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Computer Based Examination System

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Title *	Question Paper Answer Key
OES Exam *	GPSC01202318 / Assistant Professors in Government College in Physics/ Completed / 2023-06-03

1	<b>Question Description</b>	<p>In the case of fields of arbitrary moving charges, the magnetic field vectors is such that</p> <p>A) <math>\vec{B} = \frac{\hat{n} \times \vec{E}}{c^2}</math></p> <p>B) <math>\vec{B} = \frac{\hat{n} \times \vec{E}}{c}</math></p> <p>C) <math>\vec{B} = \frac{\hat{n} \cdot \vec{E}}{c^2}</math></p> <p>D) <math>\vec{B} = \frac{\hat{n} \cdot \vec{E}}{c}</math></p>
	A	A
	B	B
	C	C
	D	D
	E	None of the above
	<b>Correct Answer</b>	B
	<b>Marks</b>	1

2

<b>Question Description</b>	The ground state energy of a particle in a box is 1.25eV. if 3 particles each having spin $\frac{1}{2}$ are introduced in the box then the total ground state energy of the system will be
<b>A</b>	3.75 eV
<b>B</b>	4eV
<b>C</b>	6eV
<b>D</b>	7.5 eV
<b>E</b>	None of the above
<b>Correct Answer</b>	D
<b>Marks</b>	1

3

<b>Question Description</b>	In 8085 microprocessor system with memory mapped I/O
<b>A</b>	I/O devices have 8-bit addresses
<b>B</b>	I/O device are accessed using IN and out instructions
<b>C</b>	There can be maximum of 256 input devices and 256 inputt devices
<b>D</b>	Arithmetic and analog operations can be directly performed with the I/o data
<b>E</b>	None of the above
<b>Correct Answer</b>	C
<b>Marks</b>	1

4

**Question Description**

When unpolarised light is incident on a glass plate at a particular angle, it is observed that the reflected beam is linearly polarized. What is the angle of the refracted beam with respect to the surface normal?

- (a) The light is completely reflected and there is no refracted beam.
- (b)  $23.3^\circ$
- (c)  $33.4^\circ$
- (d)  $56.7^\circ$

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

C

**Marks**

1

5

**Question Description**The value of residue of complex function  $\frac{\sin z}{1-z^8}$  at  $z = i$  is

- (a)  $\frac{\sinh(1)}{8}$
- (b)  $\frac{\sin(1)}{8}$
- (c)  $\frac{\cosh(1)}{8}$
- (d) 0

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

A

**Marks**

1

6

<b>Question Description</b>	For a system at constant temperature and pressure, which statement is true ?
<b>A</b>	The Gibbs potential always increases.
<b>B</b>	The Helmholtz energy always decreases.
<b>C</b>	The entropy always decreases.
<b>D</b>	Neither Gibbs nor Helmholtz energies increase.
<b>E</b>	None of the above
<b>Correct Answer</b>	D
<b>Marks</b>	1

7

**Question Description**

The value of  $\sigma^2 = \sigma_x^2 + \sigma_z^2$  is equal to

A)  $\hbar^2$

B)  $\frac{\hbar^2}{4}$

C)  $\frac{3}{4}\hbar^2$

D)  $\frac{1}{2}\hbar^2$

A

A

B

B

C

C

D

D

E

None of the above

**Correct Answer**

C

**Marks**

1

8

<b>Question Description</b>	Using the de Broglie relation, what is the wavelength of thermal neutrons of velocity 2200 m/s and mass = 1.008982 amu, given $h = 6.625 \times 10^{-34}$ J s, $1 \text{ amu} = 1.6598 \times 10^{-24}$ g ?
<b>A</b>	$1.798 \times 10^{-10}$ m.
<b>B</b>	$1.798 \times 10^{-6}$ m.
<b>C</b>	$1.04 \times 10^{-10}$ m.
<b>D</b>	$5.29 \times 10^{-11}$ m.
<b>E</b>	None of the above
<b>Correct Answer</b>	A
<b>Marks</b>	1

9

**Question Description**

A dielectric has a density of  $1600 \text{ kg/m}^3$  and a mass number of 156. The dipole moment of each molecule is  $1.77 \times 10^{-32} \text{ C m}$ . What is the macroscopic polarization density? (Avogadro number =  $6.023 \times 10^{26} / \text{kg mole}$ )

