P1	Maximum Marks: 60 Total No. of Questions: 60 Total Duration: 80 Minutes Maximum Time for Answering: 70 Minutes Date: _____/_____/_____	**YOUR COLLEGE NAME HERE** 
	MENTION YOUR NUMBER	

VERSION CODE						**Subject Code**	**GT-P-01**
25UGE(MOCK)							

Do's:

1. Check whether the CET Number has been entered and shaded in the respective circles on the OMR answer sheet.
2. The version code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
3. The Version Code and Serial number of this question booklet should be entered on the Nominal Roll without any mistakes.
4. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts:

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**

- Do not remove the seal present on the right-hand side of this question booklet.
  - Do not; look inside this question booklet or start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. In case of usage of signs and symbols in the questions, the regular textbook connotation should be considered unless stated otherwise.
2. This question booklet contains 60 questions and each question will have one statement and four different options / responses and out of which you have to choose one correct answer.
3. Remove the paper seal of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., If so, get if replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
4. Completely **darken/shade** the relevant circle with a **blue or black ink ballpoint pen against the question number on the OMR answer sheet.**

CORRECT METHOD	WRONG METHOD
(A) ● (C) (D)	⊗ (B) (C) (D) (A) (B) (C) ✓ (A) ● ● (D)
	☛ (B) (C) (D) (A) ● (C) (D)

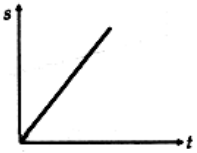
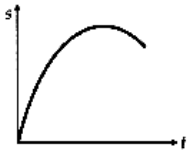
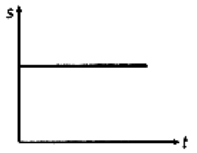
5. Please note that even a, minute unintended ink dot on the OMR answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
6. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
7. Hand over the **OMR** answer sheet to the room invigilator as the final bell rings.

Name of candidate (in capitals): _____

Roll Number: _____ Invigilator's Signature:_____

1. A particle moves in one dimension. The velocity is given by $v(t) = c_2t^2 + c_1t + c_0$, where c_1 and c_2 are constants. What is the acceleration of the particle when time t = 1 s?
   (1) $c_1 + c_2$ (2) zero
   (3) $c_1 + 2c_2$ (4) c_1

2. An object is thrown from the surface of the moon. The escape speed for the object is
   (1) $\sqrt{2g'R_m}$ where g' = acceleration due to gravity on the moon and R_m = radius of the moon
   (2) $\sqrt{2g'R_e}$, where g'=acceleration due to gravity on the moon and R_e = radius of the earth
   (3) $\sqrt{2gR_m}$, where g = acceleration due to gravity on the earth and R_m = radius of the moon
   (4) $\sqrt{4gR_m}$, where g = acceleration due to gravity on the earth and R_m = radius of the moon

3. A body is travelling in a straight line with a uniformly increasing speed. Which one of the plots represents the changes in distance (s) travelled with time (t)?
   (1) 
   (2) 
   (3) 
   (4) 

4. The relationship between phase difference $\Delta\phi$ and the path difference Δx between two interfering waves is given by: { λ = wavelength)
   (1) $\Delta x = \left(\frac{2\pi}{\lambda}\right)\Delta\phi$ (2) $\Delta\phi = (2\pi)\Delta x$
   (3) $\Delta x = \left(\frac{\lambda}{2\pi}\right)\Delta\phi$ (4) $\Delta\phi = \left(\frac{\lambda}{\pi}\right)\Delta x$

