UNIVERSAL ACADEMY

*Icon of Success and Excellence*

# MOCK CET - 2015

| DATE | SUBJECT | TIME |
|---|---|---|
| 01.05.2015 | PHYSICS | 2.30 PM TO 3.40 PM |

| MAXIMUM MARKS | TOTAL DURATION | MAXIMUM TIME FOR ANSWERING |
|---|---|---|
| 60 | 80 MINUTES | 70 MINUTES |

| MENTION YOUR CET NUMBER | | | | | QUESTION BOOKLET DETAILS | |
|---|---|---|---|---|---|---|
| | | | | | VERSION CODE | SERIAL NUMBER |
| | | | | | C–3 | |

**DOs:**

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the Invigilator after **1st Bell** i.e, after **2.30 p.m**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should be shaded completely.
5. Compulsory sign at the bottom portion of the OMR answer sheet in the space provided.

**DONTs:**

1. **The timing and marks printed on the OMR answer sheet should not be damaged/mutilated/ spoiled.**
2. The **2nd Bell** rings at **2.35 p.m.** till then,
   - Do not remove the seal/staple present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

## IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distraction (four different options / choices).
2. After the **2nd Bell** is rung at **2.35 p.m**. Remove the seal/staple present on the right hand side of this question booklet and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options /choices) given under each question/statement.
   - Completely **darken / shade** the relevant circle with a **BLUE OR BLACK INK BALLPOINT PEN against the question number on the answer sheet.**

**CORRECT METHOD OF SHADING THE CIRCLE ON THE ANSWER SHEET IS AS SHOWN BELOW:**


4. Please note that even a minute unintended ink dot on the answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR sheet.
5. Use the space provided on each page of the question booklet for Rough work. Do not use the OMR answer sheet for the same.
6. After the **last bell** is rung at **3.45 pm** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the OMR answer sheet to the room invigilator as it is.
8. After separating and retaining the top sheet, (UA copy ) the invigilator will return the bottom sheet replica (candidate's copy) to you to carry home for self – evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE week. For results, log on to the website www.uaes.in 5 days after the examination.

# PHYSICS CET - 3

1. A particle moves along a straight line such that its displacement at any time t is given by,
   $x = t^3 - 6t^2 + 3t + 4$ meters
   The velocity when the acceleration is zero, is
   a) 3 $ms^{-1}$ b) –12 $ms^{-1}$ c) 42 $ms^{-1}$ d) –9 $ms^{-1}$
2. A car moving with a speed of 40$kmhr^{-1}$ can be stopped by applying brakes in 2 meters. If the same car is moving with a speed of 80$kmhr^{-1}$, what is the minimum stopping distance?
   a) 8 m b) 6 m c) 4 m d) 2 m
3. Two coordinates of moving particle at any time t are given by $x = at^2$ and $y = bt^2$. The velocity magnitude of the particle
   a) $2t(a+b)$ b) $2t\sqrt{a^2-b^2}$ c) $2t\sqrt{a^2+b^2}$ d) $\sqrt{a^2+b^2}$
4. The kinetic energy acquired by a mass m in travelling distance d, starting from rest, under the action of a constant force is directly proportional to
   a) $\sqrt{m}$ b) $\frac{1}{\sqrt{m}}$ c) m d) $m^{O}$
5. A ball is dropped from a spacecraft revolving around the earth at a height of 120km. What will happen to the ball?
   a) it will continue to move with velocity v along the original orbit of spacecraft
   b) it will move with the same speed tangentially to the spacecraft
   c) it will fall down to the earth gradually
   d) it will go very far in space
6. A moving body of mass m and velocity 3$kmhr^{-1}$ collides with a rest body of mass 2 m and sticks to it. Now the combined mass starts to move. What will be the combined velocity?
   a) 1 $kmhr^{-1}$ b) 2 $kmhr^{-1}$ c) 3 $kmhr^{-1}$ d) 4 $kmhr^{-1}$
7. The kinetic energy acquired by a mass m in travelling a certain distance d, starting from rest under the action of a constant force, is directly proportional to
   a) $\sqrt{m}$ b) independent of m c) $\frac{1}{\sqrt{m}}$ d) m
8. A body, constrained to move in y-direction is subjected to a force given by $\vec{F} = (-2\hat{i} + 15\hat{j} + 6\hat{k})$ N. The work done by this force in moving the body through a distance of $10\hat{j}$ m along y-axis is
   a) 190 J b) 160 J c) 150 J c) 20 J
9. A ball of mass 0.25kg attached to the end of the string of length 1.96m is moving in a horizontal circle. The string will break, if the tension is more than 25N. What is the minimum speed with which the ball can be moved?
   a) 3$ms^{-1}$ b) 5$ms^{-1}$ c) 9.8$ms^{-1}$ d) 14$ms^{-1}$
10. Find the torque of a force $\vec{F} = -3\hat{i} + \hat{j} + 5\hat{k}$ acting at the point $\vec{r} = 7\hat{i} + 3\hat{j} + \hat{k}$
    a) $14\hat{i} - 38\hat{j} + 16\hat{k}$ b) $4\hat{i} + 4\hat{j} + 6\hat{k}$ c) $-21\hat{i} + 4\hat{j} + 4\hat{k}$ d) $-14\hat{i} + 34\hat{j} - 16\hat{k}$
11. For a planet having mass equal to the mass of the earth but radius is one fourth of radius of the earth, then escape velocity for this planet will be
    a) 11.2$kms^{-1}$ b) 22.4$kms^{-1}$ c) 3.6$kms^{-1}$ d) 44.8$kms^{-1}$
12. It is easier to swim in sea water than in ordinary water because
    a) atmospheric pressure is highest at the sea level
    b) sea water contains salt
    c) density of sea water is higher than that of ordinary water
    d) density of sea water is less than that of ordinary water
13. Time period of simple pendulum in a satellite is
    a) infinite b) zero c) 2 second d) cannot be calculated
14. When the temperature increases the viscosity of
    a) gases decreases and liquids increases b) gases increases and liquids decreases
    c) both for gases and liquids decreases d) both for gases and liquids increase
15. A body executing S.H.M. has a velocity 3$ms^{-1}$ when at a distance 4 m from the mean position and 4 $m/s^{-1}$ when at a distance 3 m from the mean position. What is its amplitude of vibration?
    a) 3 m b) 4 m c) 5 m d) 6 m
16. Two simple pendulum having lengths 0.5m and 20m are displaced linearly a little at the same time. They will be in same phase when shorter length pendulum completes oscillations