**A)**  $10.9 \text{ C/m}^2$

**B)**  $10.9 \times 10^{-5} \text{ C/m}^2$

**C)**  $10.9 \times 10^{-8} \text{ C/m}^2$

**D)**  $10.9 \times 10^{-8} \text{ C m}^2$

**A**

A

**B**

B

**C**

C

**D**

D

**E**

None of the above

**Correct Answer**

B

**Marks**

1

10

**Question Description**

A plane polarized electromagnetic wave in free space at time  $t = 0$  is given by  $\vec{E}(x, z) = 10\hat{j} \exp[i(6x + 8z)]$ . The magnetic field  $\vec{B}(x, z, t)$  is

(a)  $\vec{B}(x, z, t) = \frac{1}{c}(6\hat{k} - 8\hat{i}) \exp[i(6x + 8z - 10ct)]$

(b)  $\vec{B}(x, z, t) = \frac{1}{c}(6\hat{k} + 8\hat{i}) \exp[i(6x + 8z - 10ct)]$

(c)  $\vec{B}(x, z, t) = \frac{1}{c}(6\hat{k} - 8\hat{i}) \exp[i(6x + 8z - ct)]$

(d)  $\vec{B}(x, z, t) = \frac{1}{c}(6\hat{k} + 8\hat{i}) \exp[i(6x + 8z + ct)]$

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

A

**Marks**

1

11

**Question Description**

The number of particles emitted each minute by a radioactive source is recorded for a period of 20 hours; a total of 3600 counts are registered. What is the approximate probability of observing zero particles per minute?

(a) 0.74

(b) 0.32

(c) 0.05

(d) 0.01

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

C

**Marks**

1

12

<b>Question Description</b>	What are the working characteristics of a light-emitting diode (LED) and a photo diode ?
<b>A</b>	An LED works in forward bias with recombination of electrons and holes.
<b>B</b>	A photo diode works in reverse bias with minority electrons in the p-type jumping to the n-type and minority holes in the n-type to the p-type thus setting up an e.m.f.
<b>C</b>	An LED works in reverse bias and gives out light while a photodiode absorbs light in forward bias.
<b>D</b>	Both (A) and (B).
<b>E</b>	None of the above
<b>Correct Answer</b>	D
<b>Marks</b>	1

13

**Question Description**

A point charge  $q$  is at a distance  $d$  from a conducting plane. The energy required to move, the charge to infinitely away from the plane is

A)  $\frac{-q^2}{4d}$

B)  $\frac{-q^2}{4d^2}$

C)  $\frac{-q}{d}$

D)  $-qd$

A

A

B

B

C

C

D

D

E

None of the above

**Correct Answer**

A

**Marks**

1

14

**Question Description**

A Carnot engine operating between temperatures  $T_1$  and  $T_2$  has efficiency 0.2. When  $T_2$  is reduced by 60 K, its efficiency increases to 0.4. Then,  $T_1$  and  $T_2$  are respectively

- (a) 200 K, 150 K.
- (b) 250 K, 200 K.
- (c) 300 K, 240 K.
- (d) 300 K, 150 K.

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

C

**Marks**

1

15

**Question Description**

A particle is constrained to move in a truncated harmonic potential well ( $x > 0$ ) such that

$$V(x) = \frac{1}{2}m\omega^2x^2, \quad x > 0$$
$$= \infty, \quad \textit{otherwise}$$

The allowed energies of this particle are

- (a)  $(n + \frac{1}{2})\hbar\omega$
- (b)  $(2n + \frac{1}{2})\hbar\omega$
- (c)  $(2n + \frac{3}{2})\hbar\omega$
- (d)  $(n + \frac{5}{2})\hbar\omega$

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

C

**Marks**

1

16	<b>Question Description</b>	Using Einstein's mass-energy equivalence, if the mass of the electron is $9.1 \times 10^{-28}$ g, $c = 3 \times 10^{10}$ cm/s , $1 \text{ eV} = 1.6021 \times 10^{-12}$ erg, the approx. energy equivalence of the electron is :
	A	938 MeV .
	B	0.51 MeV .
	C	939 MeV .
	D	139 MeV .
	E	None of the above
	<b>Correct Answer</b>	B
	<b>Marks</b>	1

17	<b>Question Description</b>	15 coupons are numbered 1,2, ....., 15. Seven coupons are selected at random one at a time with replacement. The probability that the number appearing on a selected coupon is no larger than 9, is :
	A	$(9/16)^6$
	B	$(8/15)^7$
	C	$(3/5)^7$
	D	$(5/3)^7$
	E	None of the above
	<b>Correct Answer</b>	C
	<b>Marks</b>	1

18

**Question Description**

If the coordinate  $q$  and the momentum  $p$  form a canonical pair  $(q, p)$ , which one of the sets given below also forms a canonical?

