) State Brewster's law and show that when light is incident at polarizing angle, the reflected and refracted rays are mutually perpendicular to each other.

(ii) A parallel plate air condenser has a capacity of 20 µF. What will be the new capacity if –
(a) The distance between the two plate is doubled and
(b) A marble slab of dielectric constant 8 is introduced between the two plates.

(iii) What is an oscillator? Draw the block diagram for oscillator.

(iv) The primary of a transformer has 40 turns and works on 100 V and 100 W. Find the number of turns in the secondary to set up voltage to 400 V. Also, calculate the current in secondary if efficiency is 1.

Q.8. Give the theory of interference bands and hence obtain an expression for fringe width.
The radius of a toroid is 5 cm and has 500 turns of wire on it. Find the value of the current passing through it, if the magnetic induction inside it is 0.025 Wb/m².   (7)

OR

Q.8. What is a magnetic domain? Explain ferromagnetism on the basis of domain theory.
Find the longest wavelength in the Paschen series of Hydrogen atom. (Given R = 1.097 X 10⁷ m⁻¹)   (7)

END

(4).

STD XII   M.M – 70

                                                                                                 Time – 3 Hrs.

Note: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Draw neat and well labelled diagrams wherever necessary.

4) Use of only logarithmic table is allowed.

Section – I

Q.1. Select and write the most appropriate answer from the given alternatives for each sub   (7)
question:

(1) The kinetic energy E. angular momentum L and momentum of inertia I of a rotating body
are related as ....

(a) $E = 2IL$ (b) $E = \dfrac{L^2}{2I}$ (c) $E = \sqrt{2I^2 L}$ (d) $\dfrac{L^2}{2\sqrt{I}}$

(2) Maximum velocity of a particle performing linear S.H.M with amplitude 'a' and period
T is ....

(a) $\dfrac{4a}{T}$ (b) $\dfrac{2a}{T}$ (c) $\dfrac{2\pi a}{T}$ (d) $2\pi\sqrt{\dfrac{a}{T}}$

(3) Two liquid drops merge into a single drop. In this process...............
(a) energy is released   (b) energy is absorbed
(c) energy remain constant   (d) first energy is absorbed then released

(4) Two tuning forks of the frequency n_1 and n_2 are respectively in resonance with air
columns of lengths l_1 and l_2, closed at one end. The end correction is.............

(a) $\dfrac{n_1 l_1 - n_2 l_2}{n_1 - n_2}$ (b) $\dfrac{n_1 l_1 - n_2 l_2}{2(n_1 - n_2)}$ (c) $\dfrac{n_1 l_1 - n_2 l_2}{2(n_2 - n_1)}$ (d) $\dfrac{n_1 l_1 - n_2 l_2}{n_2 - n_1}$

(5) The coefficient of absorption and coefficient of reflection of a body are 0.5 and 0.2
respectively. If the amount of heat transmitted by the body is 1200 J. the amount of heat
incident on the body is ....
(a) 2400 J   (b) 3000 J   (c) 4000 J   (d) 6000 J

(6) Water rises upto a height 'h' inside a capillary tube of certain diameter. Now if a similar
tube of half the diameter is dipped in water, the water will rise upto the height of ....
(a) h   (b) 2h   (c) 3h   (d) 4h

(7) If the diatomic molecules of a gas are rigid then, γ = ...

(a) $\dfrac{5}{3}$ (b) $\dfrac{7}{5}$ (c) $\dfrac{9}{7}$ (d) $\dfrac{7}{9}$

P.T.O.

(1)

Q.2. Attempt any SIX of the following: (12)

(i) Show that linear speed of a particle performing uniform circular motion is the product of radius of a circle and angular speed of particle.

(ii) Find the value G from the following data. $M = 6 \times 10^{24}$ kg, $R = 6400$ km, $g = 9.774$ m/s^2

(iii) Derive an expression for linear velocity of a body rolling without slipping along an inclined plane.

(iv) An object of mass 0.5 kg is performing linear S.H.M having force constant 10N/m and amplitude 3 cm. What is the total energy of the object?

(v) The sound waves having wavelengths 86 cm and 88 cm in air, when superimposed, produce 9 beats per second. Find the velocity of sound.

(vi) Show graphically the spectrum of energy distribution of a black body in terms of wavelengths.

(vii) A body cools from 60^0 C to 52^0 C in 10 minutes and to 46^0 C in the next 10 minutes. Find the temperature of the surrounding.

(viii) State and explain principle of superposition of waves.

