

NAME:

ID.NO.

SEC NO

BITS PILANI DUBAI
II Semester 2006 - 2007
COMPREHENSIVE EXAMINATION

COURSE NO.: TAUC211;
TIME: 2 hrs;

COURSE TITLE: Measurement Techniques-I, Physics
WEIGHTAGE: 40%

Date: 21ST May 2007

ANSWER SHEET (MT-1 , PHYSICS , TAUC211)

Q1.	a	b	c	d
Q2.	a	b	c	d
Q3.	a	b	c	d
Q4.	a	b	c	d
Q5.	a	b	c	d
Q6.	a	b	c	d
Q7.	a	b	c	d
Q8.	a	b	c	d
Q9.	a	b	c	d
Q10.	a	b	c	d
Q11.	a	b	c	d
Q12.	a	b	c	d
Q13.	a	b	c	d
Q14.	a	b	c	d
Q15.	a	b	c	d
Q16.	a	b	c	d
Q17.	a	b	c	d
Q18.	a	b	c	d
Q19.	a	b	c	d
Q20.	a	b	c	d

RECHECK REQUEST:

PHYSICS

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

$$c = 2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1}; \quad \mu_0 = 4\pi \times 10^{-7} \text{ N A}^{-2}; \quad \epsilon_0 = 8.85 \times 10^{-12} \text{ F}\cdot\text{m}^{-1};$$

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

e/m ratio

- If a charged particle q enters with velocity v in a magnetic field B at an angle θ with B , the force experienced by the particle is
 a) Zero b) qvB c) $qvB\sin\theta$ d) $qvB\cos\theta$
- A 1.22 Kev electron is circulating in a plane at right angle to a uniform magnetic field B . The orbit radius is 24.7cm. The magnitude of B is
 a) 0.5T b) 2.5T c) $4.78 \times 10^{-4} \text{ T}$ d) $10.07 \times 10^{-6} \text{ T}$

Electron Diffraction

- In this experiment we adjust the voltage of the electron beam to get circular rings. By doing this we adjust
 a. the applied magnetic field on the electron beam
 b. the electric field applied to the electron beam
 c. the intensity of the electron beam
 d. the wavelength of the electron beam
- An electron beam of wavelength 0.122nm is required for studying a graphite crystal. What should be the potential applied to an electron beam for this study
 a) 101.26V b) 244 V c) 0.51 V d) 500V.

Fine Structure

- A diffraction grating is having 6000 grooves per centimeter. The grating constant will be
 a) $1.2 \times 10^3 \text{ m}$ b) $1.2 \times 10^{-3} \text{ m}$ c) $1.667 \times 10^{-6} \text{ m}$ d) $1.667 \times 10^{-12} \text{ m}$
- A monochromatic light of wavelength 632.8nm is incident normally on a diffraction grating given in the above question.. Find the angle at which the second order maxima are observed
 a) 22.3° b) 49.4° c) 89° d) 126°

Planck's Constant

- Monochromatic light with a frequency well above the cutoff frequency is incident on the emitter in a photoelectric effect apparatus. The intensity of the light is then doubled while the frequency is kept constant
 a) the work function decreases
 b) the photocurrent increases
 c) the stopping potential increases
 d) kinetic energy of the emitted electron becomes doubled

8. Find the maximum kinetic energy in eV of photocurrent if the work function of the material is 2.45eV and frequency of the radiation is 3.2×10^{15} Hz
- a) 10.75eV b) 13.2eV c) 1.32eV d) 107.5eV

Single and Double Slit

9. A parallel beam of light of wavelength 5000 \AA is incident normally on a single slit of width 0.001mm. The light is focused by a convex lens on a screen placed in focal plane. The first minimum is formed for the angle of diffraction equal to
- a) 0° b) 15° c) 30° d) 60°
10. Which of the following does not support the wave nature of light
- a) Interference b) Diffraction c) Polarization d) Photoelectric effect

Induction of solenoids

11. A solenoid of length 50 cm having 100 turns carries a current of 2.5A. The magnetic field in the interior of the solenoid is

a) 3.14×10^{-4} T b) 6.28×10^{-4} T c) 19.2×10^{-4} T d) 126.8×10^{-4} T

12. Energy in a current carrying coil is stored in form of
- (a) Electric field (b) magnetic field (c) dielectric strength (d) heat

