

Given: $c = 2.998 \times 10^8 \text{ m/s}$; $\mu_0 = 4\pi \times 10^{-7} \text{ M/Amp}^2$; $\epsilon_0 = 8.85 \times 10^{-12} \text{ F/m}$;
 $h = 6.63 \times 10^{-34} \text{ J.s}$; $e = 1.602 \times 10^{-19} \text{ C}$; $m_e = 9.1 \times 10^{-31} \text{ Kg}$; $m_p = 1.67 \times 10^{-27} \text{ Kg}$

e/m ratio of the electron

1. An ion ($q = +2e$) enters a magnetic field with flux density 1.2 Web/m^2 at a velocity of $2.5 \times 10^5 \text{ m/s}$ perpendicular to the field. Determine the force on it.
2. An electron is moving with a speed of $5 \times 10^7 \text{ m/s}$ at right angles to a magnetic field of 0.5 T . What is the radius of the circle in which electron moves.

Single and double slit

3. When are two light sources of common frequency said to be coherent?
4. What is the resultant amplitude of the superposition of the two waves $y_1 = 20 \sin \omega t$ and $y_2 = 20 \sin(\omega t + 60^\circ)$

Planck's Constant

5. Light of wavelength 600 nm falls on metal having work function 2 eV . Find the stopping potential
6. Light of wavelength 200 nm falls on aluminum surface. In aluminum 4.2 eV is required to remove an electron. What is the K.E. of the slowest emitting photoelectron

Induction of solenoid

7. Define self inductance.
8. Give the definition of magnetic flux.

Solar Cell

9. From the current - voltage characteristics of a solar cell at different temperatures, what is the effect of temperature on the current and voltage?
10. What is a thermopile?

Hall Effect

11. An electron is moving vertically upwards in the earth's magnetic field. Find the direction of its deflection.
12. The hall effect can be used to measure blood flow rate because the blood contains ions which constitute an electric current. Determine the flow velocity in an artery 3.3 mm in diameter if the measured emf is 0.10 mV and magnetic induction is 0.070 T .

Elastic Collision

13. What is the difference between elastic and inelastic collision?
14. If a ball of mass m moving with initial velocity v collides with a wall and returns back with the same velocity. What is the impulse experience by the ball?

Electron Diffraction

15. Define Bragg's Law?
16. Write an expression for electron wavelength as a function of accelerating voltage?

Fine Structure:

17. What prominent spectral line of the second order is observed in this experiment?
18. Define Grating Constant?

Vibrations On Strings

19. How to construct standing waves?
20. How frequency depends on length, tension and density of the wire

RLC Circuits

21. Define resonance phenomenon in LCR circuit
22. Draw a circuit diagram for measuring voltage in a parallel LCR circuit.

Ferromagnetism

23. By using the data generated for a steady state ferromagnetic hysteresis loop for a hypothetical material, find (a) retentivity and (b) coercivity

H ($\times 10^4 \text{ Am}^{-1}$):	6	1	0	-1	-2	-3	-4	-5	-6
B (Wbm^{-2})	0.65	0.58	0.56	0.53	0.46	0.30	0	-0.44	-0.65

24. Draw the hysteresis loop for (a) solid iron core and (b) laminated iron core.

Given: $c = 2.998 \times 10^8 \text{ m/s}$; $\mu_0 = 4\pi \times 10^{-7} \text{ M/Amp}^2$; $\epsilon_0 = 8.85 \times 10^{-12} \text{ F/m}$;
 $h = 6.63 \times 10^{-34} \text{ J.s}$; $e = 1.602 \times 10^{-19} \text{ C}$; $m_e = 9.1 \times 10^{-31} \text{ Kg}$; $m_p = 1.67 \times 10^{-27} \text{ Kg}$

