UNIVERSAL ACADEMY

Icon of Success and Excellence

MOCK CET - 2015

DATE	SUBJECT	TIME
20.04.2015	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–2	

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.**

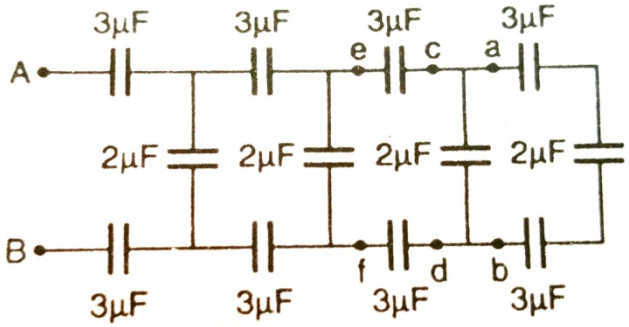
CORRECT METHOD OF SHADING THE CIRCLE ON THE ANSWER SHEET IS AS SHOWN BELOW:

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.

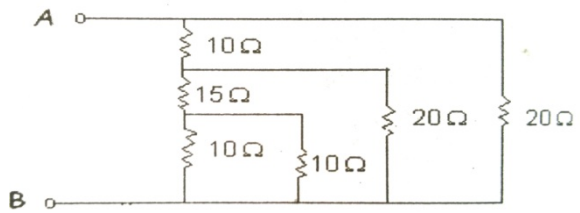
PHYSICS CET - 2

1. A body is projected with kinetic energy E such that its range is maximum. Its potential energy at the maximum height is
   a) E b) E/2 c) 2E d) 1.414 E
2. A block of weight 50 N is pulled along a rough horizontal surface. If the coefficient of friction is 1, the least possible force that can move the block is (in N)
   a) 100/$\sqrt{2}$ b) 100 $\sqrt{2}$ c) 50 $\sqrt{2}$ d) 50/$\sqrt{2}$
3. A sphere of mass 2m collides with a stationary sphere of mass 3m and stick to it. Then the loss in kinetic energy during collision is
   a) 60% b) 80% c) 40% d) 20%
4. A particle of mass 1 kg is moving with a constant speed of $20\sqrt{2}\,ms^{-1}$ in the xy plane along the line y = x + 4. Angular momentum of the particle about the origin is
   a) -80 $\hat{k}$ b) $20\hat{\imath} + 20\hat{\jmath}$ c) $20\hat{\jmath}$ d) $-80\hat{\jmath}$
5. A satellite moves around the earth in a circular orbit with a speed of v. If m is mass of the satellite, its total energy is
   a) $-\frac{1}{2}mv^2$ b) $\frac{1}{2}mv^2$ c) $\frac{3}{2}mv^2$ d) $\frac{1}{4}mv^2$
6. The angle of contact of a liquid with a solid does not depend on
   a) The angle of inclination of the solid to the solid-liquid surface
   b) The nature of the liquid and the solid
   c) The medium which exists above the free surface of the liquid
   d) The cleanliness and freshness of the two surfaces in contact
7. During an adiabatic process, the pressure of a gas is proportional to the cube of its absolute temperature. The value of $\frac{C_p}{C_v}$ for that gas is
   a) 3/5 b) 4/3 c) 5/3 d) 3/2
8. A very weekly damped oscillator is acted upon by an external periodic force and is executing simple harmonic oscillations in a steady state. What is the phase difference between the applied force and oscillator at resonance
   a) Zero b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) π
9. A car sounding its horn at 480 Hz moves towards a high wall at a speed of 20 ms^{-1} (speed of sound is 340 ms^{-1}). The frequency of the reflected sound heard by the observer in the car is nearly
   a) 480 Hz b) 510 Hz c) 540 Hz d) 570 Hz
10. A empty vessel is partially filled with water. The frequency of vibration of air column in the vessel
    a) Increases b) Decreases
    c) Remains the same d) Depends on the purity of the water
11. Sound waves transfer
    a) Momentum b) Both energy and momentum
    c) Only energy not momentum d) Energy
12. We have a jar A filled with gas characterised by the parameters P,V and T another jar B filled with a gas with parameters 2P, V/4 and 2T where the symbols have their usual meaning. The ratio of the number of molecules of jar A to those of jar B is
    a) 1:2 b) 1:4 c) 4:1 d) 2:1
13. The best laboratory approximation to an ideal black body is
    a) A lump of charcoal heated to high temperature
    b) A glass surface coated with coal tar
    c) A metal coated with a black dye
    d) A hollow enclosure blackened inside with soot and having a small hole
14. In which process the PV indicator diagram is a straight line parallel to volume axis?
    a) Isobaric b) Isothermal c) Adiabatic d) Irreversible