a) 5 b) 1 c) 2 d) 3

17. Two sound waves having a phase difference of $60^O$ have path difference of

a) $2\lambda$ b) $\frac{\lambda}{2}$ c) $\frac{\lambda}{6}$ d) $\frac{\lambda}{3}$

18. A vehicle, with a horn of frequency n is moving with a velocity of $30ms^{-1}$ in a direction perpendicular to the straight line joining the observer and the vehicle. The observer perceives the sound to have a frequency n + $n_1$. Then $n_1$ is equal to

a) $n_1 = 10n$ b) $n_1 = 0$ c) $n_1 = 0.1n$ d) $n_1 = –0.1n$

19. A strip consisting of two different metals riveted together is heated, it will

a) bend towards the metal with higher coefficient of thermal expansion
b) bend towards the metal with lower coefficient of thermal expansion
c) not bend at all
d) twist itself into a helix

20. An ideal Carnot engine, whose efficiency is 40%, receives heat at 500K. If its efficiency is 50%, then the intake temperature for the same exhaust temperature is

a) 600K b) 700K c) 800K d) 900K

21. A gas in an air tight container is heated from $25^OC$ to $90^OC$. The density of the gas will

a) increase slightly b) increase considerably
c) remain the same d) decrease slightly

22. A body cools from $50.0^OC$ to $49.9^OC$. How long will it take to cool from $40.0^OC$ to $39.9^OC$? Assume the temperature of surrounding to be $30.0^OC$ and Newton Law of cooling to be valid.

a) 2.5s b) 10s c) 20s d) 5s

23. A black body has maximum wave length $\lambda_m$ at 2000K. It corresponding wavelength at 3000K will be

a) $\frac{3}{2}\lambda_m$ b) $\frac{2}{3}\lambda_m$ c) $\frac{16}{81}\lambda_m$ d) $\frac{81}{16}\lambda_m$

24. Three charges each equal to + 2C are placed at the three corners of an equilateral triangle. If the force between any two charges is F, then net force on either charge is

a) 3F b) 2F c) $\sqrt{2F}$ d) $\sqrt{3F}$

25. The electric potential V as a function of distance x (meter is given by V = $(5x^2 + 10x – 9)$ volt. The value of electric field at a point x = 1 m is

a) 20 $Vm^{-1}$ b) 6 $Vm^{-1}$ c) 11 $Vm^{-1}$ d) – 23 $Vm^{-1}$

26. Electric charges q, q, –2q are placed at the corners of an equilateral triangle ABC of side $l$. The magnitude of electric dipole moment of the system is