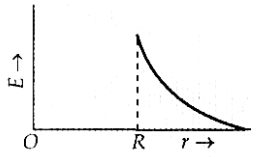
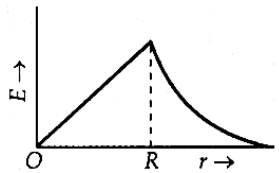
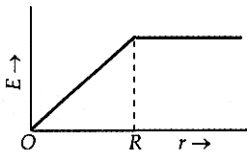
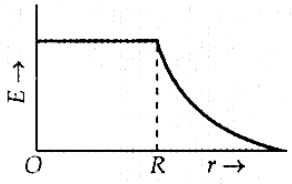
5. If the radius of earth shrinks by one percent and its mass remaining the same, then acceleration due to gravity on the earth's surface will:
   (1) decrease
   (2) either decrease or remain constant
   (3) remain constant
   (4) increase

6. What happens, if the monochromatic light used in Young's double slit experiment is replaced by white light?
   (1) Only the central fringe is white and all the other fringes are coloured
   (2) All bright fringes have colours between violet and red
   (3) All bright fringes become white
   (4) No fringes are observed

7. A cup contains 250 g of water. The number of negative charges present in the cup of water is
   (1) 3.34×10^7 C (2) 1.34×10^7 C
   (3) 1.34×10^{19} C (4) 1.34×10^{-19} C

8. Two waves have intensity ratio 25 : 4. What is the ratio of maximum to minimum intensity?
   (1) $\frac{9}{49}$ (2) $\frac{16}{25}$
   (3) $\frac{49}{9}$ (4) $\frac{25}{4}$

9. Let E_a be the electric field due to a dipole in its axial plane distant l and let E_q be the field in the equatorial plane distant l. The relation between E_a and E_q is:
   (1) $E_a = 2E_q$ (2) $E_a = E_q$
   (3) $E_q = 2E_a$ (4) $E_a = 3E_q$

10. The electric field due to a uniformly charged sphere of radius R as a function of the distance from its centre is represented graphically by:
   (1) 
   (2) 
   (3) 
   (4) 

11. A solid sphere of radius R is uniformly charged so that volume charge density is p. The electric field at a distance r(r < R) is

(1) $\frac{\rho r}{3\varepsilon_0}$ (2) $\frac{\rho r^2}{3\varepsilon_0 R^3}$

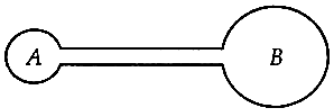
(3) $\frac{\rho r}{\varepsilon_0 R^2}$ (4) $\frac{\rho r^2}{\varepsilon_0 R^3}$

12. There is a uniform field of strength $10^3\,\mathrm{Vm}^{-1}$ along the y - axis. A body of mass 1g and charge 10^{-6} C is projected into the field from the origin along the positive x - axis with a velocity of 10 ms^{-1}. Its speed (in ms^{-1}) after 10 second will be (neglect gravitation)

(1) $10\sqrt{2}$ (2) 20

(3) $5\sqrt{2}$ (4) 10

13. There is a small bubble at one end and bigger bubble at other end of a rod. What will happen?



(1) smaller will grow until they collapse
(2) remain in equilibrium
(3) bigger will grow until they collapse
(4) Medium will grow until they collapse

14. A batsman deflects a ball by an angle of 45° without changing its initial speed which is equal to 54 km/h. What is the impulse imparted to the ball? (Mass of the ball is 0.15 kg.)

(1) 4.4 kg ms^{-1} (2) 4.8 kg ms^{-1}

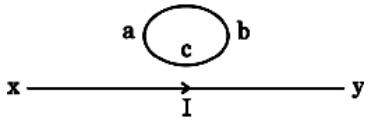
(3) 4.6 kg ms^{-1} (4) 4.2 kg ms^{-1}

15. A 100 mH coil carries a current of 1 A. Energy stored in the form of magnetic field is

(1) $0\cdot 1J$ (2) $0\cdot 5J$

(3) $0\cdot 05J$ (4) 1 J

16. The direction of induced current in the loop abc is:



(1) along abc if I is constant
(2) along abc if I increases
(3) along abc if I decreases
(4) along acb if I increases

17. The induction coil works on the principle of

(1) Fleming's right - hand rule
(2) self - induction
(3) mutual induction
(4) Ampere's rule