1. An electron and proton are projected at right angles to a uniform magnetic field with the same linear momentum. They are moving in a circular path of radius r_e and r_p . What is the relation between both the radii.
2. Alpha particles($m = 6.68 \times 10^{-27} \text{ Kg}$, charge = $+2e$), accelerated through a potential difference to 2KeV, enter a magnetic field $B = 0.2 \text{ T}$ perpendicular to the direction of motion. Calculate the radius of their path.
3. Light from a laser beam of wavelength 589nm forms an interference pattern on a screen 0.8m from a pair of slits. The bright fringes in the pattern are 0.35 cm apart. What is the slit separation?
4. Two wavelengths λ_1 and λ_2 are used in the double slit experiment. If one is 430nm, what value must the other have for the fourth order bright fringe of one to fall on the sixth order bright fringe of the other?
5. What potential difference must be applied to stop the fastest photoelectrons emitted by a nickel surface under the action of ultraviolet light of wavelength 2000 \AA . The work function of the nickel is 5.00eV.
6. What wavelength must electromagnetic radiation have if a photon in the beam is to have the same momentum as electron moving with a speed of $2 \times 10^5 \text{ m/s}$?
7. An alpha particle and a proton are projected at right angles to the magnetic field with same kinetic energy. Find the ratio of the radius of curvatures of these two particles?
8. Write the expression of Lorentz's force in a vectorial form.
9. A ferromagnetic material when placed in a strong external magnetic field, the domain will reorient in a direction ----- with that of the field.
10. Magnetization as a function of the external field is described by a -----.
11. The magnetic field perpendicular to a 3.0 cm^2 area 40 loop coil is changing in the following way: $B = 250 - 0.60t \text{ mT}$, with t in seconds. What is the induced emf in the coil.
12. An electron beam is accelerated through a series of potential drops viz. 6.5 kV and 7 kV. Calculate the wavelengths corresponding to the accelerating potentials mentioned above.
13. An electron beam diffracts over a crystal that has lattice constants 225 nm and 135 nm. Calculate the diameter of the diffraction rings corresponding to the 6.5 kV potential applied for the first order diffraction. (Given, the Radius of glass bulb = 65mm)
14. A ball of mass 'm' with initial speed 'a' collides with another ball of mass 'M', initially at rest. After the collision the two balls stick together, moving with speed 'b'. The ratio of final velocity to the initial velocity i.e., $(b/a) =$ -----
15. A rifle has a mass of 4.5 kg and it fires a bullet of mass 10 g at a muzzle speed of 820 ms^{-1} . What is the recoil speed of the rifle as the bullet leaves the gun barrel?
16. Calculate the angular frequency ω in a circuit where $C = 1 \mu\text{F}$ and $L = 2 \text{ mH}$
17. As temperature is lowered to zero Kelvin, then (a) semiconductor becomes -----
(b) metal becomes -----
18. A p-type semiconductor has an acceptor level 62 meV above the valence band. The maximum wavelength of the light that can create a hole is -----
19. For standing wave $y = 2A \sin(kx)\cos(\omega t)$ along the string, which of the following facts is/are true (a) the amplitude of the wave is 2A (b) all the particles on the string vibrate with the same frequency (c) it is standing wave (d) none of these
20. In the second order diffraction spectrum of an element, two close wavelength of light fall at an angle of 44.088° and 44.156° respectively. Calculate the difference in wavelength in the doublet. The diffraction grating constant is 1692nm.



BITS, PILANI - DUBAI
II YEAR FIRST SEMESTER, 2010-2011
COMPREHENSIVE EXAMINATION (Closed book)

Course Title: Measurement Techniques –I (Chemistry)

Max Marks: 40

Course No: TA C211 Question paper contains 4 pages

Date: 27.12.2010

Name :

Section No:

ID Number :

1. Give the components of starch. (1M)

2. How will you distinguish a reducing and non reducing sugar in the laboratory ? (2M)

3. Write the confirmatory test to identify oxalic acid in the laboratory with appropriate chemical equation. (2M)

4. Which group in succinic acid is responsible for the brisk effervescence when treated with sodium bicarbonate solution ? (2M)

5. Write the rate expression for the following reaction and find the order . (3M)



6. In a reaction with initially 0.12M, the concentration of reactant is reduced to 0.06M in 10 hours and 0.03M in 20 hours. **(4M)**

- (a) What is the order of the reaction?
- (b) What is the rate constant in both the cases ?