a) $ql$ b) $2ql$ c) $\sqrt{3}ql$ d) $4ql$

27. The masses of three wires of copper are in the ratio of 1: 3: 5 and their lengths are in the ratio 5 : 3 : 1. The ratio of their electrical resistance is

a) 1 : 3 : 5 b) 5 : 3 : 1 c) 1 : 15 : 125 d) 125 : 15 : 1

28. A conductor contains $8x10^{+22}$ free electrons per cubic meter. The conductor carries a current of 1A and has a length of 10cm. The area of cross-section of the conductor is $7.81x10^{-6}m^2$. The time taken by an electron to move from one end of the conductor to the other end is

a) $10^{-2}$s b) $10^{-4}$s c) $10^5$s d) $10^6$s

29. In an experiment with potentiometer, when the galvanometer deflection is zero, no current flows in

a) the wire of potentiometer b) the primary circuit
c) the galvanometer circuit d) accumulate or cell

30. A potential difference is applied across the ends of a metallic wire. If the potential difference is doubled, the drift velocity

a) will be doubled b) will be halved
c) will be quadrupled d) will remain unchanged

31. A current of 2A is flowing through a wire of 50cm. If the wire is placed at an angle of $60^0$ with respect to the direction of uniform field of $5x10^{-4}$ N/A-m, the force acting on the wire is

a) $4.33x10^{-4}$N b) 4.33N c) $4.33x10^{-3}$N d) $4.33x10^{-2}$N

32. A proton and $\alpha$-particle enter a uniform field with same velocity. The period of rotation of $\alpha$-particle is

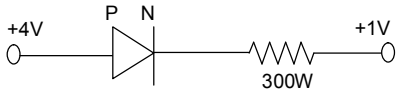
a) four times that of the proton b) two times that of the proton
c) same as that of proton d) three times that of proton

33. The magnetism of the magnet is due to

a) the spin motion of electron b) cosmic rays

b) presence of big magnet inside the earth d) earth

34. An alternating voltage (in volt) = $200\sqrt{2}\sin 100t$ is connected to one microfarad capacitor through an a.c ammeter. The reading of the ammeter shall be
    a) 10mA b) 20mA c) 40mA d) 80mA
35. In an A.C circuit, capacitance of 5μF has a reactance of $\frac{1}{1000}\Omega$. The frequency of A.C in MHz will be
    a) $\frac{1000}{\pi}$ b) $\frac{100}{\pi}$ c) 200 d) 5000
36. A capacitor of capacity C is connected in A.C circuit. If the applied emf is $V = V_0\sin\omega t$, then the current is
    a) $I = \frac{V_0}{L\omega}sin\omega t$ b) $I = \frac{V_0}{\omega C}\sin\left(\omega t + \frac{\pi}{2}\right)$ c) $I = V_0 C\omega sin\omega t$ d) $I = V_0 C\omega\sin(\omega t + \frac{\pi}{2})$
37. An inductance of 1.4H and a resistance of 440Ω are connected in series with an A.C supply of 220V,50Hz. The time lag between current and emf applied is
    a) 1s b) $2.5\times10^{-3}$s c) $2.5\times10^{3}$s d) $10^{-3}$s
38. A current of 10A is flowing in a wire of length 1.5m. A force of 15N acts on it when it is placed in a uniform magnetic field of 2T. The angle between the magnetic field and the direction of the current is
    a) $30^0$ b) $45^0$ c) $60^0$ d) $90^0$
39. Two parallel slits 0.6mm apart are illuminated by light source of wavelength 6000Å. The distance between two consecutive dark fringes on a screen 1m away from the slits is
    a) 1mm b) 0.01mm c) 0.1m d) 10m
40. Two coherent sources have intensity in the ratio of 100:1. Ratio of $I_{max} : I_{min}$ is
    a) $1:100$ b) 1:10 c) 10:1 d) 3:2
41. In the Young's double slit experiment with sodium light, the slits are 0.589m apart. The angular separation of the third maximum from the central maximum will be (given $\lambda$ = 589nm)
    a) $\sin^{-1}(0.33\times10^{8})$ b) $\sin^{-1}(0.33\times10^{6})$ c) $\sin^{-1}(3\times10^{-8})$ d) $\sin^{-1}(3\times10^{-6})$
42. In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then in the interference pattern
    a) intensities of both the maxima and the minima increase
    b) intensity of maxima increases and the minima has zero intensity
    c) intensity of maxima decreases and that of the minima increases
    d) intensity of maxima decreases and the minima has zero intensity
43. Which experiment explains the wave nature of electron?
    a) Michelson experiment b) Davisson Germer experiment
    c) Roentgen experiment d) Rutherford experiment
44. Mark the correct statement:
    In photo electric effect
    a) electrons are emitted from metal surface when light falls on it
    b) the kinetic energy of photo electrons is more for light of longer wavelength in comparison to that due to shorter wavelength
    c) both (a) and (b)
    d) none of these
45. A potential barrier of 0.5V exists across a pn-junction. If the depletion region is 0.5μm, then the intensity of electric field is
    a) $4\times10^{6}ms^{-1}$ b) $3\times10^{6}ms^{-1}$ c) $1\times10^{6}ms^{-1}$ d) $2\times10^{6}ms^{-1}$
46. Radio waves of constant amplitude can be generated with the help of
    a) a half wave rectifier circuit b) a full wave rectifier circuit
    c) an amplifier circuit d) an oscillator circuit
47. In the circuit given below, the value of the current is