(a)  $(q, -p)$

(b)  $(q^2, p^2)$

(c)  $(p, -q)$

(d)  $(q^2, -p^2)$

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

C

**Marks**

1

19

**Question Description**

The true length of some given distance is 2 cm. A set of observations referred to as P finds the same distance as a narrow distribution centred at 4 cm while another set of observations referred to as Q finds a broad distribution centred at 2 cm. Which of the following statements is correct ?

**A**

The observations P are accurate while those of Q are inaccurate.

**B**

The distribution P is more precise but much less accurate than Q.

**C**

The distribution Q is both more accurate and precise than P.

**D**

The distribution P is both more accurate and precise than Q.

**E**

None of the above

**Correct Answer**

B

**Marks**

1

20	<b>Question Description</b>	When samples are taken of a distribution, the Central Limit Theorem states that the distribution of a large enough number (typically 30) of the means of such samples will always be :
	<b>A</b>	An exponential distribution.
	<b>B</b>	A normal distribution.
	<b>C</b>	A Poisson distribution.
	<b>D</b>	A sinusoidal distribution
	<b>E</b>	None of the above
	<b>Correct Answer</b>	B
	<b>Marks</b>	1

21	<b>Question Description</b>	The third law of thermodynamics :
	<b>A</b>	Cannot follow from Carnot's theorem.
	<b>B</b>	States that the enthalpy is zero at absolute zero.
	<b>C</b>	The volume coefficient of expansion is zero at $T=0$ .
	<b>D</b>	No engine is perfect enough to reach $T=0$ .
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

22	<b>Question Description</b>	In order to find the best empirical fit to a data set, the method of least squares uses the following:
	<b>A</b>	The minimum summation of the squares of the deviations from the best fit.
	<b>B</b>	The minimum square root of the sums of the deviations from the best fit.
	<b>C</b>	The minimum sum of the derivatives of the squares of the deviations from the best fit.
	<b>D</b>	The minimum summation of the deviations from the best fit.
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

23	<b>Question Description</b>	Liouville's theorem relates to :
	<b>A</b>	Motion of a particle in phase space.
	<b>B</b>	Density of states of an ensemble in phase space.
	<b>C</b>	Constant density of states in phase space.
	<b>D</b>	Equations of motion in phase space.
	<b>E</b>	None of the above
	<b>Correct Answer</b>	C
	<b>Marks</b>	1

24

**Question Description**

The free energy for a photon gas is given by

$$F = -\frac{a}{3}VT^4, \text{ where } a \text{ is a constant.}$$

The entropy  $S$  and pressure  $P$  of the photon gas are

- (a)  $S = \frac{4}{3}aVT^3, P = \frac{a}{3}T^4$   
(b)  $S = \frac{1}{3}aVT^4, P = \frac{4a}{3}T^3$   
(c)  $S = \frac{4}{3}aVT^4, P = \frac{a}{3}T^3$   
(d)  $S = \frac{1}{3}aVT^3, P = \frac{4a}{3}T^4$

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

A

**Marks**

1

25

**Question Description**

Consider a junction field-effect transistor with n-type semiconductor between the source and drain. If there is a small gate voltage  $V_g$  with no drain voltage  $V_d$  the space charge region between source and drain is of uniform width. How does the space-charge conducting region change in going from source to drain when there is a small positive bias of  $V_d$  ?

**A**

No change provided  $V_d$  is small.

**B**

It tapers down from source to drain.

**C**

It increases up from source to drain.

**D**

It tapers down and then increases in going from source to drain.

**E**

None of the above

**Correct Answer**

B

**Marks**

1

26

**Question Description**

In a thought or “gedanken” experiment, a slim long rod with a clock attached to it, moves in a direction parallel to its long axis at a velocity near to that of light. According to the Lorentz transformational equations, what would an observer on the ground observe ?

**A**

A length extension of the rod.

**B**

A length contraction of the rod.

**C**

A slowing down of the attached clock.

**D**

Both (B) and (C).