15. If the pressure in a closed vessel is reduced by drawing out some of the gas, the mean free path of the two molecules
    a) Increases
    b) Decreases
    c) Remains unchanged
    d) Increases or decreases according to the nature of the gas
16. Two balls of equal masses are thrown upwards along the same vertical direction at an interval of 2s, with the same initial velocity of 39.2 ms^{-1}. The two balls will collide at a height of
    a) 39.2 m b) 73.5 m c) 78.4 m d) 117.6 m
17. Physical quantity which remains constant throughout the trajectory of a particle is
    a) Momentum b) Vertical component of velocity
    c) Horizontal component of velocity d) Energy
18. The force between two charges 2μC and 4 μC is 24 N when they are separated by a certain distance in free space. The force if (i) distance between them is doubled and (ii) distance is halved are
    a) 16N, 80N b) 8N, 72N c) 6N, 96N d) 10N, 68N
19. A rod with linear charge density λ is bent in the shape a circular ring. The electric potential at the centre of the circular ring is
    a) $\frac{\lambda}{4\varepsilon_0}$ b) $\frac{\lambda}{2\varepsilon_0}$ c) $\frac{\lambda}{\varepsilon_0}$ d) $\frac{2\lambda}{\varepsilon_0}$
20. Point charges of 3nC are situated at each of three corners of a square whose side is 15 cm. The magnitude and direction of electric field at the vacant corner of the square i
    a) 2296 V/m along the diagonal b) 9622 V/m along the diagonal
    c) 22 V/m along the diagonal d) Zero
21. The capacitance between A and B in the arrangement given below is

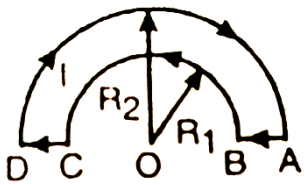


    a) 1 μF b) 10 μF c) 50 μF d) 1.5 μF
22. A capacitor of 10 μF charged upto 250 V is connected in parallel with another capacitor of 5 μF charged upto 100 V. The common potential is
    a) 500 V b) 400 V c) 300 V d) 200 V
23. If a dielectric substance is introduced between the plates of a charged air-gap capacitor, the energy of the capacitor will
    a) Decrease b) Remains unchanged
    c) Increase d) First decreases and then increases
24. The terminal potential of a cell is greater than its emf when it is
    a) Being charged b) An open circuit c) Being discharged d) It never happens
25. Two wires made of same material have their electrical resistances in the ratio 1:4. If their lengths are in the ratio 1:2, the ratio of their masses is
    a) 1:1 b) 1:8 c) 8:1 d) 2:1
26. The effective resistance between A and B is