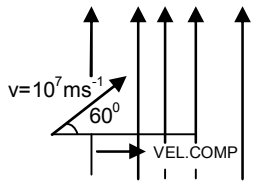

    a) 0A b) $10^{-2}$A c) $10^{2}$A d) $10^{-3}$A
48. Consider the following communication systems
    A. telephony

B. radio communication
C. microwave communication
D. optical communication

The correct sequence of these systems from the point of view of increasing order of base band channels each one of them can accommodate is

a) B,D,C,A b) C,D,A,B c) A,B,C,D d) D,B,A,C

49. Modulation is used to
    a) reduce the band width used
    b) separate the transmissions of different users
    c) ensure that intelligence may be transmitted to long distances
    d) allow the use of practical antennas
50. In kinetic theory of gases, which of the following statements regarding elastic collisions of the molecules is wrong?
    a) kinetic energy is lost in collisions
    b) kinetic energy remains constant in collision
    c) momentum is conserved in collision
    d) pressure of the gas remains constant in collisions
51. ${}_1H^1 + {}_1H^1 + {}_1H^2 \rightarrow X + {}_1e^0$ + energy. The emitted particle is
    a) neutron b) proton c) $\alpha$-particle d) neutrino
52. If atomic number and mass number of element is z & m, then number of neutron will be
    a) $m.z$ b) $m + z$ c) $\frac{m}{z}$ d) $m - z$
53. The mass number of a nucleus is
    a) always less than its atomic weight
    b) always greater than its atomic weight
    c) equal to its atomic weight
    d) sometimes greater than and sometimes equal to its atomic weight
54. A galvanometer has a resistance of 55Ω. It given a full scale deflection by a current of 10 mA. What resistance must be connected across it to enable it to read 1A?
    a) 5.55Ω b) 0.555Ω c) 55.5Ω d) 0.055Ω
55. An electron and a proton of equal momentum enter a uniform magnetic field normal to the lines of force. If the radii of circular paths be $r_e$ and $r_p$ respectively, then
    a) $\frac{r_e}{r_p} = \frac{1}{1}$ b) $\frac{r_e}{r_p} = \frac{m_p}{m_e}$ c) $\frac{r_p}{r_e} = \frac{m_p}{m_e}$ d) $\frac{r_e}{r_p} = \frac{m_e}{m_p}$
56. A current of $\frac{1}{4\pi}$A is flowing in a long straight conductor. The line integral of magnetic induction around a closed path enclosing the current carrying conductor is
    a) $10^{-7}$ weber0 per metre b) $4\pi x10^{-7}$ weber per metre
    c) $4\pi^2 x10^{-7}$ weber per metre d) zero
57. A $\beta$particle moving with a speed of $10^7 ms^{-1}$ enters into a region of uniform magnetic field of 0.2T. The force experienced by $\beta$particle is




    a) $2.77x10^{-13}$N b) $1.6x10^{-13}$N c) $5.54x10^{-13}$N d) none of these
58. A S.H.M oscillator has period of 0.1s and amplitude of 0.2m. The maximum velocity is given by
    a) $100ms^{-1}$ b) $100\pi ms^{-1}$ c) $4\pi ms^{-1}$ d) $20\pi ms^{-1}$
59. An air-column in a pipe, which is closed at one end, will be in resonance with a vibrating tuning fork of frequency 264Hz, if the length of the column is ($v = ms^{-1}$)
    a) 31.25cm b) 62.50cm c) 93.75cm d) 125.75cm
60. A gas receives an amount of heat equal to 110 joules and performs 40J of work. The change in the internal energy of the gas is
    a) 70J b) 150J c) 110J d) 40J