RLC Circuit

13. In a parallel tuned circuit of LCR, if V is the voltage across resistor and I is the current flowing through resistor, then
- (a) V and I is minimum at resonance
 (b) V is maximum and I is minimum at resonance
 (c) V is minimum and I is maximum at resonance
 (d) V and I both are maximum at resonance
14. A circuit has $L=12\text{mH}$, $C=1.6\mu\text{F}$ and $R=1.5\Omega$. What is the frequency at which this circuit would resonate to an external frequency
- a) 1.2KHz b) 2.4KHz c) 3.6KHz d) 7.2KHz

Hall effect

15. If current flowing in a rectangular strip(magnetic field is constant) decreases then
- (a) Hall voltage decreases linearly (b) Hall voltage increases linearly
 (c) Hall voltage increases exponentially (d) Hall voltage decreases exponentially
16. In the above set up if we increase the magnetic field(keeping current constant) which one of the following is true
- a) resistance increases exponentially b) Hall Voltage increases exponentially
 c) resistance increases linearly d) resistance decreases linearly

Elastic Collision

17. Which one of the following is true in case of collision
- a) Momentum and kinetic energy both are conserved in inelastic collision
 - b) only kinetic energy is conserved in inelastic collision
 - c) only kinetic energy is conserved in elastic collision
 - d) Momentum and kinetic energy both are conserved in elastic collision

Solar Cell

18. Which one of the following is true about solar cell
- a) It is a p-n junction device
 - b) It is a p type device
 - c) It is a n type device
 - d) It is a pure semiconductor

Ferromagnetic Hysteresis

- Q19. Which one of the following is true in case of magnetism
- (a) Paramagnetic and ferromagnetic both have positive magnetic susceptibility
 - (b) Paramagnetic and ferromagnetic both have negative magnetic susceptibility
 - (c) Paramagnetic has positive and ferromagnetic has negative magnetic susceptibility
 - (d) Paramagnetic has negative and ferromagnetic has positive magnetic susceptibility

Vibration of string

20. Which one of the following relation is true. Given that f = frequency, L = length of the wire, q = area of cross section, ρ = density of wire, F = tension in the wire

a) $f = \frac{1}{2L} \sqrt{\frac{q}{F\rho}}$

b) $f = \frac{1}{2L} \sqrt{\frac{\rho}{Fq}}$

c) $f = \frac{1}{2L} \sqrt{\frac{F}{q\rho}}$

d) $f = \frac{1}{2q} \sqrt{\frac{L}{F\rho}}$

BITS,PILANI- DUBAI CAMPUS

Knowledge Village, Dubai

Year II – Semester II 2006– 2007

TEST II (Closed Book)

Course No: TA UC 222

Course Title: MEASUREMENT TECHNIQUES II

Date: 14.05.07 50 Minutes M.M = 20(10%)

ANSWER ALL THE QUESTIONS

1. A large building mass behaves like a first order system when responding to a harmonic thermal input. If the harmonic input follows the pattern of daily heating and cooling (i.e.) one cycle occurs over a 24-hour period and the time delay is 3 hours, estimate the time constant. Also find how much the amplitude response decreases at this frequency.

[5M]

2. The measurement of power is to be conducted by measuring voltage across and current through the source with the circuit shown below. Calculate the nominal value of power delivered by the source and percentage of uncertainty for the following conditions:

$$I = 10A \pm 2\%$$

$$R_1 = 500\Omega \pm 5\%$$

$$R_2 = 1000\Omega \pm 5\%$$

[5M]

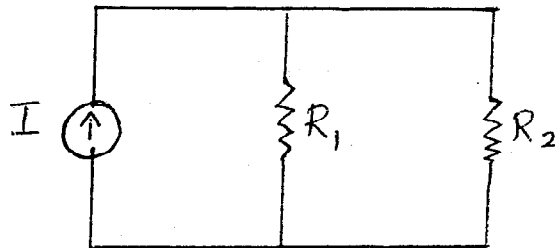


Fig (1)

3. a Explain the principle of capacitive transducers. Explain the use of it for liquid level measurement? [3M]

b. What is piezoelectric effect? [2M]

4. a. What are the advantages in using optical system for galvanometer? [2M]

b. Explain the three stages in the generalized measurement system? [1.5M]

c. Explain the working principle of thermocouple meter. [1.5M]