Q.3. Attempt any THREE of the following: (9)

(i) A stone weighing 1 kg attached at the end of a rope of length 0.5 m, is whirled in a vertical circle with minimum possible speeds. Find the tension at (a) Lowest position (b) Highest Position and (c) Central Position.

(ii) What is the effect of altitude (height) on acceleration due to gravity? Derive the necessary formula.

(iii) With neat diagram explain fundamental mode of vibration of an air column in a pipe when (a) pipe is open at both ends. (b) pipe is closed at one end.
Hence, derive an expression for fundamental frequency in each case.

(iv) A homogenous rod XY of length 'L' and mass 'M' is pivoted at the centre C such that it can rotate freely in a horizontal plane. A blob of wax of same mass M as that of the rod falls vertically and sticks to the rod mid-way between points C and Y. If the rod was rotating initially with angular sped 'ω', what will be its new angular speed?

Q.4. State the differential equation of linear S.H.M. (7)
Obtain an expression for acceleration, velocity and displacement of a particle performing linear S.H.M.
If glass capillary of diameter 0.25 mm is dipped in paraffin oil of surface tension 0.0245 N/m, oil rises upto a height of 4 cm. Calculate the density of paraffin oil.
(Angle of contact of paraffin oil = 28^0 and $g = 9.8$ m/s^2)

OR

Q.4. With the help of a neat labelled diagram, explain the behavior of a wire under increasing load. The equation of a standing wave is given by $Y = 0.02 \cos(\pi x) \sin(100 \pi t)$ m. Find the amplitude, wavelength, time period, frequency and wave velocity of interfering waves. (7)

P.T.O.

(2)

S.Y.J.C. (Electronics Technology)
PRELIM examination JANUARY 2017   Maximum Marks : 80 Duration 3 Hrs
Paper I : Digital and linear Electronics

Q 1) A) Fill in the blanks with an appropriate word   (4 M)
    a) The radix of hexadecimal number system is _____
       i) 8   ii) 2   iii) 16   iv) 4
    b) XOR gate is _____ gate
       i) Basic ii) Universal iii) Derived iv) Stable
    c) _____ are unipolar and polar
       i) Analog ii) Digital iii) Gate iv) Flip flip
    d) _____ DEMUX has 1 data input line and 4 output lines.
       i) 1:1   ii) 4:4   iii) 1:4   iv) 4:4

Q.1) B) Match the following   (4 M)
          A   B
    i) Binary number syste   a) OPMP
    ii) Basic gate   b) Radix 8
    iii) Many to one logic   c) Radix 2
    iv) Differential amplifier   d) Not gate
                                e) MUX

Q.1) C) State whether the following statements are True or false   (4 M)
    1) De multiplexer performs reverse function as that of multiplexer.
    2) Race condition of RS flip flop can be eliminated using JK flip flop.
    3) OPAMP can perform only amplification.
    4) Simultaneous A/D converter is slow in operation and complicated in construction.

Q. 2) A) Answer any two questions (2 Marks each)   (4 M)
    1) What is MUX.
    2) What are derived gates.
    3) What is open loop game of OPAMP.

Q. 2) B) Answer any two questions (2 Marks each)   (4 M)
    1) What is an Encoder.
    2) What are a D flip flop.
    3) State two applications of DMUX.

Q. 3) A) Answer any two questions (3 Marks each)   (6 M)
    1) Draw the logic diagram. $Y = \bar{A} + A . \bar{B}$
    2) What is edge triggering in flip flop.
    3) Convert $(1101)_2 = ($ $)_{10}$ $(142)_{10} = ($ $)_{16}$

Q. 3) B) Answer any two questions (3 Marks each)   (6 M)
    1) State any three characteristics of TTL logic family.
    2) Explain working of inverting amplifier.
    3) Add the following 1) 10111 + 1011 2) 10101 + 11101

Q. 4) A) Answer any two questions (3 Marks each)   (6 M)
    1) Draw basic gates using NOR gate.
2) Explain the working of T flip flop using block diagram.
3) Compare types of D to A converters.

Q. 4) B) Answer any two questions (3 Marks each)   (6 M)
    1) Write the rules of binary adition.
    2) Simplify the following using Boolean algebra Y = A.B + A.B + A.B
    3) What are counters and explain its types.

Q.5) A) Attempt any one   (4M)
    1) Subtract using 1's complememt   1111 - 1000
    2) Draw the circuit diagram of differentiator circuit using OPAMP and state the expression
      for its output.

Q.5) B) Attempt any Two questions (4 Marks each)   (8M)
    1) Explain working of simultaneous A to D converter using diagram.
    2) Give four applications of DMUX.
    3) Explain the working of JK flip flop.

