question paper

PHYSICS

NOTE: Answer all the 20 questions. Each question carry 4 marks. Write the correct answer in a separate answer sheet attached with the question paper. No marks will be awarded for overwriting.

$c = 2.998 \times 10^{8}\ m{\cdot}s^{-1}$; $\mu_0 = 4\pi \times 10^{-7}\ N\ A^{-2}$; $\varepsilon_0 = 8.85 \times 10^{-12}\ F{\cdot}m^{-1}$;

$h = 6.63 \times 10^{-34}\ J{\cdot}s$; $e = 1.602 \times 10^{-19}\ C$; $m_e = 9.1 \times 10^{-31}\ kg$; $m_p = 1.67 \times 10^{-27}\ kg$

e/m ratio

1. An electron with a speed v moves in a circle of radius r in a uniform magnetic field B.The speed of the electron is now doubled. What will be the new radius of the circular path?

2. An electron of mass m and charge e is accelerated by a potential difference ΔV enters in a magnetic field B(velocity is perpendicular to B). Write e/m in terms of B, ΔV and radius r of the circular path of electron.

Fine Structure

3. A diffraction grating with grating constant 2083nm is illuminated by a sodium light. What is the angular position for wavelength 589nm in third order.

4. For the above grating , if there are two yellow lines of wavelength 589nm and 589.59nm, what is the angular separation between them in second order.

Planck's Constant

5.In photoelectric effect if frequency of incident light decreases, what is the effect on photocurrent.

6. If intensity of incident light increases, what is the effect on stopping potential?

Single and Double Slit

7. In a double slit experiment, the distance of the screen from the slit is 52cm, the wavelength of light used is 480nm and the width of central maxima is 10mm.The distance between the slits is 0.12mm. What is the slit width?

8. In the above question what is the spacing between the consecutive maxima.

Induction of solenoids

9. An inductor has an inductance L_0. A second inductor identical except that it has triple the number of windings. What is the inductance of second inductor in terms of L_0?

10.A solenoid of radius R , length L has total N number of turns carrying current I. What is self inductance of the solenoid?

BITS, Pilani- Dubai
Dubai International Academic City
Second Semester 2007-2008
Comprehensive Examination Answer Key

Course No. TA UC 211 **Measurement Technique-1(BIOLOGY)**

Maximum Marks: 40

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1. The amount of blood sample required/drawn for Hb count by acid hematin method is _____

Ans: 20µl (2)

2. List out the various types of Leucocytes. (2)

Ans: There are Two major types of Leukocytes- Granulocytes and Agranulocytes. Granulocytes are further divided into Three types- Neutrophils, Basophils and Eosinophils. The Agranulocytes are of Three types- Monocytes, Lymphocytes(B and T) and Natural Killer Cells.

(1+1)

3. For RBC count the blood is drawn up to which mark and how many times it is diluted (Dilution Factor) in the RBC dilution pipette ? (1+1) = (2)
Ans: 0.5 mark and 200 Dilution Factor

4. Mention the type of antibody present in 'A' type blood group? (2)
Ans: B Antibodies

5. A person with AB blood group can donate blood to _____ (2)
Ans: AB

6. What is the wavelength of light used in spectrophotometer for protein estimation by Biuret Method? (2)
Ans: 540nm

7. For which experiment you have used acetocarmine in the lab and what is its role? (2)

Ans: Acetocarmine is used as a stain for the experiment "Cell Division in Onion Root Tips" to observe the various stages of Mitotic Division. The role of Acetocarmine is to stain the nucleus of the plant cell so that the stages of Mitotic Cell division can be identified.

8. For what purpose the onion root tips are kept in 10 % HCl while studying mitosis? (2)

Ans: Loosening the cell wall of plant cell to facilitate the uptake of stain/dye

9. What is the average count of WBC for an adult male and female? (2)

Ans: 5000 – 10000 Cells/ mm^3

10. What is Erythroblastosis Fetalis?
Ans: (2)

- Rh incompatibility occurs when an Rh negative mother carries an Rh positive fetus for the second time. This positive Rh factor can be inherited from the child's father.
- If the mother's blood encounters the fetus's blood through the placenta, her immune system may respond to the presence of the protein and attack it with antibodies
- .The immune reaction normally poses no threat to the woman's first child, as antibodies are not built up in time to attack the fetus's blood. But problems arise during the woman's second Rh positive pregnancy, by which time the antibodies have become strong enough to aggressively destroy the second Rh fetus's red blood cells.

11. List out the various constituents of diluting fluid used for WBC count .Give the function of each of the constituents. (4)

Ans: The Diluting fluid used in WBC count is 2% Acetic acid with methylene blue. Meltylene blue is a basic dye which stains the nucleus of WBCs. A sample of whole blood is mixed with a weak acid solution i.e. 2% acetic acid that lyses nonnucleated red blood cells.