a) 30 Ω b) 20 Ω c) 10 Ω d) 20.2 Ω

27. A 60 W bulb carries a current of 0.5A. The total charge passing through it in one hour is
a) 3600C b) 3000C c) 2400C d) 1800C
28. A 10 m long wire of resistance 15 ohm is connected in series with a battery of emf 2V and no internal resistance and a resistance of 5 ohm. The potential gradient along the wire is
a) 0.15 Vm^{-1} b) 0.45 Vm^{-1} c) 1.5 Vm^{-1} d) 4.5 Vm^{-1}
29. In a Wheatstone's bridge the values of resistors P and Q are respectively 3 and x. If 4Ω and 2Ω are values of resistors R and S respectively, then x is
a) 1 Ω b) 1.5 Ω c) 2.5 Ω d) 2 Ω
30. If a long hollow copper pipe carries a direct current, the magnetic field associated with current will be
a) Only outside the pipe b) Only inside the pipe
c) Neither inside or outside d) Both inside and outside
31. An ammeter is obtained by shunting a 30 Ω galvanometer with a 30 Ω resistance. What additional shunt is required across it to double its range?
a) 10 Ω b) 15 Ω c) 30 Ω d) 5 Ω
32. A coil carries a current and experiences a torque due to a magnetic field. The value of the torque is 80% of the maximum possible torque. The angle between the magnetic field and the normal to the plane of the coil is
a) 30^0 b) 53^0 c) 45^0 d) 37^0
33. A wire ABCD formed by joining two semicircular wires of radii R1 and R2 carries a current i. The magnetic induction at the centre O is,



a) $\frac{\mu_0 I}{4}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$ b) $\frac{\mu_0 I}{4\pi}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$ c) $\frac{\mu_0 I}{2\pi}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$ d) $\frac{\mu_0 I}{4}\left[\frac{1}{R_1}+\frac{1}{R_2}\right]$

34. An isolated north pole of mass 10^{-3} kg and pole strength 20 Am is kept in a uniform magnetic field of induction 4 mT. The acceleration acquired by the pole is …… ms^{-2}
a) 10 b) 80 c) 40 d) 20
35. A magnetic needle lying parallel to a magnetic field required W units of work to turn it through 60^0. The torque required to maintain the needle in this position is
a) W b) — c) ¯ d) 2W
36. A conductor of resistance 2 ohm and length 0.5 m is moving with a uniform speed of 0.4 m/s perpendicular to a magnetic field of induction 1T. If this is connected to a load resistance of 3 ohm, the current in the circuit is
a) 0.04 A b) 0.02 A c) 0.01 A d) 0.08 A
37. The core of a transformer is laminated to reduce
a) Hysteresis loss b) Eddy current loss c) Magnetic loss d) Copper loss
38. Current in a coil changes from 4A to zero in 0.1 s and the emf induced is 100 V. The self inductance of the coil is

a) 2.5H b) 4H c) 0.25 H d) 0.4 H

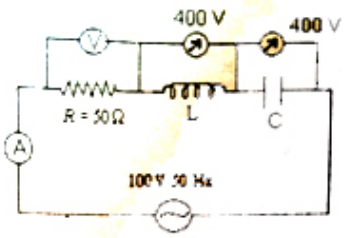
39. An alternating current of frequency f is flowing in a circuit of resistance R and coil of inductance L in series. The impedance of the circuit is

a) $R + 2\pi fL$ b) $\sqrt{R^2 + 4\pi^2 f^2 L^2}$ c) $\sqrt{R^2 + L^2}$ d) $\sqrt{R^2 + 2\pi fL}$

40. The dimensional formula of inductance is

a) $[M^1L^2T^{-1}A^{-2}]$ b) $[M^1L^2T^{-2}A^{-2}]$ c) $[M^1L^2T^{-2}A^{-2}]$ d) $[M^1L^2T^1A^{-2}]$

41. In the series LCR circuit, the voltmeter and ammeter readings are



a) 100V, 2A b) 100V, 5A c) K1000V, 2A d) 300V, 1A

42. An electromagnetic radiation has an energy of 13.2 keV. Then the radiation belongs to the region

a) Visible region b) Ultraviolet c) Infrared d) X-ray

43. The velocity of an electromagnetic wave in vacuum can changed by changing

a) Frequency b) Wavelength c) Amplitude d) None of these

44. Mirages are due to

a) Refraction of light b) Total internal reflection of light
c) Dispersion of light d) Scattering of light