Q.6) A) Attempt any Two questions (4 Marks each)   (8M)
    1) Explain the working of decade counter using IC 7490.
    2) What is 2's complement. Explain with suitable example.
    3) Give four ideal characteristics of OPAMP.

Q.6) B) Attempt any one   (4M)
    1) What are shift registors. Explain the types.
    2) What is universal building block. Explain

Q.7) A) Attempt any one   (6M)
    1) State and prove De Morgon's theorems using logic diagram.
    2) Write a note on Schmitt trigger.

Q.7) B) Attempt any one   (6M)
    1) With a neat block and logic diagram explain full adder.
    2) Explain with neat block diagram working of Master slave JK flip flop.

Marks 50	Electronics PII	Jan 2017	3 Hours

Note: i] All questions are compulsory.
ii] Figures to the right indicate full marks.
iii] Draw neat DIAGRAMS wherever necessary.
iv]Use of Log table is allowed. Calculator is not allowed

Q.1 A Select the correct alternative and rewrite the following sub questions.   [4]

i) ASCII is _____ bit code.
a) 4   b) 7   c) 8   d) None of these.

ii) 1:32 DEMUX can be designed with _____ select lines
a) 4   b) 8   c) 16   d) 32

iii) XOR gate has a high output only when _____number of inputs are used.

a)even   b)odd   c) one   d) None of these.

iv) _____is a sequential access secondary storage device.

a) Floppy disk   b) Hard disk   c)   CD Rom   d) Magnetic Tape

      B.   Attempt **any Two of** the following.   [6]

i) Convert the following:
a] (11001011.1101) binary = (?) decimal   b] (2AB.C) 16 = (?)2
ii) Explain 3bit Adder using logic gates.
iii) Explain Right shift register with logic diagram. Draw the necessary waveforms.

Q.2 A. Attempt **any Two** of the following.   [6]

i) Draw the Circuit diagram of Decoder and explain its working..
ii) Draw the diagram of asynchronous 4 bit counter. And explain the working of it.
iii) Explain the need of Preset, Clear and edge trigger in FF.

      B] Attempt **any One** of the following.   [4]
i) Explain with the help of block diagram Digital Computer
ii) Explain the working of TTL NAND gate.

Q.3 A] Attempt **any Two** of the following. [6]

i) Compare ASCII Code with EBCIDIC Code.
ii) Write a note on Semiconductors Memories used in computers.
iii) Explain the working of BCD to 7 segment decoder

.B] Attempt **any One** of the following. [4]
i) Explain working of Asynchronous Mod 10 counter. Write its TT and show waveform for each pulse
ii) Write uses of X-OR Gate. What is the importance of Universal gates?

Q.4) A] Attempt **any Two** of the following [6]
i) Explain working of Flash type ADC. Draw diagram
ii) Which IC can be used to construct controlled inverter. Explain with the help of diagram.
iii) Explain working of Clocked RS FF. Write its truth table

B. Attempt **any One** of the following. [4]

i) Draw Circuit diagram of R-2R DAC and explain its working.
ii) Why NOR gate is called universal gate.

Q.5) Attempt **any Two** of the following [6]
i) Explain the Decimal to BCD encoder with the help of circuit diagram
ii) Which type of MUX will be required to implement F =(A,B,C,D) = (0,1,3,6,10 ,11 12). Draw diagram.
iii) Explain working of MS JK FF. Write its T.T

B] Attempt **any One** of the following. [4]
i) Explain working of 4 bit adder/subtractor with the help of circuit diagram.
ii) What is 1's complement of a binary number? Explain it with suitable example

S.Y.J.C. (Electronics Technology)
PRELIM examination JANUARY 2017   Maximum Marks : 80 Duration 3 Hrs
Paper III : APPLIED ELECTRONICS

Q 1) A) Fill in the blanks with an appropriate word   (4 M)
  a) In photoelectric emission the maximum energy of electrons depends on _____
        i) frequency   ii) Amplitude   iii) Intensity   iv) None of these
  b) Time constant of RC circuit when R = 20 K ohms and C = 5 mf is _____
        i) 1 Sec   ii) 10 Sec   iii) 0.1 Sec   iv) 0.2 Sec
  c) In VCR _____ recording system is used.
        i) Helilcal scan ii) Horzontal scan iii) Vertical scan iv)None of these
  d) In audio tape recording system reading and reproduction is based on the principle of
  _____
        i) Electrostatic ii) Magnetic   iii) Electric   iv) None of these

Q.1) B) Match the following   (4 M)
          A   B
    i) LDR   a) Light emitting device
    ii) Phototransistor   b) Speed control of DC motor
    iii) LED   c) Photo electric effect
    iv) SCR   d) Photo conductive effect
                                       e) photo junction effect

Q.1) C) State whether the following statements are True or false   (4 M)
    1) IC 555 uses three comparators.
    2) DC series motor has high starting torque.
    3) Astable multivibrator is used in square wave generator.
    4) In CD the information is stored in terms of 0 and 1.