18. The degree of freedom of a triatomic gas is

(1) 1 (2) 6

(3) 8 (4) 2

19. Dimensions of coefficient of viscosity are:

(1) $[ML^{-3}T^{-4}]$ (2) $[MT^2]$

(3) $[ML^{-1}T^{-1}]$ (4) $[ML^{-1}T^{-2}]$

20. A block having mass m collides with another stationary block having a mass 2m. The lighter block comes to rest after the collision. If the velocity of the first block is v, then the value of coefficient of restitution will be

(1) 0.6 (2) 0.5

(3) 0.4 (4) 0.8

21. The mass density of a nucleus of mass number A is:

(1) proportional to A^3 (2) independent of A

(3) proportional to $A^{1/3}$ (4) proportional to $A^{2/3}$

22. In a nuclear fusion reaction, two nuclei, A and B fuse to produce a nucleus C, releasing an amount of energy ΔE in the process. If the mass defects of the three nuclei are ΔM_A, ΔM_B and ΔM_C respectively, then which of the following relations holds? Here, c is the speed of light.

(1) $\Delta M_A - \Delta M_B = \Delta M_C - \Delta E / c^2$

(2) $\Delta M_A + \Delta M_B = \Delta M_C + \Delta E / c^2$

(3) $\Delta M_A - \Delta M_B = \Delta M_C - \Delta E / c^2$

(4) $\Delta M_A + \Delta M_B = \Delta M_C - \Delta E / c^2$

23. In uncontrolled chain reaction, the quantity of energy released is

(1) first very high and normal
(2) normal
(3) very low
(4) very high

24. A beaker full of hot water is kept in a room. If it cools from 80 °C to 75 °C in t_1 minutes, from 75 °C to 70 °C in t_2 minutes and from 70 °C to 65 °C in t_3 minutes, then

(1) $t_1 > t_2 > t_3$ (2) $t_1 = t_2 = t_3$

(3) $t_1 < t_2 = t_3$ (4) $t_1 < t_2 < t_3$

25. Four thin rods of mass M and length l, form a square frame. Moment of inertia of this frame about an axis through the centre of the square and perpendicular to its plane is

(1) $\frac{13}{3}Ml^2$ (2) $\frac{2}{3}Ml^2$

(3) $\frac{4}{3}M^2$ (4) $\frac{1}{3}M^2$

26. Joule second is the unit of

(1) angular momentum (2) pressure
(3) work (4) momentum

27. Waves in the decreasing order of their wavelengths are:

(1) X- rays, infrared rays, visible rays, radio-waves
(2) radio-waves, infrared rays, visible rays, X- rays
(3) radio-waves, ultraviolet rays, visible rays, X - rays
(4) radio-waves, visible rays, infrared rays, X - rays

28. The capacitance of a parallel plate capacitor is 10μF. When a dielectric plate is introduced in between the plates, its potential becomes $\frac{1}{4}$ th of its original value. What is the value of the dielectric constant of the plate introduced?

(1) 20 (2) 4
(3) 40 (4) 2.5

29. A parallel plate capacitor is charged by connecting it to a battery. Which of the following will remain constant if the distance between the plates of the capacitor is increased in this situation?

(1) Energy stored (2) Capacitance
(3) Electric field (4) Potential difference

30. The time period of mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of the parts, then the new time period will be:

(1) 2T (2) T
(3) $\frac{T}{4}$ (4) $\frac{T}{2}$

31. A positively charged particle is released from rest in a uniform electric field. The electric potential energy of the charge

(1) increases because the charge moves along the electric field.
(2) decreases because the charge moves along the electric field.
(3) decreases because the charge moves opposite to the electric field.
(4) remains constant because the electric field is uniform.

