

# COMMON ENTRANCE TEST - 2007

DATE	SUBJECT	TIME
09 - 05 - 2007	PHYSICS & CHEMISTRY (COMBINED PAPER)	10.00 AM to 12.30 PM

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
120	150 MINUTES	140 MINUTES

MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS									
	VERSION CODE	SERIAL NUMBER								
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## IMPORTANT INSTRUCTIONS TO CANDIDATES

(Candidates are advised to read the following instructions carefully, before answering on OMR answer sheet.)

1. Ensure that you have entered your Name and Register Number of 2<sup>nd</sup> PUC Annual Examination / 12<sup>th</sup> Std. in the space provided on the OMR answer sheet.
2. Ensure that CET No. has been entered and shaded the respective circles on the OMR answer sheet.
3. **ENSURE THAT THE TIMING, MARKS PRINTED ON THE OMR ANSWER SHEET ARE NOT DAMAGED/ MUTILATED/ SPOILED.**
4. This Question Booklet is issued to you by the invigilator after the 2<sup>nd</sup> Bell. i.e., after 10.00 a.m.
5. Enter the Serial Number of this question booklet on the OMR answer sheet.
6. Carefully enter the Version Code of this question booklet on the OMR answer sheet and SHADE the respective circles completely.
7. As answer sheets are designed to suit the Optical Mark Reader (OMR) system, please take special care while filling and shading the CET NO. & Version Code of this question booklet.
8. **DO NOT FORGET TO SIGN AT THE BOTTOM PORTION OF OMR ANSWER SHEET IN THE SPACE PROVIDED.**
9. Until the 3<sup>rd</sup> Bell is rung at 10.10 a.m. :
  - Do not remove the seal 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.
10. After the 3<sup>rd</sup> Bell is rung at 10.10 a.m., remove the seal present on the right hand side of this question booklet and start answering on the OMR answer sheet.
11. This question booklet contains 120 questions and each question will have four different options / choices.
12. During the subsequent 140 minutes :
  - Read each question carefully.
  - Determine the correct answer from out of the four available options / choices given under each question.
  - **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 OF SHADING THE CIRCLE ON THE OMR SHEET IS AS SHOWN BELOW :**



13. Please note that even a minute unintended ink dot on the OMR sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
14. Use the space provided on each page of the question booklet for Rough work AND do not use the OMR answer sheet for the same.
15. After the last bell is rung at 12.30 p.m., stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
16. Hand over the OMR ANSWER SHEET to the room invigilator as it is.
17. After separating and retaining the top sheet (CET Cell Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
18. Preserve the replica of the OMR answer sheet for a minimum period of One year.



# PHYSICS

1. A ray of light is travelling from glass to air. (Refractive index of glass = 1.5) The angle of incidence is  $50^\circ$ . The deviation of the ray is

1)  $\sin^{-1}\left[\frac{\sin 50^\circ}{1.5}\right] - 50^\circ$                       2)  $50^\circ - \sin^{-1}\left[\frac{\sin 50^\circ}{1.5}\right]$

3)  $80^\circ$     4)  $0^\circ$

2. A vessel of height  $2d$  is half filled with a liquid of refractive index  $\sqrt{2}$  and the other half with a liquid of refractive index  $n$ . (The given liquids are immiscible). Then the apparent depth of the inner surface of the bottom of the vessel (neglecting the thickness of the bottom of the vessel) will be

1)  $\frac{nd}{d + \sqrt{2}n}$                                       2)  $\frac{\sqrt{2}n}{d(n + \sqrt{2})}$

3)  $\frac{d(n + \sqrt{2})}{n\sqrt{2}}$                                       4)  $\frac{n}{d(n + \sqrt{2})}$

3. A ray of light is incident normally on one face of a right angled isosceles prism. It then grazes the hypotenuse. The refractive index of the material of the prism is

1) 1.732    2) 1.5  
3) 1.414    4) 1.33

4. Two thin equiconvex lenses each of focal length 0.2 m are placed coaxially with their optic centres 0.5 m apart. Then the focal length of the combination is

1) 0.1 m    2) -0.1 m  
3) 0.4 m    4) -0.4 m

5. A prism of a certain angle deviates the red and blue rays by  $8^\circ$  and  $12^\circ$  respectively. Another prism of the same angle deviates the red and blue rays by  $10^\circ$  and  $14^\circ$  respectively. The prisms are small angled and made of different materials. The dispersive powers of the materials of the prisms are in the ratio

1) 11 : 9    2) 6 : 5  
3) 9 : 11    4) 5 : 6

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(Space for Rough Work)

