BITS - PILANI DUBAI CAMPUS

DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI, UAE

BE (Hons.) : Second Semester : 2011-2012

COMPREHENSIVE EXAMINATION (Closed book)

Year : **II**	Date : **04.06.2012**	
Course No. : TAC 211	Course Title : **MT-1(PHYSICS)**	
Duration : **1 hr**	Marks : **80**	Weightage : **40%**

Note: **Answer all the questions. Each question carries equal marks. Use the constants if necessary. Write the most suitable formula and the answer only. Do the rough work in the space provided and not on the answer sheet.**

Given: $c = 3.0 \times 10^{8}\ ms^{-1}$; $\mu_o = 4\pi \times 10^{-7}\ Hm^{-1}$; $\varepsilon_0 = 8.85 \times 10^{-12}\ F/m$; $h = 6.63 \times 10^{-34}\ Js$; $e = 1.602 \times 10^{-19}\ C$; $m_e = 9.1 \times 10^{-31}\ Kg$; and $m_p = 1.67 \times 10^{-27}\ Kg$.

1. A magnetron in a microwave oven emits microwaves with frequency 2450 MHz. What magnetic field strength would be required for electrons to move in circular path with this frequency?
2. For a certain cathode material used in a photoelectric effect experiment, a stopping potential of 3.0 V was required for light of wavelength 300 nm, 2.00 V for 400 nm and 1.0 V for 600 nm. Determine the work function for this material and Planck's constant as obtained from these data.
3. For the above mentioned data, find the work function of the material.
4. Laser light of wavelength 633 nm is made to incident on a narrow slit of width 0.28 mm. The diffraction pattern is observed on a screen 6.0 m away. What is the distance between the fifth minima on the two sides the central fringe.
5. Light from a sodium lamp passes through a diffraction grating having 1000 slits per millimeter. The interference pattern is viewed on a screen 1.0 m behind the grating. Two bright yellow fringes are visible 72.88 cm and 73 cm from the central maximum. What are the wavelengths of these two fringes?
6. An inductor is made by tightly wrapping 0.30 mm diameter wire around 4.00 mm diameter cylinder. What length cylinder has an inductance of 10μH?

Please turn over to see question nos.7 to 20

SPACE FOR ROUGH WORK

7. If the de Broglie wavelength of an electron is 1 A, compute its kinetic energy in eV?

8. When driven by a 120 Hz vibrator, a string has transverse waves of 31 cm wavelength travelling along it. What is the speed of the waves in the string?

9. In the above question, if the tension is 1.2 N, what is the mass of the 50 cm of the string?

10. In a parallel R-L-C circuit the applied voltage , the angular frequency are 50 V and 10000 $rads^{-1}$. A resistor 300 ohm, inductor of inductive reactance 600 ohm and a capacitor of capacitive reactance 200 ohm connected in parallel. Determine the impedance of the parallel combination.

11. In the above problem, find the amplitude of the total current.

12. For making of permanent magnets, solid iron core is preferred or laminated core is preferred? Why?

13. The gap between valence and conduction bands in Silicon is 1.12 eV. A nickel nucleus in an excited state emits a gamma ray photon of wavelength 9.31 $x10^{-4}$ nm. How many electrons can be excited from the top of the valence band to the bottom of the conduction band by the absorption of this gamma ray?

Please turn over to see question nos.14 to 20.

SPACE FOR ROUGH WORK

14. You have a 1.0 mH inductor. What capacitor should you choose to make an oscillator with a frequency of 920 kHz? Express the capacitance in pF only.

15. Light passes through a 0.12 mm wide slit and forms a diffraction pattern on a screen 1.0 m behind it. The width of the central maximum is 0.85 cm. What is the wavelength of the light used?

16. Find the magnitude of the hall voltage induced across a silver wire of square cross-section of side 1 mm when it carries a current of 1.5 A and a transverse magnetic field of strength 0.1 T is applied. The charge carrier density of silver is $5.85 \times 10^{28}\ m^{-3}$.