**E**

None of the above

**Correct Answer**

D

**Marks**

1

27	<b>Question Description</b>	Four fold degeneracy in the excited state ( $n = 2$ ) in hydrogen atom can be partially removed by
	<b>A</b>	Application of weak electric field
	<b>B</b>	By supplying heat energy to the atom
	<b>C</b>	By accelerating the atom in a particle acceleration
	<b>D</b>	By applying gravitational field
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

28	<b>Question Description</b>	The Kelvin and Clausius statements of the 2 <sup>nd</sup> law of thermodynamics implies:
	<b>A</b>	That refrigeration is possible.
	<b>B</b>	That the perfect engine is a Carnot engine.
	<b>C</b>	Perpetual motion machines are not possible.
	<b>D</b>	Work cannot be completely converted to heat.
	<b>E</b>	None of the above
	<b>Correct Answer</b>	C
	<b>Marks</b>	1

29

**Question Description** A sphere of radius  $R$  is uniformly charged. Which of the following is not true ?

**A** The field within is zero.

**B** The field outside falls as the inverse square of the distance from the centre.

**C** The field outside falls as the inverse square of the distance from the surface.

**D** The radial field at the sphere surface is discontinuous.

**E** None of the above

**Correct Answer** B

**Marks** 1

30

**Question Description**

An electron is in a state with spin wave function  $\phi = \begin{bmatrix} \sqrt{3}/2 \\ 1/2 \end{bmatrix}$  in the  $S_z$  representation. What is the probability of finding the z-component of its spin along the negative z-direction?

- (a) 0.75
- (b) 0.50
- (c) 0.35
- (d) 0.25

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

D

**Marks**

1

31

## Question Description

If  $\vec{A} = 5t^2\hat{i} + t\hat{j} + t^3\hat{k}$ ,  $\vec{B} = \sin t\hat{i} - \cos t\hat{j} + 6\hat{k}$ ,  $\frac{d}{dt}(\vec{A} \cdot \vec{B})$  is

A)  $(2t^2 - 5)\cos t + 23 t \sin t$

B)  $(9t^2 - 3)\cos t + 18 t \sin t$

C)  $(7t^2 - 3)\cos t + 15 t \sin t$

D)  $(5 t^2 - 1)\cos t + 11 t \sin t$

A A

B B

C C

D D

E None of the above

Correct Answer D

Marks 1

**Question Description**

In spherical polar coordinates  $\vec{r} = (r, \theta, \phi)$ , the delta function  $\delta(\vec{r} - \vec{r}_0)$  can be written as

- (a)  $\delta(r - r_0)\delta(\theta - \theta_0)\delta(\phi - \phi_0)$
- (b)  $\frac{1}{r^2}\delta(r - r_0)\delta(\cos\theta - \cos\theta_0)\delta(\phi - \phi_0)$
- (c)  $\frac{1}{(r-r_0)^2}\delta(r - r_0)\delta(\cos\theta - \cos\theta_0)\delta(\phi - \phi_0)$
- (d)  $\frac{1}{r^2\cos^2\theta}\delta(r - r_0)\delta(\theta - \theta_0)\delta(\phi - \phi_0)$

**A**

a

**B**

b

**C**

c

**D**

d

**E**

None of the above

**Correct Answer**

B

**Marks**

1

33

**Question Description**

In the Bose-Einstein condensation, the critical temperature  $T_C$  is that temperature at which :

**A**

All the bosons occupy the  $p=0$  state.

**B**

Some bosons occupy the  $p=0$  state.

**C**

A first order phase transition in  $C_V$  ends.

**D**

The internal energy shows a kink.

**E**

None of the above

**Correct Answer**

B

**Marks**

1

34

<b>Question Description</b>	A pipe of rectangular cross-section has each pair of opposite faces held at the same electric potential. The potential within the pipe in the two orthogonal directions will be :
<b>A</b>	Exponential.
<b>B</b>	Sinusoidal.
<b>C</b>	Damped sinusoidal.
<b>D</b>	Uniform.
<b>E</b>	None of the above
<b>Correct Answer</b>	B
<b>Marks</b>	1

35

**Question Description**

For uniform magnetic field  $B$ , the vector potential  $\vec{A}$  is given by

A)  $\frac{1}{2} \vec{r} (\vec{r} \cdot \vec{B})$

B)  $\frac{1}{2} (\vec{B} \times \vec{r})$

C)  $\frac{1}{2} \vec{B} (\vec{r} \cdot \vec{B})$

D)  $\frac{1}{2} \left( \frac{\vec{B} \times \vec{r}}{r} \right)$

A

A

B

B

C

C

D

D

E

None of the above

**Correct Answer**

B

**Marks**

1

36

<b>Question Description</b>	In a nuclear counting experiment the count rate is about 5 counts / hr. To establish the uncertainty in the count to better than 1%, you have to count for
<b>A</b>	2 hrs
<b>B</b>	20 hrs
<b>C</b>	200 hrs
<b>D</b>	2000 hrs
<b>E</b>	None of the above
<b>Correct Answer</b>	D
<b>Marks</b>	1