6. The electro magnetic theory of light failed to explain
- 1) Interference
  - 2) Diffraction
  - 3) Polarisation
  - 4) Photo electric effect
7. Light from two coherent sources of the same amplitude  $A$  and wavelength  $\lambda$  illuminates the screen. The intensity of the central maximum is  $I_0$ . If the sources were incoherent, the intensity at the same point will be
- 1)  $\frac{I_0}{2}$
  - 2)  $I_0$
  - 3)  $2I_0$
  - 4)  $4I_0$
8. In Young's double slit experiment with sodium vapour lamp of wavelength 589 nm and the slits 0.589 mm apart, the half angular width of the central maximum is
- 1)  $\text{Sin}^{-1}0.1$
  - 2)  $\text{Sin}^{-1}0.001$
  - 3)  $\text{Sin}^{-1}0.0001$
  - 4)  $\text{Sin}^{-1}0.01$
9. A single slit Fraunhofer diffraction pattern is formed with white light. For what wavelength of light the third secondary maximum in the diffraction pattern coincides with the second secondary maximum in the pattern for red light of wavelength  $6500 \text{ \AA}$  ?
- 1)  $9100 \text{ \AA}$
  - 2)  $4642.8 \text{ \AA}$
  - 3)  $4100 \text{ \AA}$
  - 4)  $4400 \text{ \AA}$
10. The head lights of a jeep are 1.2 m apart. If the pupil of the eye of an observer has a diameter of 2 mm and light of wavelength  $5896 \text{ \AA}$  is used, what should be the maximum distance of the jeep from the observer if the two head lights are just separated?
- 1) 3.39 m
  - 2) 3.39 km
  - 3) 33.9 m
  - 4) 33.9 km

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(Space for Rough Work)

11. When the angle of incidence is  $60^\circ$  on the surface of a glass slab, it is found that the reflected ray is completely polarised. The velocity of light in glass is
- 1)  $3 \times 10^8 \text{ ms}^{-1}$                       2)  $2 \times 10^8 \text{ ms}^{-1}$   
3)  $\sqrt{3} \times 10^8 \text{ ms}^{-1}$                       4)  $\sqrt{2} \times 10^8 \text{ ms}^{-1}$
12. A 20 cm length of a certain solution causes right handed rotation of  $38^\circ$ . A 30 cm length of another solution causes left handed rotation of  $24^\circ$ . The optical rotation caused by 30 cm length of a mixture of the above solutions in the volume ratio 1 : 2 is
- 1) right handed rotation of  $3^\circ$                       2) left handed rotation of  $3^\circ$   
3) right handed rotation of  $14^\circ$                       4) left handed rotation of  $14^\circ$
13. Two identical charges repel each other with a force equal to 10 mgwt when they are 0.6 m apart in air. ( $g = 10 \text{ ms}^{-2}$ ) The value of each charge is
- 1)  $2\mu\text{C}$     2)  $2\text{nC}$   
3)  $2 \times 10^{-7}\text{C}$     4)  $2\text{mC}$
14. The potential of the electric field produced by a point charge at any point  $(x, y, z)$  is given by  $V = 3x^2 + 5$ , where  $x, y, z$  are in metres and  $V$  is in volts. The intensity of the electric field at  $(-2, 1, 0)$  is
- 1)  $-12\text{Vm}^{-1}$     2)  $+12\text{Vm}^{-1}$   
3)  $-17\text{Vm}^{-1}$     4)  $+17\text{Vm}^{-1}$
15. The potential of a large liquid drop when eight liquid drops are combined is 20V. Then the potential of each single drop was
- 1) 2.5 V    2) 5 V  
3) 7.5 V    4) 10 V

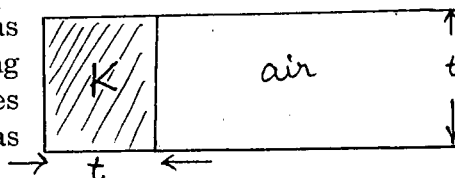
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(Space for Rough Work)

16. Two identical capacitors each of capacitance  $5\mu F$  are charged to potentials 2 kV and 1 kV respectively. The -ve ends are connected together. When the +ve ends are also connected together, the loss of energy of the system is

- 1) 1.25 J  
2) 5 J  
3) 0 J  
4) 160 J

17. A parallel plate capacitor with air as the dielectric has capacitance  $C$ . A slab of dielectric constant  $K$  and having the same thickness as the separation between the plates is introduced so as to fill one-fourth of the capacitor as shown in the figure. The new capacitance will be



- 1)  $\frac{KC}{4}$   
2)  $(K+1)\frac{C}{4}$   
3)  $(K+2)\frac{C}{4}$   
4)  $(K+3)\frac{C}{4}$