17. For the data given in the above question, compute the value of the hall coefficient.

18. Draw the circuit diagram for the solar cell experiment for the studying the V-I characteristics.

19. The magnetic field in a certain region of space is given by $(0.080\ \mathbf{i})$ T. A proton shot into the field with velocity $10^5(\ 2\mathbf{i} + 3\mathbf{j}\ )\ ms^{-1}$. Find the radius of the circular path and its period of revolution.

20. Ken and Kim are skating together on a rink at 3.0m/s. Ken keeps asking Kim how much she weighs. Annoyed, Kim pushes away from Ken so that she speeds up at to 4.0 m/s and he slows down to 2.25 m/s in the same direction. If Ken weighs 700 N, what does Kim weigh in kg. (Take $g = 9.8 m/s^2$)

End of the paper.

SPACE FOR ROUGH WORK

ANSWER SHEET

BITS-PILANI DUBAI: SECOND SEMESTER, 2011-12

Written Viva Test - 2

Course No: **TA C211** Course Title: **MEASUREMENT TECHNIQUES-1 (PHYSICS)**

Time: **30 minutes** Date: **20.05.2012** Max. Marks: **24**

NAME: **ID. NO:** **SEC NO:**

Note: Answer any 12 questions. Each question carries 2 marks. Write the **appropriate formula(e) and the answer(s) only** in the space provided on the top sheet (page-1) attached with the question paper. Rough work should be done in the space provided. **Write the units at the appropriate places**. The question paper and answer sheet has four pages.

Q.No.	ANSWER

Question number for recheck:

Given: $c = 3.0 \times 10^{8}\ ms^{-1}$; $\mu_o = 4\pi \times 10^{-7}\ Hm^{-1}$; $\varepsilon_o = 8.85 \times 10^{-12}\ F/m$; $h = 6.63 \times 10^{-34}\ Js$;
$e = 1.602 \times 10^{-19}\ C$; $m_e = 9.1 \times 10^{-31}\ Kg$; and $m_p = 1.67 \times 10^{-27}\ Kg$.

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1. A strip of copper 1.5 cm wide and 1.0 mm thick conducts electricity I = 60 A flows in a B= 2.5T and generates $V_H = 0.74\ \mu V$. Calculate the drift velocity and number density of electrons.
2. A charge of 2.0μC moves with a speed of 2×10^{6} m/s along the positive x – axis. A magnetic field **B** = (0.2 j +0.4 k)T exists in space. What is the magnetic force acting on the charge?
3. In a laboratory experiment, a 200g air-track glider and a 400g air-track glider are pushed toward each other from opposite ends of the track. The gliders have Velcro tabs on the fronts and will stick together when they collide. The 200g glider is pushed with an initial speed of 3 m/s. The collision causes it to reverse direction at 0.4 m/s. What was the initial speed of the 400g glider?
4. A 0.25 kg ball moving in the +x direction at 13m/s is hit by a bat. Its final velocity is 19 m/s in the –x direction. The bat acts on the ball for 0.010 s. Find the average force exerted on the ball by the bat.
5. Which statement(s) is / are **incorrect** in the case of semiconductor?
   a. Their resistivity is normally greater than that of most metals.
   b. A 'hole' in a semiconductor is due to the removal of the proton.
   c. Conduction in an n-type semiconductor is due to the transfer of neutrons.
   d. Conduction in a p-type semiconductor is due to the transfer of electrons.
   e. With increase in temperature, the resistance of the semiconductor decreases.
   f. With addition of penta-valent impurities, the semiconductor becomes negatively charged.
6. The gap between the valence and conduction bands in a semiconductor is 5.47eV. What is the maximum wavelength of the photon that can excite an electron from the top of a valence band into conduction band?
7. Define (a) Coercivity and (b) Retentivity of the material.
8. A magnet in a shape of a cylindrical rod has a length of 4.8cm and a diameter of 1.1 cm. It has uniform magnetization at right angles of 5.3 kA/m. Calculate its dipole moment.

.....SPACE FOR ROUGH WORK.....