7. What is cell constant? What is its unit? **(3M)**

8. The conductance of 0.1 M weak electrolytic solution is $39 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$. Calculate its specific conductance. **(3M)**

9. Give any two advantages of potentiometric titrations over indicator methods. **(2M)**

10. How does a pH electrode follow the neutralization reaction? **(2M)**

11. Draw the pH curve for the titration of a strong acid versus strong base. Indicate the stoichiometric point. (3M)
12. In KMnO_4 titrations, KMnO_4 should be added in small lots, why? (2M)
13. Calculate the weight of ferrous sulphate required to prepare 0.2M, 250ml aqueous solution (Molar mass of ferrous sulphate = 278). (3M)
14. Write the equation for the redox reaction of MnO_4^- . (2M)

15. Write the precautions to be made during the preparation of acetanilide. **(2M)**
16. How will you purify the crude product obtained during the preparation of acetanilide? **(1M)**
17. Write the equation for acetanilide preparation and indicate the electrophile and nucleophile of the reaction clearly. **(3M)**

BITS, Pilani – Dubai
Dubai International Academic City, Dubai

Course Name : Measurement Technique – I (Biology)
Course Number: TA C 211

Max Mark: 40
Date: 27.12.2010
No of pages: 4

1st Semester 2010-2011

Name :		
ID Number:		Section Number:

1. Write the function / purpose of the following: (5 X 1 = 5 Marks)
- a. Iris Diaphragm Lever

 - b. Diffraction grating

 - c. Autoclave

 - d. 10% HCl in Onion root squash Experiment

 - e. Potassium chromate

2. Name the four different objective lenses in the microscope used in our lab: (8X0.5= 4 Marks)

S.No.	Name	Magnification
1.		
2.		
3.		
4.		

3. (a) What are the precautions to be taken while handling AgNO_3 ? (6 X 2 = 12 Marks)

(b) What are the constituents of DNSA reagent?

(c) State the principle behind spectrophotometry.

(d) How do we prepare Sabouraud Dextrose broth?

(e) What is the significance of G₀ phase?

(f) Write the formula for Salinity and Chlorinity.

4. Differentiate between the following: [1 Major Point Only] (4 X 1 = 4 Marks)

1.	Magnification	Resolution
2.	Inoculation	Incineration
3.	Cytokinesis in plant cells	Cytokinesis in animal cells
4.	Supernatant	Pellet

5. Calculate the calibration constant, given that 10 divisions of retical scale coincides with 8 divisions of stage micrometer at 400times total magnification. Write down the formula also.

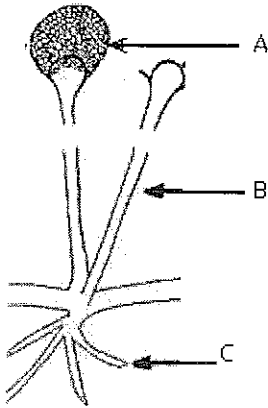
[3]