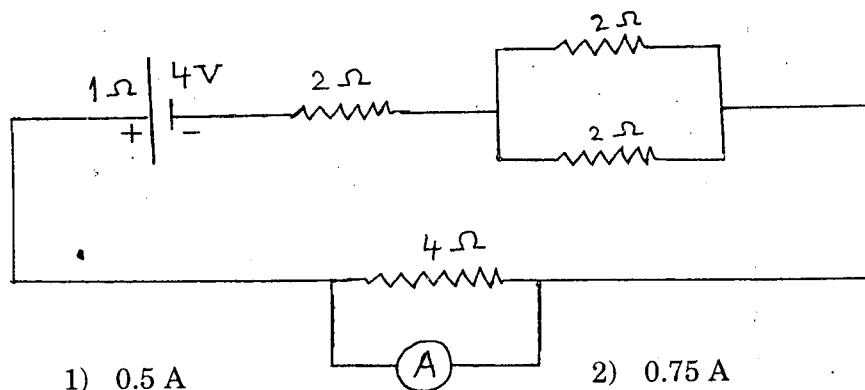
18. A current of 5 A is passing through a metallic wire of cross-sectional area  $4 \times 10^{-6} \text{ m}^2$ . If the density of charge carriers of the wire is  $5 \times 10^{26} \text{ m}^{-3}$ , the drift velocity of the electrons will be

- 1)  $1 \times 10^{-2} \text{ ms}^{-1}$   
2)  $1.56 \times 10^{-3} \text{ ms}^{-1}$   
3)  $1.56 \times 10^{-2} \text{ ms}^{-1}$   
4)  $1 \times 10^2 \text{ ms}^{-1}$

19. Two bulbs rated 25 W – 220 V and 100 W – 220 V are connected in series to a 440 V supply. Then,

- 1) both the bulbs fuse  
2) neither of the bulbs fuses  
3) 25 W bulb fuses  
4) 100 W bulb fuses

20. The current passing through the ideal ammeter in the circuit given below is



- 1) 0.5 A  
2) 0.75 A  
3) 1 A  
4) 1.25 A

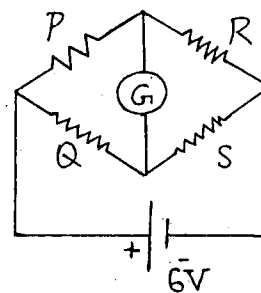
(Space for Rough Work)

21. In the Wheatstone's network given below,

$$P = 10\Omega, \quad Q = 20\Omega$$

$$R = 15\Omega, \quad S = 30\Omega$$

The current passing through the battery  
(of negligible internal resistance) is



- |           |           |
|-----------|-----------|
| 1) 0.72 A | 2) 0.18 A |
| 3) 0 A    | 4) 0.36 A |

22. A circular coil carrying a certain current produces a magnetic field  $B_0$  at its centre. The coil is now rewound so as to have 3 turns and the same current is passed through it. The new magnetic field at the centre is

- |           |                    |
|-----------|--------------------|
| 1) $3B_0$ | 2) $\frac{B_0}{3}$ |
| 3) $9B_0$ | 4) $\frac{B_0}{9}$ |

23. A proton and a deuteron with the same initial kinetic energy enter a magnetic field in a direction perpendicular to the direction of the field. The ratio of the radii of the circular trajectories described by them is

- |                   |          |
|-------------------|----------|
| 1) 1 : 2          | 2) 1 : 1 |
| 3) 1 : $\sqrt{2}$ | 4) 1 : 4 |

24. Two tangent galvanometers A and B have coils of radii 8 cm and 16 cm respectively and resistance  $8\Omega$  each. They are connected in parallel with a cell of emf 4 V and negligible internal resistance. The deflections produced in the T.G's A and B are  $30^\circ$  and  $60^\circ$  respectively. If A has 2 turns, then B must have

- |             |             |
|-------------|-------------|
| 1) 2 turns  | 2) 6 turns  |
| 3) 12 turns | 4) 18 turns |

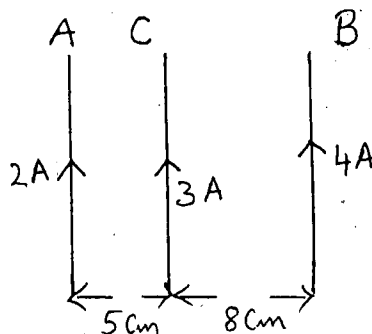
25. A charged particle is moving in a magnetic field of strength  $B$  perpendicular to the direction of the field. If  $q$  and  $m$  denote the charge and mass of the particle respectively. Then the frequency of rotation of the particle is

- |                              |                              |
|------------------------------|------------------------------|
| 1) $f = \frac{2\pi m}{qB}$   | 2) $f = \frac{2\pi^2 m}{qB}$ |
| 3) $f = \frac{qB}{2\pi m^2}$ | 4) $f = \frac{qB}{2\pi m}$   |