37

<b>Question Description</b>	A rectangular current carrying loop is placed in a steady magnetic field $\mathbf{B}$ such that its plane is at an angle to the field's direction. If the loop is free to rotate or move, it will:
<b>A</b>	Orient with its normal at right angles to $\mathbf{B}$ .
<b>B</b>	Precess with its normal around $\mathbf{B}$ .
<b>C</b>	Orient with its normal along $\mathbf{B}$ .
<b>D</b>	Retain its relative orientation to $\mathbf{B}$ .
<b>E</b>	None of the above
<b>Correct Answer</b>	C
<b>Marks</b>	1

38

**Question Description**

In what respect can the grand canonical ensemble be treated like a canonical ensemble?

**A**

Its energy is fixed.

**B**

The volume of each constituent assembly is fixed.

**C**

It is an open isothermal system.

**D**

The number of particles within each assembly and the reservoir is fixed.

**E**

None of the above

**Correct Answer**

D

**Marks**

1

39

**Question Description**

Which one of the following function is not analytic where  $z = x + iy$  ?

A)  $Re(z)$

B)  $Z^{-1}$

C)  $\sin Z$

D)  $e^{\sin z}$

A

A

B

B

C

C

D

D

E

None of the above

**Correct Answer**

A

**Marks**

1

40

**Question Description**

The Hamiltonian of a system is given by  $H = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 8 & 0 & 0 \\ 0 & 0 & 3 & 2\lambda \\ 0 & 0 & 2\lambda & 7 \end{bmatrix}$  where  $\lambda$  is a small parameter. By decomposing the same as  $H = H_0 + H_p$ , the eigen values of unperturbed Hamiltonian,  $H_0$  can be obtained. The eigen values of  $H_0$  are

- A)  $(1 + \lambda, 8, 3, 7)$
- B)  $(1, 8 - \lambda, 3 - \lambda, 7 - \lambda)$
- C)  $(1, 8, 3, 7)$
- D)  $(1, 8\lambda, \lambda 3, \lambda 7)$

A

A

B

B

C

C

D

D

E

None of the above

**Correct Answer**

C

**Marks**

1

41	<b>Question Description</b>	If a waveform consisting of many different time-domain components is Fourier transformed, what would one obtain in the frequency domain ?
	<b>A</b>	A continuous bounded function in the positive frequency domain and the same in the negative frequency domain.
	<b>B</b>	A continuous bounded function only in the positive frequency domain.
	<b>C</b>	The same complicated waveform but in the inverse time domain.
	<b>D</b>	A set of discrete frequencies each corresponding to one time-domain component.
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

42	<b>Question Description</b>	The Poynting vector of an electromagnetic wave gives :
	<b>A</b>	The rate of change of energy.
	<b>B</b>	The direction of motion of the wave.
	<b>C</b>	The direction of energy flow of the wave.
	<b>D</b>	The momentum of the wave.
	<b>E</b>	None of the above
	<b>Correct Answer</b>	C
	<b>Marks</b>	1

43

**Question Description**

The probability  $P(x,t)dx$  that a particle will be found between  $x$  and  $x+dx$  in terms of the wave function  $\Psi(x,t)$  is :

- A)  $|\Psi(x,t)|^2$
- B)  $|\Psi(x,t)|$
- C)  $\Psi^*(x,t) \Psi(x,t) dx$
- D)  $\Psi(x,t) = e^{i(kx - \omega t)}$

A

A

B

B

C

C

D

D

E

None of the above

**Correct Answer**

C

**Marks**

1

44

**Question Description**

Two concentric spheres of radii 10 cm and 20 cm are equally but oppositely charged so that their potential difference is 100 V. What is the charge in Coulomb's required for this ?

