COMMON ENTRANCE TEST - 2004

Subject: PHYSICS

DATE: 19.05.2004

TIME: 10.30 A.M. TO 11.50 A.M.

MAXIMUM MARKS: 60

MAXIMUM TIME: 80 MINUTES

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CET No. below				
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QUESTION BOOKLET					
VERSION	SERIAL				
CODE	NUMBER				
A 1	002369				

IMPORTANT INSTRUCTIONS TO CANDIDATES

(Please read the following instructions carefully, before you start answering on the OMR answer sheet)

- 1. The OMR answer sheet is issued at the start of the examination at 10.15 a.m., the candidate should first enter only Name and CET No. on the OMR answer sheet.
- 2. After the 2nd bell at 10.30 a.m. the Question Papers will be issued. Now, the candidate should enter the Version Code and Serial Number of question booklet on the OMR answer sheet. But, he shall not remove the staples on the right side of this booklet OR look inside the question booklet OR start answering on the OMR answer sheet until the 3rd bell rings.

As answer sheets are designed to suit the Optical Mark Reader (OMR) system, special care should be taken to fill those items accurately.

DO NOT DAMAGE OR MUTILATE THE TIMING, MARKS ON THE OMR ANSWER SHEETS.

- 3. Remove the staples at the right side to open the question paper booklet only after the 3rd bell at 10.40 a.m.
- 4. This question booklet contains 60 questions.
- 5. During the subsequent 70 minutes:
 - a) Read each question carefully.
 - b) Determine the correct answer from out of the four available choices given under each question.
 - c) Completely darken / shade the relevant circle with a blue or black ink ballpoint pen against the question number on the OMR answer sheet.

For example:

Q. No. 14: The product of 0.5 x 0.05 is: 1) 0.05 2) 0.005 3) 0.025 4) 0.25

As the correct answer is option no. 3, the candidate should darken the circle corresponding to option no. 3 completely with a blue or black ink ballpoint pen on the OMR answer sheet, as shown below:



- 6. For each correct answer, one mark will be awarded. For each wrong answer, quarter (1/4) mark will be deducted and if more than one circle is darkened for a given question, one mark will be deducted. Even a minute unintended dot will also be recognised and recorded by the scanner. Please avoid multiple markings of any kind.
- 7. Rough work should be done only on the blank space provided on each page of the question booklet. Rough work should not be done on the OMR answer sheet.
- 8. Please stop writing when the last bell rings at 11.50 a.m. Hand over the OMR answer paper set to the invigilator, who will separate the top sheet and will retain the same with him and return the bottom sheet replica to you to carry home.

NOTE: The candidate should safely preserve the replica of the OMR answer sheet for a minimum period of one year from the date of Common Entrance Test.

PHYSICS

- - 1) 0.4 m

2) 0.2 m

3) 0.1 m

4) 0.75 m

2. The physical quantity having the same dimensions as Planck's constant h is

1) Boltzmann constant

2) force

3) linear momentum

4) angular momentum

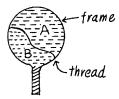
- 3. A balloon is rising vertically up with a velocity of 29ms^{-1} . A stone is dropped from it and it reaches the ground in 10 seconds. The height of the balloon when the stone was dropped from it is $(g = 9.8 \text{ ms}^{-2})$
 - 1) · 100 m

2) 200 m

3) 400 m

4) 150 m

4. A thread is tied slightly loose to a wire frame as in figure and the frame is dipped into a soap solution and taken out. The frame is completely covered with the film. When the portion *A* is punctured with a pin, the thread



- 1) becomes concave towards A
- 2) becomes convex towards A
- 3) remains in the initial position.
- 4) either (1) or (2) depending on the size of A w.r.t. B
- 5. Oxygen is 16 times heavier than hydrogen. Equal volumes of hydrogen and oxygen are mixed. The ratio of speed of sound in the mixture to that in hydrogen is

1)
$$\sqrt{\frac{1}{8}}$$

2) $\sqrt{\frac{32}{17}}$

3) $\sqrt{8}$

4) $\sqrt{\frac{2}{17}}$

		4			. A - 1
6.	When light is incident on a diffraction g	rating tl	ne zero order pi	rincipal maximum	will he
	1) one of the component colours	2)	absent		
	3) spectrum of the colours	4)	white	•	
7.	H - polaroid is prepared by		n		
	1) stretching polyvinyl alcohol a	nd then	heated with de	hydrating agent	
	2) stretching polyvinyl alcohol a	nd then	impregnating	with indine	
	3) orienting herapathite crystal				
	4) by using thin tourmaline crys			in in the second	
8.	SI unit of permittivity is				
	1) $C^2 m^2 N^{-1}$. 2)	$C^{-1} m^2 N^{-2}$		
	3) $C^2 m^2 N^2$	4)	$C^2 m^{-2} N^{-1}$	•	

A spherical drop of capacitance 1 μ F is broken into eight drops of equal radius. Then, the 9. capacitance of each small drop is

1)
$$\frac{1}{8}\mu F$$
 2) $8\mu F$ 3) $\frac{1}{2}\mu F$ 4) $\frac{1}{4}\mu F$

Two equal forces (P each) act at a point inclined to each other at an angle of 120° . The 10. magnitude of their resultant is

> 2P3) P_2

1) *P*

11.	If two wa	aves of the san t disturbance	ne frequency ar of the same am	id amplitud plitude the	de respectively waves differ in	on superposition prod n phase by	duce a
	1)	$\frac{\pi}{3}$		2)	$2\pi/3$		
	3)	π .		4)	zero		
12.	A man, s intervals cliffs is .	s of one second	een two cliffs, cl l. If the speed (aps his har of sound in	nds and starts latin is 340 ms	nearing a series of ech	noes at en the
	1)	340 m		2)	1620 m		
	3)	680 m		4)	1700 m		•
13.	and the the first	resulting diffra dark fringes o	elength 600 nm action pattern is on either side of	s observed of the centra	on a screen 2m al bright fringe	ls on a single slit 1mr away. The distance be is	etween
•	1)	1.2 mm		2)	1.2 cm		
	3)	2.4 cm		4)	2.4 mm		
14.	taken in	a polarimetei	gar solution is tube of length ity of sugar in t	$0.25 \mathrm{m}$ and	d an optical rot	of impure sugar solu ation of 0.4 rad is obs	ition is served.
	1)	80%		2)	89%		
	3)	11%		4)	20%		
15.	An elec (in ms ⁻¹		erated through	a pd of	45.5 volt. The	velocity acquired b	y it is
	1)	4×10^6		2)	4×10^4		
	3)		•	4)	zero		

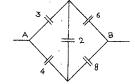
- **16.** When a body is earth connected, electrons from the earth flow into the body. This means the body is
 - 1) uncharged

- 2) charged positively
- 3) charged negatively
- 4) an insulator
- 17. Effective capacitance between A and B in the figure shown is (all capacitances are in μF)
 - 1) $21 \mu F$

2) $23 \mu F$

3) $\frac{3}{14}\mu F$

4) $\frac{14}{3}\mu F$



- 18. Which state of triply ionised Baryllium (Be^{+++}) has the same orbital radius as that of the ground state of hydrogen?
 - 1) n = 1

2) n = 2

3) n = 3

- 4) n = 4
- **19.** If M is the atomic mass and A is the mass number, packing fraction is given by
 - 1) $\frac{A}{M-A}$

 $2) \quad \frac{A-M}{A}$

3) $\frac{M}{M-A}$

- 4) $\frac{M-A}{A}$
- 20. A count rate meter shows a count of 240 per minute from a given radioactive source. One hour later the meter shows a count rate of 30 per minute. The half-life of the source is
 - 1) 20 min

2) 30 min

3) 80 min

4) 120 min

- 21. The refractive index of a particular material is 1.67 for blue light, 1.65 for yellow light and 1.63 for red light. The dispersive power of the material is
 - 1) 0.0615

2) 0.024

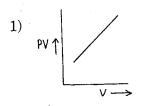
3) 0.031

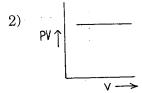
- 4) 1.60
- 22. An ideal gas heat engine operates in a Carnot's cycle between 227°C and 127°C. It absorbs 6 x 10⁴ J at high temperature. The amount of heat converted into work is
 - 1) $4.8 \times 10^4 \,\mathrm{J}$

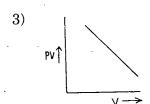
2) $3.5 \times 10^4 J$

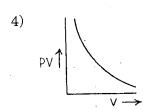
3) $1.6 \times 10^4 \,\mathrm{J}$

- 4) $1.2 \times 10^4 \,\mathrm{J}$
- 23. Which one of the following graphs represents the behaviour of an ideal gas?









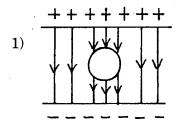
- 24. Rainbow is formed due to
 - 1) refraction
 - total internal reflection
- 2) dispersion and total internal reflection
- 4) scattering
- **25.** A beam of parallel rays is brought to a focus by a plano-convex lens. A thin concave lens of the same focal length is joined to the first lens. The effect of this is
 - 1) the focal point shifts away from the lens by a small distance.
 - 2) the focus remains undisturbed.
 - 3) the focus shifts to infinity.
 - 4) the focal point shifts towards the lens by a small distance.

			8	•	A •	1
26.		nductors of the same ratio 2:1. If the te amounts of heat co			atio 1 : 2 and their length	
	1)		2)			
	· 3)	4:1	4)			
27.	Blowing 1) 3)	g air with open mou isothermal proces isobaric process	th is an example of s 2)	adiabatic process		
28.	Sound	•	•	,	;	
	1)	vaves in air are alw	ays longitudinal bed	cause,	1	
	1)	air is a mixture of				
-	2)	density of air is ve				
	3)	of the inherent ch	aracteristics of soun	id waves in air.		
	4)	air does not have a	a modulus of rigidit;	y.	,	
29.	In Youn	g's double slit exper			replaced by white light,	
	1)	all bright fringes b	ecome white			
	2)		ave colours between	n violet and red		
•	3)	no fringes are obse		r violet and red.		
	4)		is white, all other f	ringog gro oslal	· ,	
30.	1 mm fro	ng's double slit expe re observed one met	riment, the separati tre away. If it produ te, the wavelength o	on between the two ces the second dar of the monochroma	o slits is 0.9 mm and the k fringe at a distance of atic source of light used	
			2)	600 nm		
	<i>ა)</i>	450 nm	. 4)	400 nm		

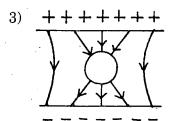
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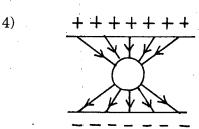
4) 400 nm

31. An uncharged sphere of metal is placed inside a charged parallel plate capacitor. The lines of force will look like



2)





32. A wire has a resistance of 6Ω . It is cut into two parts and both half values are connected in parallel. The new resistance is

1) 12Ω

2) 1.5Ω

3) 3 Ω

4) 6Ω

33. A current flows in a conductor from east to west. The direction of the magnetic field at a point above the conductor is

1) towards north

2) towards south

3) towards east

4) towards west

34. A bar magnet is equivalent to

- 1) solenoid carrying current
- 2) circular coil carrying current
- 3) torroid carrying current
- 4) straight conductor carrying current

35. Excitation energy of a hydrogen like ion in its first excitation state is 40.8 eV. Energy needed to remove the electron from the ion in ground state is

1) 54.4 eV

2) 13.6 eV

3) 40.8 eV

4) 27.2 eV

36. Threshold wavelength for photoelectric emission from a metal surface is $5200 \stackrel{0}{A}$. Photoelectrons will be emitted when this surface is illuminated with monochromatic radiation from

1) 50 W IR lamp

2) 10 W IR lamp

3) 1 W IR lamp

4) 50 W UV lamp

37. The emitter-base junction of a transistor is biased while the collector-base junction is biased.

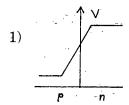
1) reverse, forward

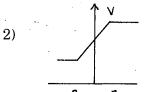
2) reverse, reverse

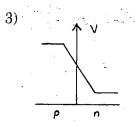
3) forward, forward

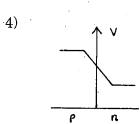
4) forward, reverse

38. In a forward biased p-n junction diode, the potential barrier in the depletion region is of the form









39. A cylinder of radius r and length l is placed in an uniform electric field E parallel to the axis of the cylinder. The total flux for the surface of the cylinder is given by

1) $\pi r^2 \cdot E$

 $2) \quad \left(\pi r^2 + \pi l^2\right) E$

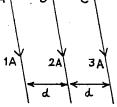
3) zero

4) $2\pi r^2 E$

40. Two electric bulbs A and B are rated as 60 W and 100 W. They are connected in parallel to the same source. Then,

- 1) both draw the same current
- 2) A draws more current than B
- 3) B draws more current than A
- 4) current drawn are in the ratio of their resistances.

- - 1) towards A.
 - 2) towards C.
 - 3) perpendicular to the plane of paper and outward.
 - 4) perpendicular to the plane of paper and inward.

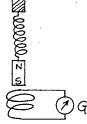


- 42. Curie-Weiss law is obeyed by iron at a temperature
 - 1) below Curie temperature
- 2) above Curie temperature
- 3) at Curie temperature only
- 4) at all temperatures
- **43.** The dimensional formula for inductance is
 - 1) $ML^2 T^{-1} A^{-2}$

2) $ML^2 T^{-2}A^{-1}$

3) $ML^2T^{-2}A^{-2}$

- 4) $ML^2 T A^{-2}$
- 44. A magnet NS is suspended from a spring and while it oscillates, the magnet moves in and out of the coil *C*. The coil is connected to a galvanometer *G*. Then, as the magnet oscillates,
 - 1) G shows deflection to the left and right with constant amplitude.
 - 2) *G* shows deflection on one side.
 - 3) *G* shows no deflection.
 - 4) *G* shows deflection to the left and right but the amplitude steadily decreases.



- 45. The maximum current that can be measured by a galvanometer of resistance $40\,\Omega$ is $10\,\text{mA}$. It is converted into a voltmeter that can read upto $50\,\text{V}$. The resistance to be connected in series with the galvanometer is (in ohm)
 - 1) 5040

2) 4960

3) 2010

4) 4050

- 46. An unknown resistance R_1 is connected in series with a resistance of $10\,\Omega$. This combination is connected to one gap of a metre bridge while a resistance R_2 is connected in the other gap. The balance point is at 50 cm. Now, when the $10\,\Omega$ resistance is removed the balance point shifts to 40 cm. The value of R_1 is (in ohm)
 - 1) 60

2) 40

3) 20

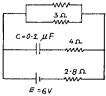
4) 10

- 47. In the circuit shown, the internal resistance of the cell is negligible. The steady state current in the 2Ω resistor is
 - 1) 0.9 A

2) 1.5 A

3) 0.6 A

4) 1.2 A



- 48. A rectangular coil of 300 turns has an average area of 25 cm x 10 cm. The coil rotates with a speed of 50 cps in a uniform magnetic field of strength $4 \times 10^{-2} T$ about an axis perpendicular to the field. The peak value of the induced emf is (in volt)
 - 1) 3π

2) 30π

3) 300π

- 4) $3000.\pi$
- **49.** In a LCR circuit the pd between the terminals of the inductance is 60 V, between the terminals of the capacitor is 30 V and that between the terminals of resistance is 40 V. The supply voltage will be equal to
 - 1) 50 V

2) 70 V

3) 130 V

- 4) 10 V
- **50.** A vertical circular coil of radius 0.1 m and having 10 turns carries a steady current. When the plane of the coil is normal to the magnetic meridian, a neutral point is observed at the centre of the coil. If $B_H = 0.314 \times 10^{-4} T$, the current in the coil is
 - 1) 2 A

2) 1 A

3) 0.5 A

4) 0.25 A

	is		,,,,,,,	of the sun at the time of total solar eclipse
	1) 3)	continuous emission spectrum. line emission spectrum.	2) 4)	· • • • • • • • • • • • • • • • • • • •
52.	Heavy w	vater is		
	. 1)	water, in which soap does not lat	her	
	2)	compound of heavy oxygen and h	ieavy	hydrogen
	3).	compound of deuterium and oxyg		
	4)	water at 4°C		
53.	The nuc	lear reactor at Kaiga is a	•	
•	1)	breeder reactor	2)	power reactor
	3)	research reactor	4)	fusion reactor
54.	When a	body moves in a circular path, no	work	is done by the force since,
	1)	there is no displacement		
	2)	there is no net force		
	3)	force and displacement are perpe	endici	ular to each other
	4)	the force is always away from the		
55.	A bullet	moving with a speed of 100 ms ⁻¹ c	an jus	st penetrate two planks of equal thickness.
. •				the same bullet when the speed is doubled
	will be			
	1)	4	2)	8

56.	S				
	energies	s is			
	1)	1:3	2)	1:1	
	3)	2:1	4)	3:1	
57.	The loud	lness and pitch of a sound no	te depends	on	
	. 1)	intensity and frequency	2)	frequency and number of harmonics	
	3)	Intensity and velocity	4)	frequency and velocity	
58.	Absorpt	on co-efficient of an open wir	ndow is		
	1)	zero	2)	0.5	
	3)	1	4)	0.25	
59.	In Meld	e's experiment in the transv	erse mode,	the frequency of the tuning fork and the	
	frequenc	y of the waves in the string a	are in the r	atio	
	1)	1:1	2)	1:2	
	3)	2:1	. 4)	4:1	
60.	The diffe	erence between the apparan	t frequency	of a source of sound as perceived by the	
				of the frequency of the source. If the speed	
		in air is 300 ms ⁻¹ the velocity		• -	
	1)	6 ms^{-1}	2)	$3~\mathrm{ms^{-1}}$	
	3)	1.5 ms ⁻¹	4)	$12 \; \mathrm{ms^{-1}}$	
	·		0 70 1		

(Space for Rough Work)

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