(Space for Rough Work)



26.  $A$  and  $B$  are two infinitely long straight parallel conductors.  $C$  is another straight conductor of length 1 m kept parallel to  $A$  and  $B$  as shown in the figure. Then the force experienced by  $C$  is



- 1) towards  $B$  equal to  $0.6 \times 10^{-5} N$
- 2) towards  $A$  equal to  $5.4 \times 10^{-5} N$
- 3) towards  $B$  equal to  $5.4 \times 10^{-5} N$
- 4) towards  $A$  equal to  $0.6 \times 10^{-5} N$

27. An electric bulb has a rated power of 50 W at 100 V. If it is used on an a.c. source 200 V, 50 Hz, a choke has to be used in series with it. This choke should have an inductance of

- 1) 1.1 H
- 2) 0.1 H
- 3) 1 mH
- 4) 0.1 mH

28. An inductance of  $\frac{200}{\pi}$  mH, a capacitance of  $\frac{10^{-3}}{\pi}$  F and a resistance of  $10 \Omega$  are connected in series with an a.c. source 220 V, 50 Hz. The phase angle of the circuit is

- 1)  $\frac{\pi}{3}$
- 2)  $\frac{\pi}{2}$
- 3)  $\frac{\pi}{4}$
- 4)  $\frac{\pi}{6}$

29. A stepdown transformer reduces the voltage of a transmission line from 2200 V to 220 V. The power delivered by it is 880 W and its efficiency is 88%. The input current is

- 1) 4.65 A
- 2) 0.465 A
- 3) 0.0465 A
- 4) 4.65 mA

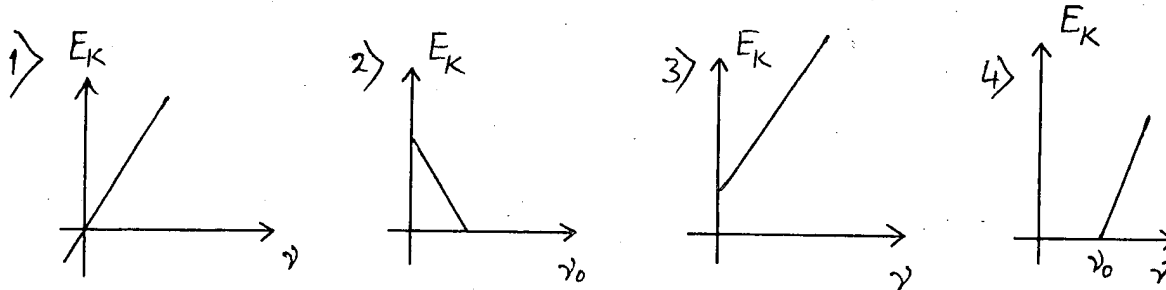
30. Current in a coil changes from 4 A to zero in 0.1 second and the emf induced is 100 V. The self inductance of the coil is

- 1) 4 H
- 2) 2.5 H
- 3) 0.4 H
- 4) 0.25 H

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(Space for Rough Work)

31. All components of the electromagnetic spectrum in vacuum have the same
- 1) Frequency
  - 2) Wavelength
  - 3) Velocity
  - 4) Energy
32. Which one of the following graphs represents the variation of maximum kinetic energy ( $E_K$ ) of the emitted electrons with frequency  $\gamma$  in photoelectric effect correctly ?



- 1) 1
- 2) 2
- 3) 3
- 4) 4

33. A and B are two metals with threshold frequencies  $1.8 \times 10^{14}$  Hz and  $2.2 \times 10^{14}$  Hz. Two identical photons of energy 0.825 eV each are incident on them. Then photoelectrons are emitted in
- 1) A alone
  - 2) B alone
  - 3) in both A and B
  - 4) in neither A nor B
- (Take  $h = 6.6 \times 10^{-34}$  Js)

34. The ionization energy of  $L_i^{++}$  is equal to
- 1)  $hcR$
  - 2)  $2 hcR$
  - 3)  $6 hcR$
  - 4)  $9 hcR$
35. Electrons in a certain energy level  $n = n_1$ , can emit 3 spectral lines. When they are in another energy level  $n = n_2$ . They can emit 6 spectral lines. The orbital speeds of the electrons in the two orbits are in the ratio
- 1) 1 : 2
  - 2) 2 : 1
  - 3) 3 : 4
  - 4) 4 : 3

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(Space for Rough Work)