A)  $400 \pi \epsilon_0$

B)  $800 \pi \epsilon_0$

C)  $80 \pi \epsilon_0$

D)  $40 \pi \epsilon_0$

**A**

A

**B**

B

**C**

C

**D**

D

**E**

None of the above

**Correct Answer**

C

**Marks**

1

45	<b>Question Description</b>	For circular and parabolic orbits in an attractive $1/r$ potential having the same angular momentum, perihelion distance of parabola is
	<b>A</b>	Double the radius of circle
	<b>B</b>	Equal to the radius of circle
	<b>C</b>	Half the radius of circle
	<b>D</b>	Thrice the radius of circle
	<b>E</b>	None of the above
	<b>Correct Answer</b>	C
	<b>Marks</b>	1

46	<b>Question Description</b>	For a plane wave normally incident on a boundary without losses, the following is true :
	<b>A</b>	The reflection and transmission coefficients add to unity.
	<b>B</b>	The incident wave must equal either the transmitted or reflected wave.
	<b>C</b>	The refracted wave cannot be greater than the reflected wave.
	<b>D</b>	Both options (A) and (B).
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

47	<b>Question Description</b>	A system of 3 indistinguishable particles has a total energy of $4\epsilon$ . There are four single particle energy states with energy $0, \epsilon, 2\epsilon, 3\epsilon$ . The number of microstates accessible to the system will be
	<b>A</b>	1
	<b>B</b>	2
	<b>C</b>	3
	<b>D</b>	4
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

48	<b>Question Description</b>	The modification of Ampere's law by Maxwell for time-dependent fields in matter deals with :
	<b>A</b>	Addition of a time-dependent free current term.
	<b>B</b>	Addition of a time-dependent electric field term.
	<b>C</b>	Addition of a time-dependent magnetic field term.
	<b>D</b>	Addition of a time-dependent displacement current term.
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

49	<b>Question Description</b>	In a white dwarf star, if the Fermi temperature is given to be above $10^{10}$ K and the interior stellar temperature is about $10^7$ K, then it may be said that :
	<b>A</b>	The energy states of the electrons are almost the same.
	<b>B</b>	The He atoms are mostly devoid of their electrons.
	<b>C</b>	Only radiation exists in the stellar interior.
	<b>D</b>	The whole star is in a single fully degenerate ground state.
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

50	<b>Question Description</b>	For two interacting particles $m_1$ and $m_2$ described in the Centre-of-Mass frame (COM) and the Laboratory frame of reference (Lab), the following may be said :
	<b>A</b>	In the COM, the particles lie along one line before and along another after collision.
	<b>B</b>	In the Lab, the particles move off in different directions after collision.
	<b>C</b>	A fictitious reduced mass is used in both frames.
	<b>D</b>	Both (A) and (B).
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

51

**Comprehension**

Read the passage below and answer the questions:

In the time of Charles the Fifth, Emperor of Germany, Stoeffler, a noted mathematician, and astronomer, a man of great learning, made an astronomical calculation according to the great science of Astrology, and ascertained that the world was to be visited by another deluge. This prediction was absolutely believed by the leading men of the Empire not only, but all of Europe...Thousands of people left their homes in low lands, by the rivers, and near the sea, and sought the more elevated ground. People in some instances abandoned the aged, the sick, and the infirm to the tender mercies of the expected flood, so anxious were they to reach some place of security.

**Question Description**

In the above passage, the phrase “another deluge” indicates that there had been one more----- in the past

**A**

calculation

**B**

prediction

**C**

flood

**D**

astronomer

**E**

None of the above

**Correct Answer**

C

**Marks**

1

**Comprehension**

Read the passage below and answer the questions:

In the time of Charles the Fifth, Emperor of Germany, Stoeffler, a noted mathematician, and astronomer, a man of great learning, made an astronomical calculation according to the great science of Astrology, and ascertained that the world was to be visited by another deluge. This prediction was absolutely believed by the leading men of the Empire not only, but all of Europe...Thousands of people left their homes in low lands, by the rivers, and near the sea, and sought the more elevated ground. People in some instances abandoned the aged, the sick, and the infirm to the tender mercies of the expected flood, so anxious were they to reach some place of security.

**Question Description**

As per the implicit sense of the passage, the drawback of the prediction was that

**A** it made people abandon the aged, the sick and the infirm to the expected flood

**B** its astronomical calculation was based on the great science of Astrology

**C** it was absolutely believed by not just leading personages but all of Europe

**D** the people were anxious to reach some place of security

**E** None of the above

**Correct Answer** B

**Marks** 1

**Comprehension**

Read the passage below and answer the questions:

In the time of Charles the Fifth, Emperor of Germany, Stoeffler, a noted mathematician, and astronomer, a man of great learning, made an astronomical calculation according to the great science of Astrology, and ascertained that the world was to be visited by another deluge. This prediction was absolutely believed by the leading men of the Empire not only, but all of Europe...Thousands of people left their homes in low lands, by the rivers, and near the sea, and sought the more elevated ground. People in some instances abandoned the aged, the sick, and the infirm to the tender mercies of the expected flood, so anxious were they to reach some place of security.