6. Write the common name, biological name and label the parts for the following figure: [5]

Common name: _____

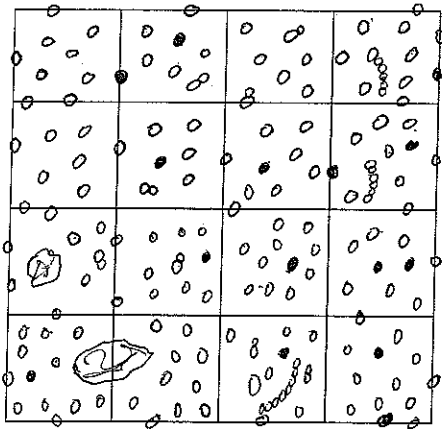
Biological name: _____

Parts: A _____, B _____, C _____

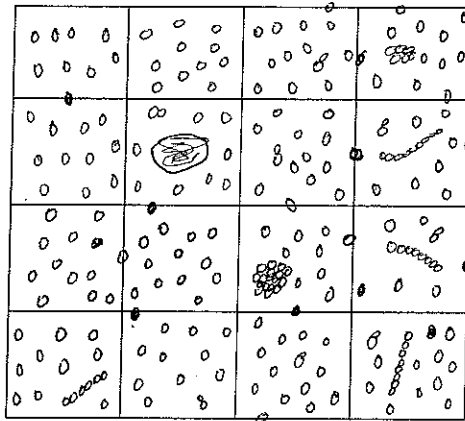


7. Calculate the viability using the information depicted below: [5]

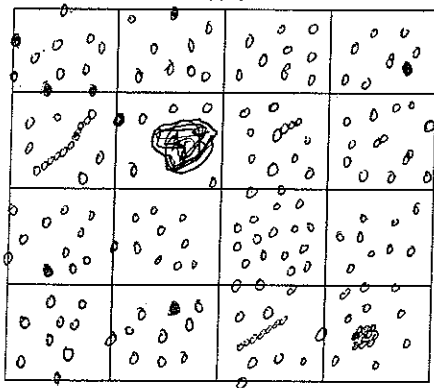
W1



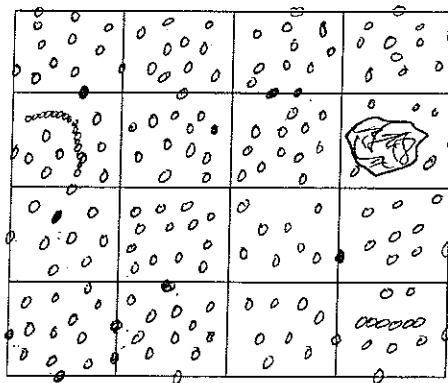
W2



W4



W3



8. Identify the stage depicted in the figure below. Justify your answer.

[2]



Given: $c = 2.998 \times 10^8 \text{ m/s}$; $\mu_0 = 4\pi \times 10^{-7} \text{ M/Amp}^2$; $\epsilon_0 = 8.85 \times 10^{-12} \text{ F/m}$;
 $h = 6.63 \times 10^{-34} \text{ J.s}$; $e = 1.602 \times 10^{-19} \text{ C}$; $m_e = 9.1 \times 10^{-31} \text{ Kg}$; $m_p = 1.67 \times 10^{-27} \text{ Kg}$

e/m ratio of the electron

1. Why electron beam bends in a circular path?
2. What is the relationship between radius of the circular path and momentum of electron beam.

Single and double slit

3. Light from a source (589nm) forms an interference pattern on a screen 0.8m from a pair of slits. The bright fringes in the pattern are 0.35cm apart. What is the slit separation?
4. What is the resultant amplitude of superposition of the two waves $y_1 = 30 \sin \omega t$ and $y_2 = 30 \cos \omega t$

Planck's Constant

5. What will happen to the photo voltage if intensity of light falling on the surface increases.
6. What will happen to the photo voltage if frequency of light falling on the surface decreases.

Induction of solenoid

7. Define Mutual inductance?
8. A solenoid 0.5m long has 2000turns/length. The magnetic induction near the center of the solenoid is 0.08T. What is the current in the solenoid..

Solar Cell

9. Define energy band gap in a semiconductor. Give the value for silicon at room temperature.
10. Give any two differences between n type and p type semiconductors.

Hall Effect

11. A long copper strip 1.8 cm wide and 1 mm thick is placed in a 1.2 T magnetic field applied perpendicular to the strip. When a steady current of 15 A passes through it, the Hall emf is measured to be $1.02 \mu\text{V}$. Determine the drift velocity of the electrons
12. Density of the free electrons in the copper in the above question

Elastic Collision

13. Define conservative force with example.
14. Define non conservative force with example.

Electron Diffraction

15. What is De' Broglie hypothesis.
16. Consider two particles of mass 10^{-31} Kg and 100 gm , both are moving with same velocity. Which one will show prominent wave property and why?

Fine Structure:

17. What is Zeeman effect.
18. A grating of length 1cm carries 10^7 lines. Calculate grating constant

Vibrations On Strings

19. Define transverse wave with example.
20. What is the use of photocell in this experiment.

Ferromagnetism

21. What is a Bohr magneton? Write the value of it.
22. Calculate the energy loss during one cycle in a transformer core, carrying AC at a frequency of 50 Hz and core volume of 0.02 m^3 . The hysteresis loop has an area of 10^4 units. The units of axis are 10^{-3} wbm^{-2} and 10^2 ATm^{-2} .

RLC Circuits

23. Give one example of resonance phenomenon .
24. Draw a circuit diagram for measuring current in a parallel LCR circuit.