12. If the 3rd division on stage micrometer coincides with 2nd divisions of ocular micrometer, then find out the Calibration constant. (Give the formula also)

(Formula = 1 mark)
Calculation = 3 mark.

Ans: 0.015

Calibration Constant = No. of divisions of the stage micrometer X Least count

Corresponding no. of divisions of the eyepiece scale

$$= \frac{3 \times 0.01}{2}$$

$$= 0.015$$

(4)

13. If numbers of mitotic cells are 9 and number of cells in the Interphase are 62, what will be the duration of mitosis? Calculate.

Ans: Number of mitotic cell = 9

Total number of cells = 9 + 62

= 71

(formula = 1 mark
calculation = 3 mark)

Mitotic index = Number mitotic cells / Total number of cells

= 9 / 71 = 0.126

(4)

Duration of Mitosis = mitotic index X Duration of cell cycle

Duration of cell cycle = 19 Hrs

Duration of Mitosis = 0.12X 19 Hrs = 0.13X1140 min

= 2 hrs 28 min = 0.13 × 1140 min

= 2 Hrs 28 min

14. Identify the given specimen and label the parts in the diagram (4)

Pencillium sp (1)

3 marks.

identification = 1 mark
label = 3 marks.

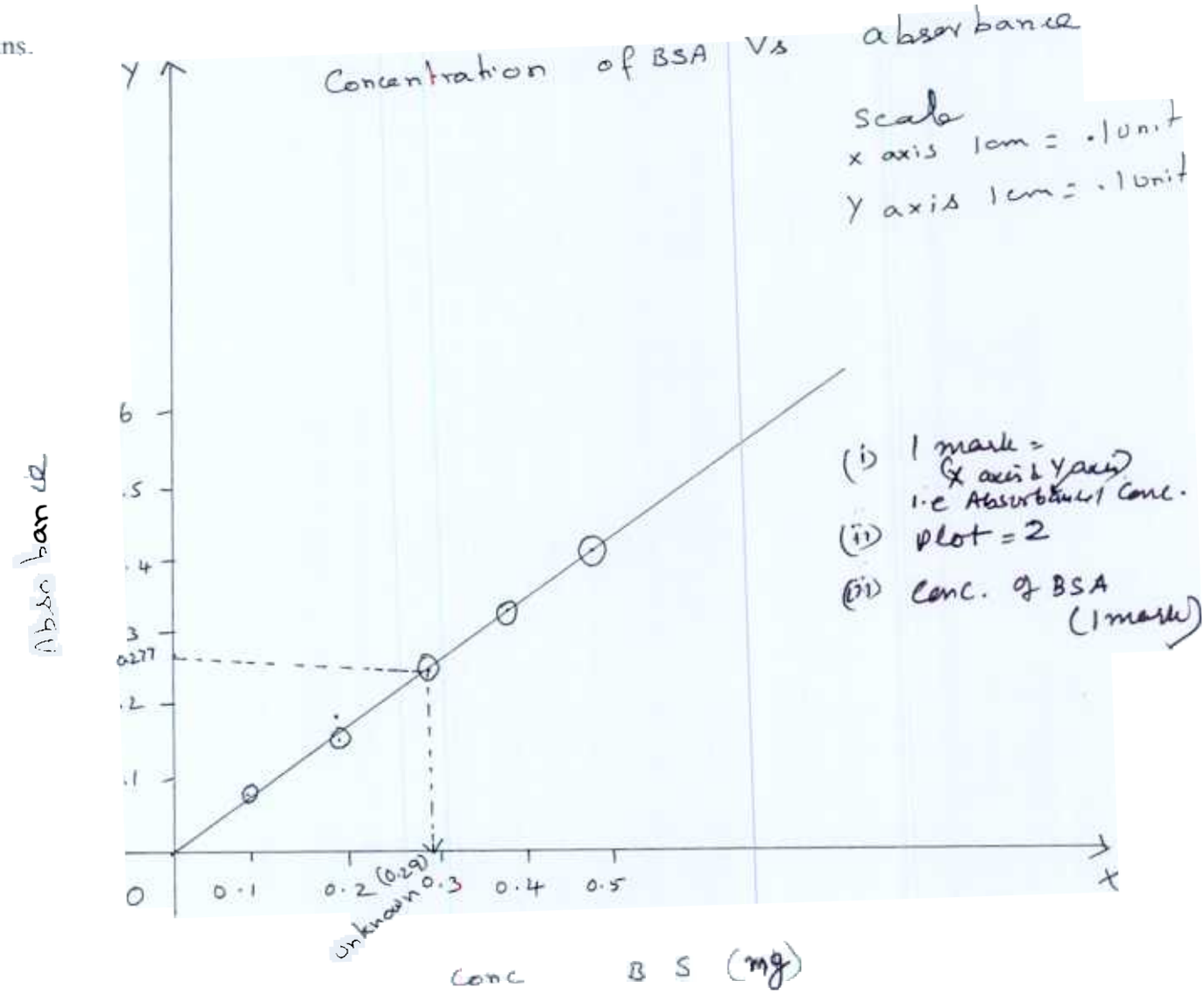
15. From the values given in the table, draw a Standard Graph and find out the Unknown Protein concentration (Given that in the BSA stock 1gm of BSA is dissolved in 100ml of Distilled Water.)