36. The deBroglie wavelength of a proton (charge =  $1.6 \times 10^{-19} C$ , mass =  $1.6 \times 10^{-27} kg$ ) accelerated through a p.d of 1 kV is
- 1) 0.9 nm                      2)  $7 \overset{0}{A}$   
3)  $0.9 \times 10^{-12} m$               4)  $600 \overset{0}{A}$
37. A radio active element forms its own isotope after 3 consecutive disintegrations. The particles emitted are
- 1)  $2\alpha$  particles and  $1\beta$  particle      2)  $2\beta$  particles and  $1\gamma$  particle  
3)  $2\beta$  particles and  $1\alpha$  particle      4)  $3\beta$  particles
38. A radio active substance contains 10,000 nuclei and its half life period is 20 days. The number of nuclei present at the end of 10 days is
- 1) 7,500                                  2) 8,000  
3) 9,000                                  4) 7,070
39. In Raman effect, Stokes' lines are spectral lines having
- 1) wavelength greater than that of the original line.  
2) wavelength less than that of the original line.  
3) wavelength equal to that of the original line.  
4) frequency greater than that of the original line.
40. The principle of LASER action involves
- 1) Stimulated emission  
2) Population inversion  
3) Amplification of particular frequency emitted by the system  
4) All of these

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(Space for Rough Work)

41. The volume of a nucleus is directly proportional to .....
- 1)  $A^{\frac{1}{3}}$     2)  $\sqrt{A}$   
 3)  $A^3$     4)  $A$
- (Where  $A$  = mass number of the nucleus)
42. An electron is
- 1) A lepton    2) A nucleon  
 3) Baryon    4) Hadron
43. Minority carriers in a p-type semiconductor are
- 1) Holes     2) Free electrons  
 3) Both holes and free electrons    4) Neither holes nor free electrons
44. In a reverse biased diode when the applied voltage changes by 1 V, the current is found to change by  $0.5 \mu A$ . The reverse bias resistance of the diode is
- 1)  $2 \Omega$      2)  $200 \Omega$   
 3)  $2 \times 10^6 \Omega$                                      4)  $2 \times 10^5 \Omega$
45. The truth table given below is for

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(A and B are the inputs, Y is the output)

- 1) NAND    2) XOR  
 3) AND     4) NOR

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(Space for Rough Work)

46. The dimensional formula for impulse is

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

2)  $M^{-1}LT^{-1}$

3)  $ML^{-1}T$

4)  $MLT^{-1}$

47. The maximum height attained by a projectile when thrown at an angle  $\theta$  with the horizontal is found to be half the horizontal range. Then  $\theta =$

1)  $\tan^{-1} \frac{1}{2}$

2)  $\frac{\pi}{4}$

3)  $\frac{\pi}{6}$

4)  $\tan^{-1} 2$

48. A shell of mass 20 kg at rest explodes into two fragments whose masses are in the ratio 2 : 3. The smaller fragment moves with a velocity of  $6 \text{ ms}^{-1}$ . The kinetic energy of the larger fragment is

1) 360 J

2) 144 J

3) 216 J

4) 96 J

49. Water rises in plant fibres due to

1) Osmosis

2) Fluid pressure

3) Viscosity

4) Capillarity

50. The acceleration due to gravity becomes  $\left(\frac{g}{2}\right)$  where  $g =$  acceleration due to gravity on the surface of the earth at a height equal to

1)  $\frac{R}{2}$

2)  $2R$

3)  $\frac{R}{4}$

4)  $4R$

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(Space for Rough Work)



56. The maximum particle velocity in a wavemotion is half the wave velocity. Then the amplitude of the wave is equal to

1)  $\lambda$

2)  $\frac{\lambda}{2\pi}$

3)  $\frac{2\lambda}{\pi}$

4)  $\frac{\lambda}{4\pi}$

57. The ratio of the velocity of sound in hydrogen  $\left(r = \frac{7}{5}\right)$  to that in helium  $\left(r = \frac{5}{3}\right)$  at the same temperature is

1)  $\frac{\sqrt{21}}{5}$

2)  $\frac{\sqrt{42}}{5}$

3)  $\sqrt{\frac{5}{21}}$

4)  $\sqrt{\frac{5}{42}}$

58. An engine is moving towards a wall with a velocity  $50 \text{ ms}^{-1}$  emits a note of  $1.2 \text{ kHz}$ . Speed of sound in air =  $350 \text{ ms}^{-1}$ . The frequency of the note after reflection from the wall as heard by the driver of the engine is

1)  $1.2 \text{ kHz}$

2)  $1.6 \text{ kHz}$

3)  $0.24 \text{ kHz}$

4)  $2.4 \text{ kHz}$

59. A glass tube is open at both the ends. A tuning fork of frequency  $f$  resonates with the air column inside the tube. Now the tube is placed vertically inside water so that half the length of the tube is filled with water. Now the air column inside the tube is in unison with another fork of frequency  $f'$ . Then