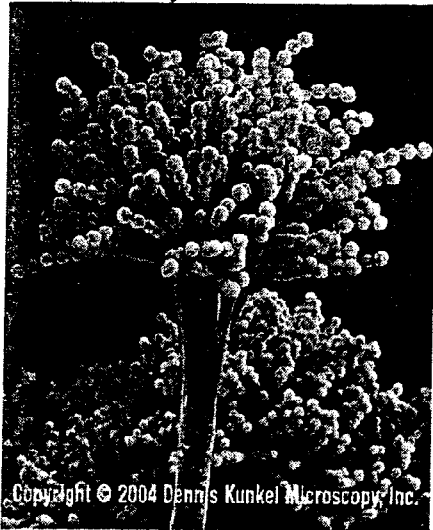
ALL THE BEST

9. Mention the component of light-microscope which helping the angle and size of the focused cone of light. (1)
10. Name the various types of Hemoglobin. (1)
11. Name the Granulated Leukocytes which is responsible for allergic reaction. (1)
12. Name the protein which you have used in Biuret's method to obtain your standard curve. (1)
13. **Define:** a) Resolving power b) Beer Lambert's Law (4)
14. What is difference between Haemocytometry & Haemometry? (2.5)
15. A technician in a clinical lab diluted a blood sample to 20times and counted 225 cells in four squares along with formula? (3)

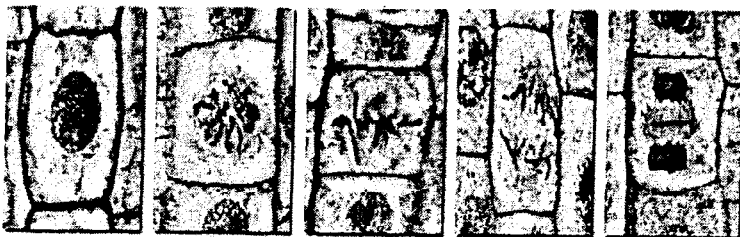
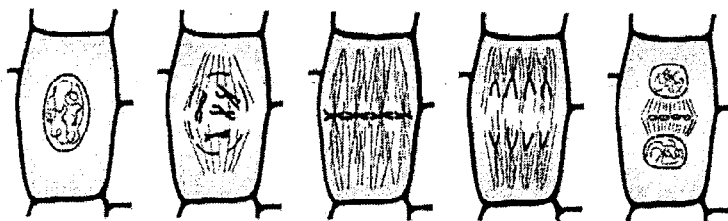
16. What are the materials required for RBC & WBC counts (instruments and also chemicals name)? (3.5)

17. Why spectrophotometer is used for Protein Estimation? (3)

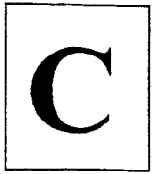
18. a) Identify and label the micro organisms. (2.5)



b) Identify Anaphase and Metaphase from the following stages and justify it with their characteristic features. (3)



BITS, Pilani-Dubai Campus
Knowledge Village



II Year - II Semester 2006 - 2007

MT-1 (Chemistry) Comprehensive Examination

COURSE NO.: TAUC211; COURSE TITLE: Measurement Techniques-I;
TIME: 30 min WEIGHTAGE: 40% Date: 21.5. 2007

I.D. No. _____

NAME: _____

Sec No: _____

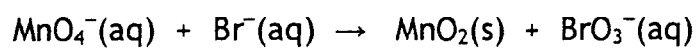
RECHECK REQUEST:

MT-1 (CHEMISTRY)

1. Starch is (1M)
(a) a trisaccharide
(b) is also called amylase
(c) is also called amylopectin
(d) is a mixture of amylase + amylopectin
2. Sucrose will not give a red precipitate of _____ when heated with Fehling's solution. (2M)
3. What happens when tartaric acid is warmed with Tollen's reagent. Give the chemical equation. (2M)
4. All organic acids give brisk effervescence when treated with sodium bicarbonate solution. This is due to the formation of _____. (2M)
5. Why does KMnO_4 act as self indicator? (2M)

6. In KMnO_4 titrations, KMnO_4 should be added in small lots, why? (2M)

7. Balance the following redox equation in acidic medium. (show the steps) (2M)



8. What is permanganometry? (1M)

9. The pH at the stoichiometric point of the hypochlorous acid versus sodium hydroxide titration is on the basic side of neutrality due to the presence of _____ ions. (2M)

10. Mention the types of potentiometric titrations. (2M)

11. Write the Henderson Hasselbalch equation. (1M)

12. Plot the pH curve for the titration of a weak base with a strong acid. Show the approximate pH values and mark the stoichiometric point. (2M)

13. For a reaction $A + H_2O \rightarrow B$, the rate of law is rate $\propto [A]$ (2M)
(i) What is its molecularity?
(ii) What is the order of reaction?