32. According to Maxwell's equations,

(1) Electric and magnetic fields are decoupled
(2) Electric and magnetic fields move around in circles
(3) Electric and magnetic fields are independent of each other
(4) Electric and magnetic fields are coupled

33. An em wave is propagating in a medium with a velocity $\vec{V} = V\hat{i}$. The instantaneous oscillating electric field of this em wave is along +y axis. Then the direction of the oscillating magnetic field of the em wave will be along:

(1) - y direction (2) - x direction
(3) +z direction (4) - z direction

34. The velocity of light is equal to

(1) $\frac{\sqrt{\varepsilon_0}}{\mu_0}$ (2) $\sqrt{\varepsilon_0\mu_0}$

(3) $\frac{\varepsilon_0}{\mu_0}$ (4) $\frac{1}{\sqrt{\varepsilon_0\mu_0}}$

35. Displacement current exists only when

(1) magnetic field is not changing
(2) electric field is not changing
(3) magnetic field is changing
(4) electric field is changing

36. What is the value of linear velocity, if $\vec{\omega} = 3\hat{i} - 4\hat{j} + \hat{k}$ and $\vec{r} = 5\hat{i} - 6\hat{j} + 6\hat{k}$?

(1) $6\hat{i} - 2\hat{j} + 8\hat{k}$ (2) $-18\hat{i} - 13\hat{j} + 2\hat{k}$

(3) $4\hat{i} - 13\hat{j} + 6\hat{k}$ (4) $-6\hat{i} - 2\hat{j} + 3\hat{k}$

37. Equation of a plane progressive wave is given by $y = 0.6\sin 2\pi\left(t - \frac{x}{2}\right)$. On reflection from a denser medium its amplitude becomes 2/3 of the amplitude of the incident wave is

(1) $y = -0.4\sin 2\pi\left(t + \frac{x}{2}\right)$

(2) $y = -0.4\sin 2\pi\left(t - \frac{x}{2}\right)$

(3) $y = 0.4\sin 2\pi\left(t + \frac{x}{2}\right)$

(4) $y = 0.6\sin 2\pi\left(t + \frac{x}{2}\right)$

38. On doping germanium metal, with a little amount of indium, one gets
(1) intrinsic semiconductor
(2) insulator
(3) n - type semiconductor
(4) p - type semiconductor

39. Two waves have equations: x_1 = a sin (ω t + ϕ_1) and x_2 =a sin (ω t + ϕ_2). If in the resultant wave the frequency and amplitude remain equals to the amplitude of superimposing waves, the phase difference between them is:

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{3}$

(3) $\frac{2\pi}{3}$ (4) $\frac{\pi}{6}$

40. At equilibrium, in a p - n junction diode the net current is
(1) due to drift of minority charge carriers
(2) due to diffusion of majority charge carriers
(3) zero as diffusion and drift currents are equal and opposite
(4) zero as no charge carriers across the junction

41. For the forward biasing of a p - n junction diode, which of the following statements is **not** correct?
(1) Forward current is due to the diffusion of both holes and electrons.
(2) Minority carrier injection occurs.
(3) The potential barrier decreases.
(4) Width of depletion layer increases.

42. In the half - wave rectifier circuit operating from 50 Hz main frequency, the fundamental frequency in the ripple would be
(1) 70.7 Hz (2) 50 Hz
(3) 100 Hz (4) 25 Hz

43. Drift speed of electrons is of the order of:
(1) 10^5 cm/sec (2) 10^0 cm/sec
(3) 10^{-2} cm/sec (4) Zero

44. Resistivity of a given conductor depends upon
(1) area of cross - section
(2) length of conductor
(3) temperature
(4) shape of the conductor

45. A wire has a resistance of 3.1 Ω at 30° C and a resistance 4.5 Ω at 100°C.The temperature coefficient of resistance of the wire is:
(1) $0.0034°C^{-1}$ (2) $0.0025°C^{-1}$
(3) $0.0064°C^{-1}$ (4) $0.0012°C^{-1}$

46. The dimension of electrical resistance is:
(1) $[ML^2 T^{-3} A^1]$ (2) $[ML^2 T^{-3} A^{-2}]$
(3) $[ML^3T^{-3} A^{-2}]$ (4) $[ML^2 T^{-3} A^{-1}]$