1)  $f' = \frac{f}{2}$

2)  $f' = 2f$

3)  $f' = 4f$

4)  $f' = f$

60. The surface temperature of the Sun which has maximum energy emission at  $500 \text{ nm}$  is  $6000 \text{ K}$ . The temperature of a star which has maximum energy emission at  $400 \text{ nm}$  will be

1)  $6500 \text{ K}$

2)  $7500 \text{ K}$

3)  $4500 \text{ K}$

4)  $8500 \text{ K}$

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(Space for Rough Work)

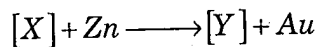
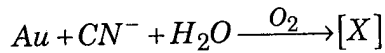
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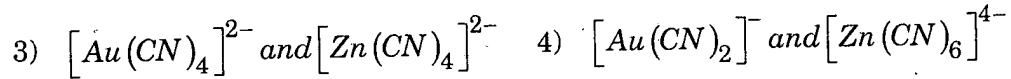
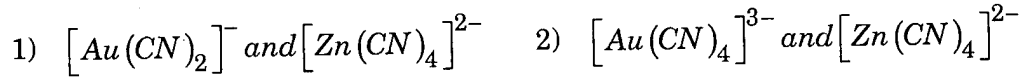
# CHEMISTRY



61. During the extraction of gold the following reactions take place -



X and Y are respectively -



62. The number of gram molecules of chlorine in  $6.02 \times 10^{25}$  hydrogen chloride molecules is -

1) 5

2) 50

3) 100

4) 10

63. Graphite is a soft solid lubricant extremely difficult to melt. The reason for this anomalous behaviour is that graphite -

1) has molecules of variable molecular masses like polymers.

2) has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds.

3) is a non-crystalline substance.

4) is an allotropic form of carbon.

64. Paracetamol is a / an

1) antimalarial

2) antipyretic

3) analgesic

4) both 2 and 3

65. Which one of the following has maximum number of atoms of oxygen ?

1) 2 g of water

2) 2 g of sulphur dioxide

3) 2 g of carbon dioxide

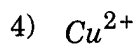
4) 2 g of carbon monoxide.

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(Space for Rough Work)



71.  $Mg^{2+}$  is isoelectronic with



72. Gram molecular volume of oxygen at STP is -

1)  $11200 \text{ cm}^3$

2)  $22400 \text{ cm}^3$

3)  $5600 \text{ cm}^3$

4)  $3200 \text{ cm}^3$

73. Presence of halogen in organic compounds can be detected using -

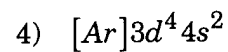
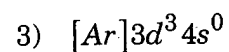
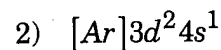
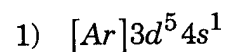
1) Beilstein's test

2) kjeldahl test

3) Duma's test

4) Leibig's test

74. The electronic configuration of  $Cr^{3+}$  is



75. The mass of a metal, with equivalent mass 31.75, which would combine with 8 g of oxygen is

1) 31.75

2) 3.175

3) 8

4) 1

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(Space for Rough Work)

76. Benzene reacts with chlorine in sunlight to give a final product –
- 1)  $C_6H_5Cl$
  - 2)  $C_6Cl_6$
  - 3)  $C_6H_6Cl_6$
  - 4)  $CCl_4$
77. In the periodic table metals usually used as catalysts belong to
- 1) s - block
  - 2) p - block
  - 3) d - block
  - 4) f - block
78. Dalton's law of partial pressures is applicable to which one of the following systems ?
- 1)  $CO + H_2$
  - 2)  $H_2 + Cl_2$
  - 3)  $NO + O_2$
  - 4)  $NH_3 + HCl$
79. The general formula of a cycloalkane is
- 1)  $C_nH_{2n+2}$
  - 2)  $C_nH_{2n-2}$
  - 3)  $C_nH_{2n}$
  - 4)  $C_nH_n$
80. In acetylene molecule, between the carbon atoms there are –
- 1) three sigma bonds
  - 2) two sigma and one pi bonds
  - 3) one sigma and two pi bonds
  - 4) three pi bonds

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(Space for Rough Work)

81. Denatured alcohol is
- 1) Rectified spirit
  - 2) Undistilled ethanol
  - 3) Rectified spirit + methanol + naphtha
  - 4) Ethanol + methanol
82. During the formation of a chemical bond
- 1) energy decreases
  - 2) energy increases
  - 3) energy of the system does not change
  - 4) electron-electron repulsion becomes more than the nucleus-electron attraction
83. One mole of oxygen at 273 k and one mole of sulphur dioxide at 546 k are taken in two separate containers, then,
- 1) kinetic energy of  $O_2 >$  kinetic energy of  $SO_2$ .
  - 2) kinetic energy of  $O_2 <$  kinetic energy of  $SO_2$ .
  - 3) kinetic energy of both are equal.
  - 4) None of these
84. +I effect is shown by
- |            |            |
|------------|------------|
| 1) $-NO_2$ | 2) $-Cl$   |
| 3) $-Br$   | 4) $-CH_3$ |
85. Formation of coloured solution is possible when metal ion in the compound contains
- |                           |                       |
|---------------------------|-----------------------|
| 1) paired electrons       | 2) unpaired electrons |
| 3) lone pair of electrons | 4) none of these      |