9. Red light falls normally on a diffraction grating ruled 4000 lines per cm and the second order image is s diffracted 34^0 from the normal. Compute the wavelength of the light.
10. A laser beam of wavelength 663 nm from a typical laser designed for the student use has an intensity of 3mW power. How many photons pass a given point in the beam each second?
11. Will the photoelectrons be emitted by a copper surface, of work function 4.4 eV, when illuminated by the visible light? Explain.
12. What wavelength must electromagnetic radiation have if a photon in the beam is to have the same momentum as an electron moving with a speed $2x10^5$ ms^{-1}?
13. The interference pattern of two identical slits separated by a distance d = 0.25 mm is observed on a screen at a distance of 1 m from the plane of the slits. The slits are illuminated by mono-chromatic light of wavelength 589.3 nm traveling perpendicular to the plane of the slits. Bright bands are observed on each side of the central maximum. Calculate the separation between the adjacent brands.
14. Two waves $y_1 = 30$ sinwt (expressed in cm) and $y_2 = 30$ coswt (expressed in cm) superimpose on each other. Calculate the amplitude of the resulting wave.
15. A steady current of 2.5 A creates a flux of 140 μWb in a coil of 500 turns. What is the inductance of the coil?
16. An electromagnet has stored 648 J of magnetic energy when a current of 9 A exists in its coils. What average emf is induced if the current is reduced to zero in 0.45 s?

.....SPACE FOR ROUGH WORK.....

17. In an ac series circuit the inductive reactance is 20 Ω. The capacitive reactance is 60 Ω and the resistance is 30 Ω and the effective current is 2 A. What is the impedance of this circuit?
18. A 40 Ω resistor is connected across a 15 V variable frequency oscillator. Find the current through the resistor when the frequency is (a) 100 Hz and (b) 100 kHz.
19. A wire 0.5 m long and with a mass per unit length of 0.0001 kgm^{-1} vibrates under a tension of 4 N. Find the fundamental frequency.
20. Standing waves are produced in a rubber tube 12 m long. If the tube vibrates in five segments and the velocity of the wave is 20 ms^{-1}, find the wavelength and frequency of the wave.
21. X radiation of wavelength 1.5 Å is incident on an NaCl crystal with d-spacing 2.8 Å. What is the highest order that the crystal can diffract?
22. An electron falls through a potential difference of 100V. What is its de-Broglie wavelength?
23. Green light of wavelength 540 nm is diffracted by a grating ruled 2000 lines per cm. Find the angular deviation of the third order image.
24. A proton is injected into a uniform magnetic field of 5 mT such that its velocity vector of magnitude $3x10^7$ m/s makes an angle 60^0 to the magnetic field vector. Find the force experienced by it is and also mention the path in which the proton travels?

.....SPACE FOR ROUGH WORK.....

BITS PILANI, DUBAI CAMPUS

SECOND SEMESTER - 2011-'12

Comprehensive Examination (Closed Book)

Course No: TAC211 **Course Title: MT-I Chemistry Laboratory**

Date: 04-06-2012 Time: 30 Minutes

Weightage: 10 % (Max. Marks: 40)

Each question carries 2 Marks : Answer all questions

1. Comment the validity of the statement: "Sucrose and Glucose will answer the Fehling's test".

2. What is Molish's reagent?

3. Starch is giving blue colored complex with Iodine but sucrose is not. Why?

4. State how the progress of the ester hydrolysis reaction is followed?

5. What are the catalysts used generally in hydrolysis experiments?

6. In an ester hydrolysis experiment, which of the product is estimated?

7. Write the Ostwald's dilution law.

8. Give the reason for lower value of molar conductance at higher concentrations, in both types of electrolytic solutions.

9. What is the solvent used in the verification of Ostwald's law experiment?

10. Draw the plot of concentration Vs molar conductance for acetic acid.

11. Mention the ions formed at the stoichiometric point during the titration of acetic acid with sodium hydroxide.

12. Draw the pH curve for the titration of HCl Vs NH_4OH and indicate the stoichiometric point.

13. Name the electrodes used in the pH meter.

14. $KMnO_4$ is not a primary standard. Why?