45. The sum of angles of refraction inside the prism at the two surfaces is (angle of the prism is A)

a) Equal to A b) Less than A c) Greater than A d) A/2

46. The focal length of a convex lens is 10 cm. the magnifying powers when it is used as a magnifying glass to form the image at (i) near point and (ii) far point are

a) 2.5 and 3.5 b) 3.5 and 4.5 c) 4.5 and 3.5 d) 3.5 and 2.5

47. Two interfering waves have amplitudes in the ratio 5:1. The ratio of the maximum to the minimum intensity is

a) 25:1 b) 4:9 c) 6:4 d) 9:4

48. Sun light is reflected from a calm lake. The reflected light is 100% polarised at a certail instant. The angle between the sun light and the surface of the lake is $\left(tan^{-1}\left(\frac{4}{3}\right) = 53^0 4'\right)$.

a) 90^0 b) $53^0 4'$ c) $36^0 56'$ d) 45^0

49. The maximum kinetic of the emitted photoelectrons depends upon:

a) The frequency of the incident light
b) The velocity of incident light photon
c) The intensity of incident light
d) The voltage applied between the electrodes of the phtotocell

50. The de Broglie wavelength of a gas molecule at a temperature T K is,

a) $\frac{h}{\sqrt{3mKT}}$ b) $\frac{h}{3mKT}$ c) $\frac{h}{\sqrt{2mKT}}$ d) $\sqrt{2mKT}$

51. When two protons attract each other

a) Distance between them is 10^{-10} m b) Distance between them is 10^{-1} m
c) Distance between them is 10^{-15} m d) It never happens

52. What percentage of the original radioactive atoms is left after 5 half lives?

a) 20% b) 10% c) 5% d) 3%

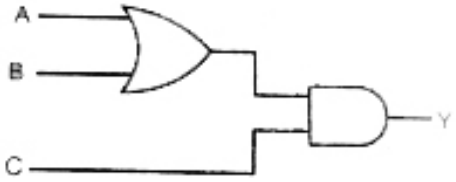
53. When the electron has a transition from the state (n+1) to state n, then frequency f of the emitted radiation will be inversely proportional to

a) n^3 b) n^2 c) n d) 1/n

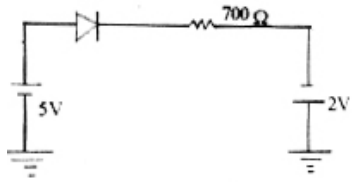
54. Positrons are produced during

a) Annihilation b) Pair production c) Positive rays d) Ionization

55. Solar energy is due to
    a) Fusion reactions b) Fission reactions c) Combustion reactions d) Chemical reactions
56. A cell of emf 4.5 V is connected to a junction diode whose barrier potential is 0.7 V. If the external resistance in the circuit is 190 ohms, the current in the circuit is
    a) 20 mA b) 2 mA c) 23 mA d) 200 mA
57. To get an output Y=1 from the circuit given below, the inputs must be



    a) A=0 , B=1 , C= 0 b) A=1 , B=0 , C= 0 c) A=1 , B=0 , C= 1 d) A=1 , B=1 , C= 0
58. The current through a ideal pn junction shown in the circuit diagram will be



    a) 5 mA b) 10 mA c) 70 mA d) 100 mA
59. An antenna behaves as a resonant circuit only when the length is
    a) Equal to $\frac{\lambda}{4}$ b) Equal to $\frac{\lambda}{2}$
    c) Equal to the integral multiples of $\frac{\lambda}{2}$ d) Equal to $\frac{3\lambda}{4}$
60. Instead of blue light if monochromatic red light is used then the measured focal length of the thin convex lens
    a) Increases b) Decreases c) Remains same d) Become zero