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(Space for Rough Work)

86. Which of the following is an intensive property ?
- 1) temperature
  - 2) surface tension
  - 3) viscosity
  - 4) all of these
87. Hofmann's bromamide reaction is to convert
- 1) amine to amide
  - 2) amide to amine
  - 3) alcohol to acid
  - 4) acid to alcohol
88. IUPAC name of  $Na_3[Co(NO_2)_6]$  is
- 1) sodium cobaltinitrite
  - 2) sodium hexanitrito cobaltate (III)
  - 3) sodium hexanitro cobalt (III)
  - 4) sodium hexanitrito cobaltate (II)
89. Thermodynamic standard conditions of temperature and pressure are
- 1)  $0^\circ C$  and 1 atm
  - 2) 273 k and 101.3 k Pa
  - 3) 298 k and 1 atm
  - 4)  $0^\circ C$  and 101.3 k Pa
90. How many chiral carbon atoms are present in 2, 3, 4 - trichloropentane ?
- 1) 3
  - 2) 2
  - 3) 1
  - 4) 4

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(Space for Rough Work)



91. The number of unidentate ligands in the complex ion is called
- 1) EAN
  - 2) Coordination number
  - 3) primary valency
  - 4) oxidation number
92.  $2SO_{2(g)} + O_{2(g)} \xrightleftharpoons{V_2O_5}$  is an example for
- 1) irreversible reaction
  - 2) heterogenous catalysis
  - 3) homogenous catalysis
  - 4) neutralisation reaction
93. The amino acid which is not optically active is
- 1) glycine
  - 2) alanine
  - 3) serine
  - 4) lactic acid
94. For a stable molecule the value of bond order must be
- 1) negative
  - 2) positive
  - 3) zero
  - 4) there is no relationship between stability and bond order.
95. Which one of the following is a second order reaction ?
- 1)  $CH_3COOCH_3 + NaOH \longrightarrow CH_3COONa + H_2O$
  - 2)  $H_2 + Cl_2 \xrightarrow{\text{sunlight}} 2HCl$
  - 3)  $NH_4NO_3 \longrightarrow N_2 + 3H_2O$
  - 4)  $H_2 + Br_2 \longrightarrow 2HBr$

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(Space for Rough Work)

96. According to Bayer's strain theory which is highly stable ?
- 1) cyclohexane
  - 2) cycloheptane
  - 3) cyclopentane
  - 4) cyclobutane
97. The number of antibonding electron pairs in  $O_2^{2-}$  molecular ion on the basis of molecular orbital theory is
- [Note - Atomic number of  $O$  is 18]
- 1) 2
  - 2) 3
  - 3) 4
  - 4) 5
98. Hydroxyl ion concentration of 1M  $HCl$  is
- 1)  $1 \times 10^{-14} \text{ mol dm}^{-3}$
  - 2)  $1 \times 10^{-1} \text{ mol dm}^{-3}$
  - 3)  $1 \times 10^{-13} \text{ mol dm}^{-3}$
  - 4)  $1 \times 10^1 \text{ mol dm}^{-3}$
99. Geometrical isomerism is shown by
- 1)  $-C-C-$
  - 2)  $-C \equiv C-$
  - 3)  $\diagup C = C \diagdown$
  - 4) None of these
100. The oxidation state of iron in  $K_4[Fe(CN)_6]$  is
- 1) 2
  - 2) 3
  - 3) 4
  - 4) 1

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(Space for Rough Work)

101. In which of the following process, a maximum increase in entropy is observed ?
- 1) dissolution of salt in water
  - 2) condensation of water
  - 3) sublimation of naphthalene
  - 4) melting of ice
102. Decomposition of benzene diozonium chloride by using  $Cu_2Cl_2/HCl$  to form chlorobenzene is
- 1) Cannizzaro's reaction
  - 2) Kolbe's reaction
  - 3) Sandmeyer's reaction
  - 4) Raschig's reaction
103. Which complex can not ionise in solution ?
- 1)  $[Pt(NH_3)_6]Cl_4$
  - 2)  $K_2[Pt(F_6)]$
  - 3)  $K_4[Fe(CN)_6]$
  - 4)  $[CoCl_3(NH_3)_3]$
104. Considering the reaction  $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)} + 393.5 \text{ kJ}$  the signs of  $\Delta H$ ,  $\Delta S$  and  $\Delta G$  respectively are
- 1) -, +, -
  - 2) -, -, -
  - 3) -, +, +
  - 4) +, -, -
105. The product formed when hydroxylamine condenses with a carbonyl compound is called
- 1) hydrazone
  - 2) hydrazine
  - 3) oxime
  - 4) hydrazide