(4)

BSA (ml)	D/W (ml)	Biuret reagent(ml)	Conc. of protein (mg)	Absorbance
0.1	0.9	2.0	0.1	0.074

0.2	0.8	2.0	0.2		0.146
0.3	0.7	2.0	0.3		0.217
0.4	0.6	2.0	0.4		0.289
0.5	0.5	2.0	0.5		0.352
Blank 0.0	1.0	2.0	0.0		0.000
Unknown	-	2.0	?		0.277

Ans.



The amount of protein present in unknown BSA is 0.29

BITS PILANI DUBAI

II Semester 2007 - 2008

COMPREHENSIVE EXAMINATION

COURSE NO.: TAUC211 COURSE TITLE: Measurement Techniques-I, Physics

TIME: 2 hrs **WEIGHTAGE: 40%** **Date: 22nd May 2008**

ANSWER SHEET (MT-1 , PHYSICS , TAUC211)

NAME: ID.NO. SEC NO

Q1.	2r	Q10.	$\mu_o N^2 \Pi R^2 / L$
Q2.	$2\Delta V / B^2 r^2$	Q11.	$f = (1/2L)\sqrt{F/\rho.q}$
Q3.	58°	Q12.	1
Q4.	0.039°	Q13.	b) Damped Oscillation
Q5.	No change	Q14.	25/Π
Q6.	No change	Q15.	c) momentum changes but energy remains unchanged
Q7.	50μm	Q16.	In a straight line
Q8.	2.08mm	Q17.	Solar energy into electricity
Q9.	9Lo	Q18.	a) only momentum is conserved
Q19.	**Retentivity:** Ability to retain a certain amount of residual magnetic field when magnetizing force is removed. **Coercive Force:** The amount of reverse magnetic field which must be applied to a magnetic material to make the magnetic flux return to zero		
Q20.	**Paramagnetic material:** Materials that acquire magnetization parallel to B **Diamagnetic material:** Materials that acquire magnetization opposite to B Fer**romagnetic material:** Materials that retain magnetization even after the removal of applied magnetic field.		

RECHECK REQUEST

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BITS, PILANI - DUBAI
II Semester 2007 - 2008
COMPREHENSIVE EXAMINATION
COURSE NO.: TAUC211 COURSE TITLE: Measurement Techniques-I, Chemistry
WEIGHTAGE: 40% **Date: 22nd May 2008**

NAME:.....ID.NO.....SEC No....

Give the components of starch. **(2M)**

Amylase and amylopectin

Sucrose does not reduce the Fehling's solution. Give reasons. **(2M)**

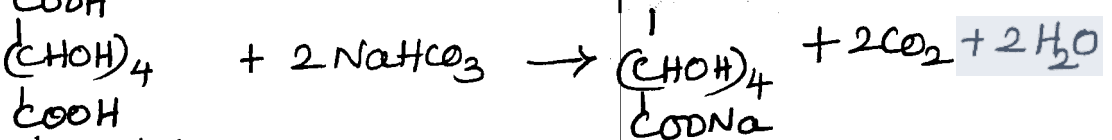
Sucrose do not contain free $-CHO$ or $-C=O$ (ketone) groups with OH on the carbon adjacent to the carbonyl group.

3. Which is more acidic, carboxylic acids or corresponding alcohols? **(1M)**

carboxylic acids

4. What happens when tartaric acid reacts with sodium bicarbonate solution? Give the relevant chemical equation. **(2M)**

CO_2 gas is liberated



5. Which substance is the oxidizing agent in the following reaction? **(2M)**

$8\ H^+(aq) + Cr_2O_7^{2-}(aq) + 2\ SO_3^{2-}(aq) \longrightarrow 2\ Cr^{3+}(aq) + 3\ SO_4^{2-}(aq) + 4\ H_2O$

$Cr_2O_7^{2-}$

6. Give any 2 important aspects which you need to be aware, while performing the permaganometry titrations. **(2M)**

— any 2 points (1 mark each)