14. For a first order reaction, rate constant $k =$ _____ (2M)

15. Give the order of the reaction $A \rightarrow C$ whose rate quadruples when the concentration of A is doubled. (2M)

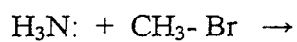
16. The unit of molar conductivity is _____ (2M)

17. Write the expression / equation representing Ostwald's dilution law. (2M)

18. The resistivity of a 0.8M solution of electrolyte is $5 \times 10^{-3} \Omega \text{ cm}$. Calculate its molar conductivity. (2M)

19. Define Specific conductance (κ). (1M)

20. Give the product in the following reaction (2M)



21. _____ and _____ are the common acyl groups. (2M)

22. Mention the functions of zinc in the preparation of acetanilide. (2M)

Name: _____ ID NO: _____ Section: _____

VERSION

B

BITS, PILANI – DUBAI, KNOWLEDGE VILLAGE, DUBAI
SECOND SEMESTER 2006 – 2007
TA UC 222 MEASUREMENT TECHNIQUES – II
LAB QUIZ (CLOSED BOOK)

MAXIMUM MARKS: 40

DATE: 03.05.06

WEIGHTAGE: 20%

DURATION: 50 MIN

All questions carry one mark each.

Please fill up the parenthesis with the most appropriate answer

1. In a laboratory experiments, it is required to measure the point velocities of fluid flowing through a circular conduit. Which of the following is more suitable? []
 - a) Pitot tube
 - b) Orifice meter
 - c) Rotameter
 - d) All of the above

2. Coefficient of discharge is applicable for []
 - a) Flow measuring devices such rotameter
 - b) Flow measuring devices such orifice meters
 - c) Flow measuring devices such pitot tubes
 - d) None of the above

3. In your liquid rotameter calibration experiment, the standard used for calibration []
 - a) Reading on the second rotameter fitted on the test rig
 - b) Discharge collected over a time period
 - c) Standards given by the manufacturer of the rotameter.
 - d) None of the above

4. Related to transient heat conduction experiment, Fourier number represents []
 - a) Non dimensional velocity
 - b) Non dimensional time
 - c) Non dimensional temperature
 - d) None of the above

5. Fluid flow through a tube is to be checked for its laminarity/Turbulancy. The critical Reynolds number is close to []
 - a) Five lakhs
 - b) Two lakhs
 - c) Two thousand
 - d) Two hundred

6. In a correctly mounted pitot tube, the fluid velocity at the tip of a pitot tube []
 - a) Is Highest
 - b) Is zero
 - c) Can be highest or lowest
 - d) Can not be predicted

7. In your Bernoulli's theorem experiment, the Piezometric head is equal to []
- a) Datum head
 - b) Velocity head - Datum head
 - c) Velocity head + Datum head
 - d) None of the above
8. Tacheometric constants are []
- a) universal constants
 - b) constants, specific to particular tilting level
 - c) applicable for digital planimeters
 - d) applicable for digital theodolites
9. In your orifice meter, in the relation for discharge, the pressure head is to be expressed in terms of []
- a) Metres of mercury
 - b) Meters of manometric fluid
 - c) Metres of flowing fluid
 - d) Meters of alcohol
10. If the Reynolds number for a particular internal flow is 5000, and diameter is 50mm; kinematic viscosity is $1 \times 10^{-6} \text{ m}^2/\text{s}$, velocity of the flow, in m/s, is []
- a) 0.5
 - b) 1
 - c) 0.1
 - d) None of the above
11. The tube of a rotameter []
- a) tapers in the upward direction
 - b) tapers in the downward direction
 - c) tapers in the horizontal direction
 - d) is of the uniform cross section
12. The fluid density does affect the working of []
- a) orifice meter
 - b) rotameter
 - c) pitot tube
 - d) all of the above
13. The test section of the pitot tube experiment is connected with _____ []
- a) suction of blower
 - b) delivery of blower
 - c) manometer
 - d) None of the above