15. Why dilute sulphuric acid is added in the make-up of ferrous sulphate solution?

16. Mention the indicator and the colour of the solution at the end point in your Redox titration.

17. Calculate the weight of ferrous sulphate required to prepare 0.5M, 500 ml aqueous solution. (Molar mass of ferrous sulphate = 278)

18. Name the acylating agents used in the preparation of acetanilide

19. Why zinc dust is added in the preparation of acetanilide?

20. Why recrystallization is carried out with the crude acetanilide?

BITS Pilani, Dubai Campus

Dubai International Academic City, Dubai

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

Max Mark: 40
Weightage: 10%
Date: 04.06.2012(FN)

2nd Semester 2011-2012

Name :	**Section Number:**
ID Number:	

Note: Write the answers in the question paper itself.
Write the formulae/ units wherever required.
Write legibly and to the point.

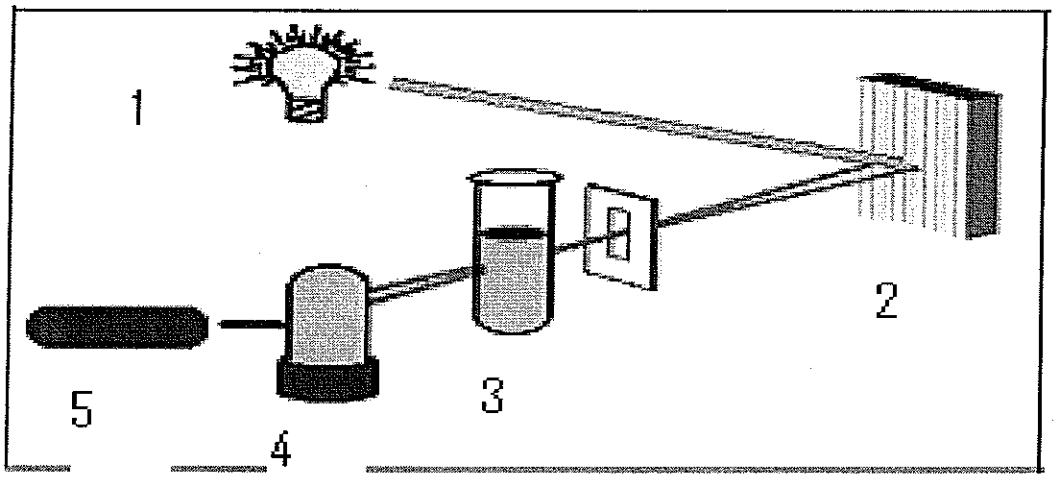
1. Calculate the Salinity (6 marks)

Sl no.	Sample taken	Volume of sample(ml)	Burette reading	
			Initial vol(ml)	Final vol(ml)
1.	Sample 1	5	11	11.6
2.		5	11.6	12.1
3.		5	12.2	12.7

2. How will you prepare the following reagents? Mention the chemicals used. (2x3=6marks)
   a. DNSA reagent –

   b. Biuret reagent –

3. Name the instrument & label the parts (1x6=6marks)



Name of the Instrument _____

1. .....

2. .....

3. .....

4. .....

5. .....

4. Expand the abbreviations given below. (1x2=2marks)

a. BSA –

b. TDS –

5. Name any four parts of Microscope and its function. (1x4=4marks)

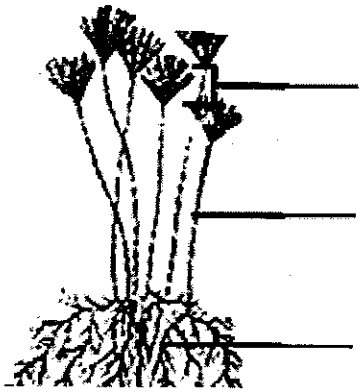
6. Calculate the calibration constant if 3 divisions of Stage micrometer coincide with 2 divisions of ocular micrometer at 100times magnification. (1x4=4marks)

7. Calculate the Telophase Index and Duration of Mitosis (1x4=4marks)

Phase	Prophase	Metaphase	Anaphase	Telophase	Interphase
No. of cells	4	3	5	3	205

8. Identify and label the parts of the specimen and mention its industrial importance.

(1x4=4marks)



Industrial importance of _____ is _____

9. Calculate the viability of Yeast cells (1x4=4marks)

	W1	W2	W3	W4
No. of dead cells	11	11	8	10
No. of live cells	65	61	53	51