**Question Description**

The "Emperor of Germany " mentioned in the passage was ----

**A**

Stoeffler

**B**

a noted mathematician

**C**

astronomer

**D**

Charles the Fifth

**E**

None of the above

**Correct Answer**

D

**Marks**

1

54

**Comprehension**

Read the passage below and answer the questions:

In the time of Charles the Fifth, Emperor of Germany, Stoeffler, a noted mathematician, and astronomer, a man of great learning, made an astronomical calculation according to the great science of Astrology, and ascertained that the world was to be visited by another deluge. This prediction was absolutely believed by the leading men of the Empire not only, but all of Europe...Thousands of people left their homes in low lands, by the rivers, and near the sea, and sought the more elevated ground. People in some instances abandoned the aged, the sick, and the infirm to the tender mercies of the expected flood, so anxious were they to reach some place of security.

**Question Description**

The antonym of “elevated” as used in the passage is -----

**A**

raised

**B**

undignified

**C**

demoted

**D**

low

**E**

None of the above

**Correct Answer**

D

**Marks**

1

**Comprehension**

Read the passage below and answer the questions:

In the time of Charles the Fifth, Emperor of Germany, Stoeffler, a noted mathematician, and astronomer, a man of great learning, made an astronomical calculation according to the great science of Astrology, and ascertained that the world was to be visited by another deluge. This prediction was absolutely believed by the leading men of the Empire not only, but all of Europe...Thousands of people left their homes in low lands, by the rivers, and near the sea, and sought the more elevated ground. People in some instances abandoned the aged, the sick, and the infirm to the tender mercies of the expected flood, so anxious were they to reach some place of security.

**Question Description**

As per the passage, the reaction of the people to the prediction shows that they were scientifically

**A**

ill-informed but concerned for their own survival

**B**

well-informed and so anxious for their own survival

**C**

uninformed to forsake those who were aged, ill or weak

**D**

ill-informed and unaware of the impending peril

**E**

None of the above

**Correct Answer**

A

**Marks**

1

56	<b>Question Description</b>	At which IIT did Israel and India partner to establish a centre of water technology?
	<b>A</b>	IIT Madras
	<b>B</b>	IIT Kanpur
	<b>C</b>	IIT Mumbai
	<b>D</b>	IIT Delhi
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

57	<b>Question Description</b>	Which martial art has been added to the 37th National Games 2023?
	<b>A</b>	Gatka
	<b>B</b>	Silambam
	<b>C</b>	Kalarippayattu
	<b>D</b>	Thoda
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

58	<b>Question Description</b>	Between which two countries is the bilateral exercise 'Samudra Shakti-23' conducted?
	<b>A</b>	India and Indonesia
	<b>B</b>	India and Singapore
	<b>C</b>	India and France
	<b>D</b>	India and USA
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

59	<b>Question Description</b>	When is International Nurses Day 2023 being observed?
	<b>A</b>	May 11
	<b>B</b>	May 12
	<b>C</b>	May 13
	<b>D</b>	May 15
	<b>E</b>	None of the above
	<b>Correct Answer</b>	B
	<b>Marks</b>	1

60	<b>Question Description</b>	The Reserve Bank of India has recently approved the merger of which two banks?
	<b>A</b>	Maratha Sahakari Bank & The Cosmos Co-operative Bank
	<b>B</b>	Maratha Sahakari Bank & The Bandhan Bank
	<b>C</b>	Maratha Sahakari Bank & The Saraswat Co-operative Bank
	<b>D</b>	Maratha Sahakari Bank & The Bharat Co-operative Bank
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

61	<b>Question Description</b>	When is World Telecommunication and Information Society Day celebrated?
	<b>A</b>	May 17
	<b>B</b>	May 16
	<b>C</b>	May 15
	<b>D</b>	May 12
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

62	<b>Question Description</b>	In which state is Burachapori wildlife sanctuary situated?
	<b>A</b>	Assam
	<b>B</b>	Sikkim
	<b>C</b>	Odisha
	<b>D</b>	Jharkhand
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