(i) Mn^{7+} cannot be used in titrations in the presence of ions like Cl^- or Br^-

(ii) $KMnO_4$ is not a primary standard, so it is to be standardized

7. Balance the following redox equation in basic medium **(2M)**
$Cr(OH)_3(s) + ClO_3^-(aq) \rightarrow CrO_4^{2-}(aq) + Cl^-(aq)$

$2\,Cr(OH)_3 + ClO_3^- + 4OH^- \longrightarrow 2\,CrO_4^{2-} + Cl^- + 5H_2O$
(1 Mark)

Steps – 1 mark

8. For the reaction, **$NO_2(g) + CO(g) \rightarrow NO(g) + CO_2(g)$** Write the correct expression for the rate of the reaction. **(2M)**

$Rate = K[NO_2][CO]$

$Rate = -\frac{d[NO_2][CO]}{dt}$

9. A hypothetical reaction **$2A + B \dashrightarrow X + Y$** has rate constant as 2.0×10^{-3} mol $L^{-1}s^{-1}$. What is the order of the reaction ? **(2M)**

Zero order

10. The reaction **$2Na + Cl_2$** · · **2NaCl** is found to follow III order kinetics, What is its molecularity? **(1M)**

Molecularity is three..

Write the purpose of addition of ice cold water to the reaction mixture in the experimental determination rate of ester hydrolysis. **(2M)**

Arresting further hydrolysis - It favours determining the amount of acid formed at a particular point of time

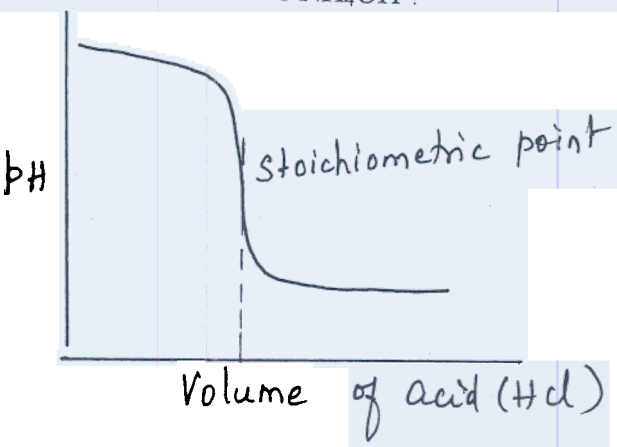
12. If the ionization constant of an acid is 4.7, what will be its dissociation constant? **(2M)**

$PKa = 4.7$, $Ka = 1.995 \times 10^{-5}$

13. The pKa of acids A and B are 3.5 and 4.5 respectively. Which will be the strongest acid?

Acid A

14. Draw potentiometric graph and mark the stoichiometric point for the potentiometric titration of HCl Vs NH_4OH ?



15. Which substance is used to prevent oxidation of aniline during the preparation of Acetanilide ? **(2M)**

Zinc

16. Write the chemical equation for the preparation of benzanilide and mention whether it is electrophilic substitution or nucleophilic substitution reaction. **(3M)**

Nucleophilic substitution reaction

17. Refluxation and recrystalization are same or different? Give reason for your answer?

Refluxation and recrystalization are different. (2M)
Refluxation – Process of heating
Recrystallization – Purification method.

18. A potential difference of 12 V is applied across a 4.6 Ω resistor, determine the current flowing. **(1M)**

$V = I \times R$

$I = 12/4.6 = 2.6\ A$

19. Write the equation for the fraction of molecules ionized (α), when a weak electrolyte such as acetic acid is dissolved in water? **(1M)**

$\alpha \quad \frac{\lambda_c}{\lambda_\alpha}$

20. The degree of dissociation of a weak electrolyte to increases, what must be done to volume of solution? **(1M)**

the volume of solution must be increased

21. Calculate the K_a of acetic acid if its 0.05 M solution has a conductance of 7.36 mho cm^2 at 25° C. (λ_∞ for $CH_3COOH = 390.7\ ohm^{-1}\ cm^{-2}$). **(2M)**

$\alpha = \frac{\lambda_c}{\lambda_\alpha} = \frac{7.36}{390.7} = 0.0188$

$K_a = \frac{0.05\alpha \times 0.05\alpha}{0.05(-\alpha)} = 1.76 \times 10^{-5}\ mol/L$

22. The conductance λ of an aqueous solution of 1.0283×10^{-3} g acetic acid per litre is 48.15 $ohm^{-1}\ cm^2$ at 25°C; λ_∞ is 390.7 $ohm^{-1}\ cm^2$. Calculate the degree of dissociation. **(2M)**

$\alpha = \frac{\lambda_c}{\lambda_\alpha} \quad \alpha = \frac{48.15}{390.7}$

$= 0.1232$