Q. 2) A) Answer any two questions (2 Marks each)   (4 M)
    1) What is a time constant.
    2) State the applications of motor.
    3) Enlist the applications of remote control.

Q. 2) B) Answer any two questions (2 Marks each)   (4 M)
    1) What are timers. Name the two types.
    2) What is the concept of remote control system.
    3) State factors which affect speed control of DC motors.

Q. 3) A) Answer any two questions (3 Marks each)   (6 M)
    1) Draw and explain solar cell.
    2) Draw and explain pin diagram of IC 555.
    3) What is back e.m.f

Q. 3) B) Answer any two questions (3 Marks each)   (6 M)
    1) Explain working of street light control using photocell.
    2)What is LDR. Explain its working.
    3) Draw a 4 by 4 dot matrix display diagram of LED

Q. 4) A) Answer any two questions (3 Marks each)   (6 M)
    1) Draw Astable multivibrator using 555 timer and label it.
    2) Draw a neat labelled diagram of ground station in remote control.
    3) Draw a tape transport mechanism of tape recorder.

Q. 4) B) Answer any two questions (3 Marks each)   (6 M)
    1) Give advantages of LED.
    2) What is photocell. Give its construction and working.
    3) What is a comparator. Explain the 3 types.

Q.5) A) Attempt any one   (4M)
    1) Draw the block diagram of remote station and explain each block.
    2) Compare VCR and VCD.

Q.5) B) Attempt any Two questions (4 Marks each)   (8M)
    1) Draw a Schmitt trigger and give expression for its output.
    2) Explain the use of remote control in consumer electronics.
    3) Write the faulty stage in the following faults:
      a) Dead VCR.   b) sound ok, no picture.

Q.6) A) Attempt any Two questions (4 Marks each)   (8M)
    1) write a short note on photo diode.
    2) What is a motor. Name the 3 different types.
    3) Explain with diagram the principle of audio recording in audio system.

Q.6) B) Attempt any one   (4M)
    1) Draw and explain the RC timer circuit using transistor.
    2) Write a short note on LED.

Q.7) A) Attempt any one   (6M)
    1) Write a short note on seven segment LED display. Explain its types.
    2) State the factors which affects the speed of DC motor.

Q.7) B) Attempt any one   (6M)
    1) Draw and explain construction of DC motor.
    2) Draw a diagram of PA system. Explain its working briefly.

Std.12ᵗʰ   FC   **MCVC**   Sub.F.C.

Marks.40

Q.No.1.A.   Fill in the blanks

(10)

1) Unit that is established by the other name ....

(Industry, business, business enterprises)

2) Selection of place is the decision of .... (Secondary, last, major)

3) .... regulate and controls the whole banking business in india.

(Co-operative bank, commercial bank, reserve bank)

4) Rate of interest in case of fixed deposit account is ....(Normal , maximum, minimum)

5) The principal of .... in not applicable in case of life insurance. (Indemnity,subrogation)

6) In every types of insurance contract, the person is required to pay .... Regularly.

(Interest, premium, dividend)

7) Production of goods takes place after .... (Distribution, purchase)

8) .... helps management in planning, controlling, and decision making.

(Budget, cash book, balance sheet)

9) Oral advertising is .... advertising. (Most expensive, free of cost, economical)

10) Multi colourf advertising is possibal on .... (radio, television)

(B)   Match the following.

(10)

Group A

1) Road transport
2) Campus interview
3) Expensive advertisement
4) Electricity and water supply
5) Railways
6) News paper
7) S.W.O.T.

Group B

a) Feasibility of project
b) Low rate of interest
c) Account of a person is credited
d) Door to door services
e) Small saving
f) Staff selection
g) T.V.

8) Current cheque

9) Crossed cheque

10) Pigmy deposit

h) Infrastructure

i) Very short life

j) Central government

Q.No.2. Write distinguish between (any 2) (10)

1) Road transport and railways transport.

2) News paper and magazine.

3) Book-keeping and account.

4) Life insurance and fire insurance.

Q.No.3. Write short note (any 2) (10)

1) Reserve bank of india.

2) Principle of insurance.

3) Element of project.

4) Type of cheques.

5) Comparison in airways and waterways.