63	<b>Question Description</b>	Recently Which Indian supercomputer secured the 75th position in the prestigious Top 500 Global Supercomputing List?
	<b>A</b>	Prakhar
	<b>B</b>	PRATYUSH
	<b>C</b>	MIHIR
	<b>D</b>	AIRAWAT
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

64	<b>Question Description</b>	Which airport has been recognized as the most punctual airport in the world by aviation analytics firm Cirium ?
	<b>A</b>	Delhi Airport
	<b>B</b>	Kochi Airport
	<b>C</b>	Guwahati Airport
	<b>D</b>	Hyderabad Airport
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

65	<b>Question Description</b>	Which state has become the first in India to enforce the 'right to walk'?
	<b>A</b>	Sikkim
	<b>B</b>	Mizoram
	<b>C</b>	Kerala
	<b>D</b>	Punjab
	<b>E</b>	None of the above
	<b>Correct Answer</b>	D
	<b>Marks</b>	1

66	<b>Question Description</b>	January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?
	<b>A</b>	Monday
	<b>B</b>	Tuesday
	<b>C</b>	Wednesday
	<b>D</b>	Sunday
	<b>E</b>	None of the above
	<b>Correct Answer</b>	B
	<b>Marks</b>	1

67	<b>Question Description</b>	Present ages of Sameer and Anand are in the ratio of 5 : 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years?
	<b>A</b>	24
	<b>B</b>	27
	<b>C</b>	40
	<b>D</b>	Cannot be determined
	<b>E</b>	None of the above
	<b>Correct Answer</b>	A
	<b>Marks</b>	1

68

**Question Description**

A alone can do a piece of work in 6 days and B alone in 8 days. A and B undertook to do it for Rs. 3200. With the help of C, they completed the work in 3 days. How much is to be paid to C?

**A**

Rs. 375

**B**

Rs. 400

**C**

Rs. 600

**D**

Rs. 800

**E**

None of the above

**Correct Answer**

B

**Marks**

1

69

<b>Question Description</b>	How much does a watch lose per day, if its hands coincide every 64 minutes?
<b>A</b>	$32\frac{8}{11}$ min.
<b>B</b>	$36\frac{5}{11}$ min.
<b>C</b>	90 min
<b>D</b>	96 min
<b>E</b>	None of the above
<b>Correct Answer</b>	A
<b>Marks</b>	1

70

<b>Question Description</b>	A 270 metres long train running at the speed of 120 kmph crosses another train running in opposite direction at the speed of 80 kmph in 9 seconds. What is the length of the other train?
<b>A</b>	230 m
<b>B</b>	240 m
<b>C</b>	260 m
<b>D</b>	320 m
<b>E</b>	None of the above
<b>Correct Answer</b>	A
<b>Marks</b>	1

71

**Question Description**

Odd man out

41, 43, 47, 53, 61, 71, 73, 81

**A**

61

**B**

71

**C**

73

**D**

81

**E**

None of the above

**Correct Answer**

D

**Marks**

1

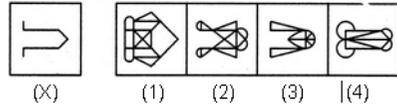
72

<b>Question Description</b>	The largest 4 digit number exactly divisible by 88 is:
<b>A</b>	9944
<b>B</b>	9768
<b>C</b>	9988
<b>D</b>	8888
<b>E</b>	None of the above
<b>Correct Answer</b>	A
<b>Marks</b>	1

73

**Question Description**

Find out the alternative figure which contains figure (X) as its part.



<b>A</b>	1
<b>B</b>	2
<b>C</b>	3
<b>D</b>	4
<b>E</b>	None of the above
<b>Correct Answer</b>	B
<b>Marks</b>	1

74

**Question Description**

The question given below consists of a question followed by three statements. You have to study the question and the statements and decide which of the statement(s) is/are necessary to answer the question.

By selling an article what is the profit percent gained?

I. 5% discount is given on list price.

II. If discount is not given, 20% profit is gained.

III. The cost price of the articles is Rs. 5000.

**A** Only I and II

**B** Only II and III

**C** Only I and III

**D** All I, II and III

**E** None of the above

**Correct Answer** A

**Marks** 1

75

<b>Question Description</b>	The difference between a two-digit number and the number obtained by interchanging the positions of its digits is 36. What is the difference between the two digits of that number?
<b>A</b>	3
<b>B</b>	4
<b>C</b>	9
<b>D</b>	Cannot be determined
<b>E</b>	None of the above
<b>Correct Answer</b>	B
<b>Marks</b>	1