14. (i) The advantage of well type manometer is that a single scale reading is sufficient for the pressure difference, since the level variation in the well is negligible for practical purposes. (ii) The accuracy of reading the scale in the well type manometer can be further increased providing an inclined tube with the well. []
- (i) is true, (ii) is false
 - (i) is false, (ii) is true
 - both (i) and (ii) are false
 - both (i) and (ii) are true
15. Convective heat transfer in the transient heat conduction experiment can be increased by []
- density difference brought about by temperature gradients
 - molecular energy interaction
 - flow of electrons in a random fashion
 - intense stirring by an external agency
16. (i) Small Biot number implies convective heat exchange controls the transient phenomenon (ii) Small Biot number implies relatively small temperature gradient or the existence of a practically uniform temperature within the system []
- both (i) and (ii) are true
 - both (i) and (ii) are false
 - (i) is true and (ii) are false
 - (i) is false and (ii) are true
17. Reynolds experiment is conducted at []
- constant head
 - linearly varying head
 - exponentially varying head
 - None of the above
18. One atmospheric pressure is equivalent to _____ mm of water column []
- 10.336
 - 103.36
 - 1033.6
 - 10336
19. In your orifice meter experiment, the flows are _____ []
- laminar
 - turbulent
 - transitional
 - None of the above
20. Bernoulli's theorem is applicable for _____ flows []
- compressible, rotational
 - incompressible, rotational
 - incompressible, irrotational
 - compressible, irrotational

21. LVDT stands for []
- a) Linear Voltage Distance Transducer
 - b) Linear Voltage Displacement Transducer
 - c) Linear Variable Differential Transducer
 - d) Linear Variable Displacement Transducer
22. An ideal op amp has []
- a) Low input resistance, low output resistance.
 - b) Low input resistance, infinite output resistance
 - c) Infinite input resistance, low output resistance
 - d) Infinite input resistance , Infinite output resistance
23. Feedback is introduced in an op amp circuit to..... []
- a) Increase gain
 - b) Improve response characteristics
 - c) Decrease output resistance
 - d) Decrease input resistance.
24. An ideal diode is []
- a) P-N junction
 - b) Can't conduct when reverse biased
 - c) Can breakdown when reverse biased excessively
 - d) All of the above
25. Modes of operation of a transistor are []
- a) Active mode
 - b) Active mode, Saturation mode
 - c) Active mode, cut off mode
 - d) Active mode, cut off mode, Saturation mode.
26. For a BJT transistor, the width ofis maximum, whileis minimum. []
- a) Emitter, Base
 - b) Collector, Emitter
 - c) Base, collector
 - d) Emitter, collector
27. Filters are used after a bridge rectifier to []
- a) Increase value of DC magnitude
 - b) Increase AC content in the signal
 - c) Suppress ripples
 - d) Invert output signal

28. NAND, NOR, XOR gates are recognized as []
a) IC :7400, IC:7408, IC:7432
b) IC :7402, IC:7400, IC:7408
c) IC :7432, IC:7402, IC:7400
d) IC :7400, IC:7402, IC:7486
29. In Non inverting amplifier, gain required is 10 and input resistance is 100Ω . The feedback resistance is []
a) 1100Ω
b) 90Ω
c) 900Ω
d) 1000Ω
30. The CRO is used to measure []
a) Voltage, frequency, phase shift
b) Voltage, time period
c) Voltage, Phase shift
d) Frequency, voltage
31. While starting d.c motor []
a) Field rheostat should be at minimum and armature should be at minimum
b) Field rheostat should be at maximum and armature should be at minimum
c) Field rheostat should be at maximum and armature should be at maximum
d) Field rheostat should be at minimum and armature should be at maximum
32. AC Meters will read []
a) Peak to Peak value
b) RMS value
c) Average Value
d) Mean Value
33. To increase the value of the capacitance, the distance between the plates must be []
a) reduced
b) has no effect on the value of capacitance
c) can be increased
d) none of the above
34. What is the gain of the non inverting amplifier if $R_f = 10K$ and $R_{in} = 1K$ []
a) -10
b) 10
c) 11
d) -11

35. The universal gates are ----- and -----
36. If the frequency of the signal is 10KHz , the time period of the signal is-----
37. In the 3 phase circuit , the currents and voltages differ from each other by an angle of --- degrees
- a) 160
 - b) 180
 - c) 360
 - d) 120
38. The theoretical value of turns ratio and current ratio of transformer is
- a) 5 and 0.2
 - b) 2 and 0.5
 - c) 0.2 and 5
 - d) 0.5 and 2
39. In an electrical circuit ammeters should be connected in and voltmeters to be connected in
- a) Parallel, Series
 - b) Series, Series
 - c) Series, Parallel
 - d) Parallel, Parallel
40. Write different type of losses in single phase transformer -----, -----
-----, ----- and -----