47. A current pass through a wire of non - uniform cross section. Which of the following quantities are independent of the cross section?
(1) Current density
(2) Drift speed
(3) Free electron density
(4) The charge crossing in a given time interval

48. An ideal gas is made to go through a cyclic thermodynamic process in four steps. The amounts of heat involved are Q_1 = 600 J, Q_2 = - 400 J, Q_3 = - 300 J and Q_4 = 200J respectively.
The corresponding works involved are W_1 = 300 J, W_2 = - 200 J, W_3 = - 150 J and W_4. What is the value of W_4?
(1) - 50 J (2) 50 J
(3) 100 J (4) 150 J

49. A ball is dropped from a bridge 122.5 m above a river. After the ball has been falling for 2s, a second ball is thrown straight down after it. What must the initial velocity of the second ball be so that both hit the water at the same time?
(1) 55.5m/s (2) 26.1m/s
(3) 9.6m/s (4) 40 m/s

50. Taking the Bohr radius as a_0 = 53pm, the radius of Li^{++} ion in its ground state, on the basis of Bohr's model, will be about
(1) 27pm (2) 18pm
(3) 53 pm (4) 13pm

51. In terms of Rydberg constant R, the wavenumber of the first Balmer line is

(1) $\frac{5R}{36}$ (2) 3R

(3) $\frac{8R}{9}$ (4) R

52. What would be the radius of second orbit of He^+ ion?

(1) 1.058Å (2) 3.023Å

(3) 4.458Å (4) 2.068Å

53. In hydrogen atom, the electron is making 6.6×10^{15} rev/sec around the nucleus in an orbit of radius 0.528 Å. The magnetic moment (Am^2) will be

(1) 1×10^{-27} (2) 1×10^{-23}

(3) 1×10^{-10} (4) 1×10^{-15}

54. A wire of length L is bent to form a ring of single loop and current is flown through it. The magnetic field at its centre is B. If the same wire is bent to form two loops and same current is flowing, the new B' at its centre will be

(1) B (2) $\frac{B}{2}$

(3) 4B (4) 2B

55. The deflection in moving coil galvanometer falls from 50 divisions to 10 divisions, when a shunt of 12Ω is applied, the resistance of galvanometer coil is

(1) 50Ω (2) 24Ω

(3) 12Ω (4) 48Ω

56. Photons of frequency v are incident on the surfaces of two metals A and B of threshold frequencies $\frac{3}{4}$ v and $\frac{2}{3}$ v, respectively. The ratio of maximum kinetic energy of electrons emitted from A to that from B is

(1) 3 : 2 (2) 2 : 3

(3) 3 : 4 (4) 4 : 3

57. If work function of a metal surface is 3.45 eV, then maximum wavelength of a photon required to eject a photoelectron is

(1) 3.6×10^{-7} m (2) 7.9×10^{-7} m

(3) 4.4×10^{-7} m (4) 6.0×10^{-7} m

58. When the light of frequency $2\nu_0$ (where ν_0 is threshold frequency), is incident on a metal plate, the maximum velocity of electrons emitted is ν_1. When the frequency of the incident radiation is increased to $5\nu_0$, the maximum velocity of electrons emitted from the same plate is ν_2. The ratio of ν_1 to ν_2 is

(1) 4 : 1 (2) 1 : 2

(3) 2 : 1 (4) 1 : 4

59. A closely wound solenoid of 800 turns and area of cross section $2.5\times10^{-4}m^2$ carries a current of 3.0 A. What is its associated magnetic moment?

(1) 0.4 J/T (2) 0.8 J/T

(3) 0.6 J/T (4) 0.5 J/T

60. Points A and B are situated perpendicular to the axis of a 2 cm long bar magnet at large distances x and 3x from its centre on opposite sides. The ratio of the magnetic fields at A and B will be approximately equal to

(1) 2 : 9 (2) 1 : 9

(3) 9 : 1 (4) 27 : 1

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK