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

2 0 = 0

Please fill your CET No. below

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.

RL - 33

PHYSICS

- 1. A thin plano-convex lens acts like a concave mirror of focal length 0.2 m when silvered from its plane surface. The refractive index of the material of the lens is 1.5. The radius of curvature of the convex surface of the lens will be
 - 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

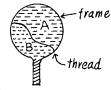
3) linear momentum

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

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

When li	ght is incident on a diffraction gra	ting th	ne zero order r	rincipal mo	minama	11 1
1)	one of the component colours	2)	absent	incipai iiia	ixiiiiuiii Wi	n be
3)	spectrum of the colours	4)	white			
H - pola	roid is prepared by		i i			
1)	stretching polyvinyl alcohol and	then	heated with d	ehvdrating	agent	
2)	stretching polyvinyl alcohol and	then	impregnating	with inding	agent	
3)	orienting herapathite crystal in	the sa	me direction i	n nitrocella	Iloso	
4)	by using thin tourmaline crystal			11 11101 000110	nose.	
SI unit o	f permittivity is					
	$C^2 m^2 N^{-1}$	2)	$C^{-1} m^2 N^{-2}$			
	$C^2 m^2 N^2$	-/	0 110 24			

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

1) $\frac{1}{8}\mu F$

2) 8 μ F

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

 $(4) \quad \frac{1}{4}\mu F$

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

1) *P*

2) 2 P

3) P_2

 P_4

- 11. If two waves of the same frequency and amplitude respectively on superposition produce a resultant disturbance of the same amplitude the waves differ in phase by

 2) $2\pi/$
 - $\frac{\pi}{3}$
- 12. A man, standing between two cliffs, claps his hands and starts hearing a series of echoes at intervals of one second. If the speed of sound in air is 340 ms⁻¹, the distance between the cliffs is
 - 1) 340 m 3) 680 m 2) 1620 m 4) 1700 m
- 13. A beam of light of wavelength 600 nm from a distant source falls on a single slit 1mm wide and the resulting diffraction pattern is observed on a screen 2m away. The distance between the first dark fringes on either side of the central bright fringe is
 - 1) 1.2 mm 3) 2.4 cm 2) 1.2 cm 4) 2.4 mm
- 14. Specific rotation of sugar solution is 0.01 SI units. 200 kgm⁻³ of impure sugar solution is taken in a polarimeter tube of length 0.25 m and an optical rotation of 0.4 rad is observed. The percentage of purity of sugar in the sample is
 - 1) 80% 2) 89% 3) 11% 4) 20%
- 15. An electron is accelerated through a pd of 45.5 volt. The velocity acquired by it is (in ms⁻¹).....
 - 1) 4×10^6 2) 4×10^4 3) 10^6 4) zero

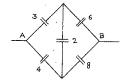
- **16.** When a body is earth connected, electrons from the earth flow into the body. This means the body is
 - 1) uncharged

- 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.µF

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 = 3

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

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

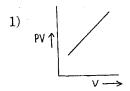
3) 0.031

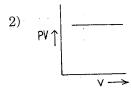
- 4) 1.60
- 22. An ideal gas heat engine operates in a Carnot's cycle between 227°C and 127°C. It absorbs 6 x 10⁴ J at high temperature. The amount of heat converted into work is
 - 1) $4.8 \times 10^4 \, J$

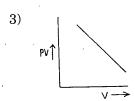
2) $3.5 \times 10^4 \text{ J}$

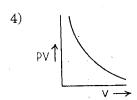
3) $1.6 \times 10^4 \,\mathrm{J}$

- 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

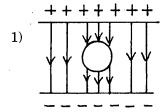
- 2) dispersion and total internal reflection
- 3) total internal reflection
- 4) scattering
- **25.** A beam of parallel rays is brought to a focus by a plano-convex lens. A thin concave lens of the same focal length is joined to the first lens. The effect of this is
 - 1) the focal point shifts away 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.

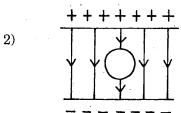
26.	Two conductors of the same material have their diameters in the ratio 1:2 and their length in the ratio 2:1. If the temperature difference between their ends is the same, then the ratio of amounts of heat conducted per second through them will be -				
		8:1	. 2		
	. 3)	4:1	4		
27.	Blowing 1) 3)	air with open mouth is an exa isothermal process isobaric process	ample of 27	adiabatic process	
28.	Sound w	vaves in air are always longitud	dinal be	cause,	
	1)	air is a mixture of several gas	ses		
	2)	density of air is very small			
	3)	of the inherent characteristics	s of sour	id waves in air.	
	4)	air does not have a modulus o	of rigidit	y.	
29.	In Young then	g's double slit experiment if me	onochro	natic light used is replaced by white light,	
	1)	all bright fringes become whit	e.		
	2)	all bright fringes have colours		o violet and red	
	3)	no fringes are observed.			
	4)	only central fringe is white, al	l other f	ringes are coloured.	
30.	In a Young's double slit experiment, the separation between the two slits is 0.9 mm and the fringes are observed one metre away. If it produces the second dark fringe at a distance of 1 mm from the central fringe, the wavelength of the monochromatic source of light used is				
		500 nm	2)	600 nm	
	3)	450 nm	4)	400 nm	

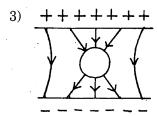
(Space for Rough Work)

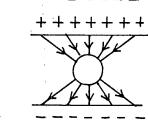
26.

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









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

4)

1) 12Ω

2) 1.5Ω

3) 3 Ω

4) 6 Ω

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

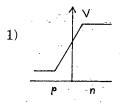
4) 50 W UV lamp

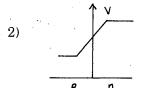
37. The emitter-base junction of a transistor is biased while the collector-base junction is biased.

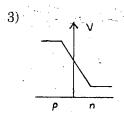
1) reverse, forward

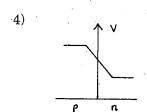
- 2) reverse, reverse
- 3) forward, forward
- 4) forward, reverse

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) $\pi r^2 \cdot E$

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

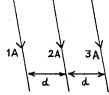
3) zero

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

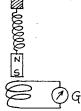
2) $ML^2 T^{-2}A^{-1}$

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.



- 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 40Ω is 10 mA. It is converted into a voltmeter that can read upto 50 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 10Ω . 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 10Ω 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

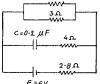
47. In the circuit shown, the internal resistance of the cell is negligible. The steady state current in the 2Ω resistor is



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

51.	The spec	ctrum obtained from the chromos	phere	of the sun at the	time of total sola	r eclips
	is		,	• [•	
	1)	continuous emission spectrum.	2)	line absorption s		
	3)	line emission spectrum.	4)	band absorption	spectrum	
52.	Heavy w	vater is			<i>پ</i>	
	1)	water, in which soap does not lat	her	* 1 * 1 * 2		
	2)	compound of heavy oxygen and h	ięavy	hydrogen		
		compound of deuterium and oxyg				
	4)	water at 4°C				
	·			1		
53.	The nucl	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 for	ce since,	•
	1)	there is no displacement			· .	
	2)	there is no net force				
	3)	force and displacement are perpe	andica	lar to each other		
	4)	the force is always away from the				
	1)	the force is always away from the	e cem	re	•	
55.	A bullet	moving with a speed of 100 ms ⁻¹ c	an ju	st penetrate two p	lanks of equal th	ickness
•	Then, th	e number of such planks penetrat	ed by	the same bullet w	hen the speed is	doubled
	will be	·········		1	,	
	1)	4 .	2)	8		•
	3)	6	4)	10		
		(C				
		(b' F 1)		XX7 1 \		

56.		lies of masses 1 kg and 2 l s is	kg have equal i	momentum. Then, the ratio of their kineti
	1)		2)	1:1
	3)	2:1	4)	3:1
57.	The loud	dness and pitch of a sound	l note depends	on
	. 1)	intensity and frequency	2)	frequency and number of harmonics
	3)	Intensity and velocity	4)	frequency and velocity
58.	Absorpt	ion co-efficient of an open	window is	
	1)	zero	· 2)	0.5
	3)	1	4)	0.25
59.		e's experiment in the trans		the frequency of the tuning fork and the
	1)	1:1		1:2
	3)	2:1	4)	4:1
60.		· · · · · · · · · · · · · · · · · · ·		of a source of sound as perceived by the
		during its approach and i in air is 300 ms ⁻¹ the velo		of the frequency of the source. If the speed
	1)	6 ms ⁻¹	2)	3 ms ⁻¹
	3)	1.5 ms ⁻¹	4)	12 ms ⁻¹
		(Spa	ace for Rough	Work)

15 A - 1