MT-1 Chemistry

BITS, PILANI - DUBAI

II YEAR First Semester , 2010-2011

Written Viva Course Title: Measurement Techniques –I (Chemistry)

Max. Marks: 24

Course No: TA C211

Question paper contains 3 pages

Date:12.12.2010

Name :

Section No:

ID Number :

1. Which group in tartaric acid reduces silver ions of Tollen's reagent into metallic silver ? [2M]

2. How will you distinguish glucose and fructose in the laboratory? [2M]

3. List any four parameters on which the rate of a reaction depends . [2M]

4. Define the order of reaction .What is the order of a reaction in which an ester gets hydrolysed to give an acid and alcohol catalysed by an acid? [2M]

5. Direct current is not used for the measurement of conductance, why? [2M]

6. Why the strong electrolytes possess lower molar conductance values at higher concentrations ? [2M]
7. When is pH equal to pK_a ? Explain. [2M]
8. Plot the titration curve of a strong base Vs weak acid . [2M]
9. In titrimetric analysis, potassium permanganate solution is standardized before carrying out the titration.. Justify by giving suitable reasons. [2M]

10. What is the choice of acid in permanganometry titrations?. Justify your answer. [2M]

11. Write the chemical equation for the preparation of Acetanilide. [2M]

12. Acylation of an amine is a Lewis type acid – base reaction. Justify. [2M]

MT-1 Chemistry

BITS, PILANI - DUBAI

II YEAR First Semester ,2010-2011

Written Viva Course Title: Measurement Techniques –I (Chemistry)

Max Marks: 24

Course No: TA C211 Question paper contains 3 pages

Date:31.10.2010

Name :

Section No:

ID Number :

1. Write the functional groups present in the carbohydrates? (2M)
2. Name the test used to detect the presence of polyhydroxy group in carbohydrates? (2M)
3. Write the expression for the rate constant of a first order reaction . (2M)
4. Show the shape of the graph that you get by plotting ' $\log(a-x)$ ' against ' t ' . (2M)
5. What is the condition for the degree of dissociation of a weak electrolyte (α) to be one? (2M)

6. When water is added to dilute acetic acid, what will happen to its specific conductance and molar conductance? (2M)
7. Write the Henderson-Hasselbalch equation. (2M)
8. Draw the pH curve for the titration of a strong acid vs strong base and indicate the stoichiometric point. (2M)
9. Write the purpose of adding dilute sulphuric acid during the preparation of standard ferrous sulphate solution? (2M)
10. Write the oxidation state of Mn in the redox titration before & after the reaction that you have done in the lab. (2M)

11. Write the purpose of adding the reaction mixture to ice cold water during the preparation of acetanilide (2M)

12. Why do we add zinc dust to the reaction mixture in the preparation of acetanilide? (2M)

20/10/2010

BITS, Pilani – Dubai
Dubai International Academic City, Dubai

Course Name : Measurement Techniques – I (Biology)
Course Number: TA C 211

Max Marks: 24
Date: 31.10.2010

1st Semester 2010-2011

Name :	Section Number:
ID Number:	

(Write the answers in the question paper itself)

Note: Each question carries 1 mark, unless indicated otherwise

Q1. What is the function of the rheostat?

Q2. What is resolution?

Q3. Rhizopus is otherwise known as _____

Q4. Least count of the stage micrometer is _____

Q5. Karyokinesis is defined as _____

Q6. What is the characteristic feature of anaphase?

Q7. Scientific name for onion: _____

Q8. Write the formula for: [2]

(a) Telophase index: _____

(b) Viability: _____

Q9. Name the broth used in yeast cell counting experiment: _____

Q10. Expand the following abbreviations: [4]

- (a) ppt: _____
- (b) BSA: _____
- (c) PBS: _____
- (d) TDS: _____

Q11. What is the concept behind the yeast cell counting experiment?

Q12. Name any four parts of the UV-Vis Spectrophotometer: [2]

Q13. Write the Beer-Lambert's law.

Q14. How do we prepare DNSA reagent? [2]

Q15. What is the wavelength at which the optical density of glucose is measured?

Q16. Calculate salinity of the sample if its chlorinity is 0.301 ppt. [2]

Q17. The determination of pH is based on which law?