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(Space for Rough Work)

106. Which of the following forms a colourless solution in aqueous medium?

- |              |              |
|--------------|--------------|
| 1) $Ti^{3+}$ | 2) $Sc^{3+}$ |
| 3) $V^{3+}$  | 4) $Cr^{3+}$ |

107. When a sulphur sol is evaporated sulphur is obtained. On mixing with water sulphur sol is not formed. The sol is

- |                |                |
|----------------|----------------|
| 1) hydrophilic | 2) hydrophobic |
| 3) reversible  | 4) lyophilic   |

108. An alkyl halide reacts with alcoholic ammonia in a sealed tube, the product formed will be

- |                     |                               |
|---------------------|-------------------------------|
| 1) a primary amine  | 2) a secondary amine          |
| 3) a tertiary amine | 4) a mixture of all the three |

109. When conc.  $H_2SO_4$  is heated with  $P_2O_5$ , the acid is converted into

- 1) sulphur
- 2) sulphur dioxide
- 3) sulphur trioxide
- 4) a mixture of sulphur dioxide and sulphur trioxide

110. Entropy of the universe is

- |                            |                            |
|----------------------------|----------------------------|
| 1) continuously increasing | 2) continuously decreasing |
| 3) zero                    | 4) constant                |

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(Space for Rough Work)

111. Which of the following salts on being dissolved in water gives  $\text{pH} > 7$  at  $25^\circ\text{C}$  ?

- |                           |                           |
|---------------------------|---------------------------|
| 1) $\text{NH}_4\text{CN}$ | 2) $\text{NH}_4\text{Cl}$ |
| 3) $\text{KNO}_3$         | 4) $\text{KCN}$           |

112. The reagent used in Clemmenson's reduction is

- |                                       |                                  |
|---------------------------------------|----------------------------------|
| 1) alc. $\text{KOH}$                  | 2) aq. $\text{KOH}$              |
| 3) $\text{Zn-Hg}$ / con. $\text{HCl}$ | 4) Conc. $\text{H}_2\text{SO}_4$ |

113. When  $\text{KBr}$  is dissolved in water,  $\text{K}^+$  ions are

- |               |             |
|---------------|-------------|
| 1) oxidised   | 2) reduced  |
| 3) hydrolysed | 4) hydrated |

114. The noble gas mixture is cooled in a coconut bulb at  $173\text{ K}$ . The gases that are not adsorbed are

- |                                |                                |
|--------------------------------|--------------------------------|
| 1) $\text{He}$ and $\text{Ne}$ | 2) $\text{Ar}$ and $\text{Kr}$ |
| 3) $\text{He}$ and $\text{Xe}$ | 4) $\text{Ne}$ and $\text{Xe}$ |

115. The volume of  $10\text{N}$  and  $4\text{N HCl}$  required to make 1 litre of  $7\text{N HCl}$  are

- 0.75 litre of  $10\text{N HCl}$  and 0.25 litre of  $4\text{N HCl}$
- 0.80 litre of  $10\text{N HCl}$  and 0.20 litre of  $4\text{N HCl}$
- 0.60 litre of  $10\text{N HCl}$  and 0.40 litre of  $4\text{N HCl}$
- 0.50 litre of  $10\text{N HCl}$  and 0.50 litre of  $4\text{N HCl}$

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(Space for Rough Work)

116. A metal present in insulin is

- |           |              |
|-----------|--------------|
| 1) copper | 2) iron      |
| 3) zinc   | 4) aluminium |

117. Carbon forms two oxides which have different compositions. The equivalent mass of which remains constant ?

- |                              |                           |
|------------------------------|---------------------------|
| 1) carbon                    | 2) oxygen                 |
| 3) neither carbon nor oxygen | 4) both carbon and oxygen |

118. Maximum number of molecules of  $CH_3I$  that can react with a molecule of  $CH_3NH_2$  are

- |      |      |
|------|------|
| 1) 1 | 2) 2 |
| 3) 4 | 4) 3 |

119. Ellingham diagram represents a graph of

- |                      |                        |
|----------------------|------------------------|
| 1) $\Delta G$ Vs $T$ | 2) $\Delta G^0$ Vs $T$ |
| 3) $\Delta S$ Vs $P$ | 4) $\Delta G$ Vs $P$   |

120. Identify the ore not containing iron

- |                  |               |
|------------------|---------------|
| 1) chalcopyrites | 2) carnallite |
| 3) siderite      | 4) limonite   |

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(Space for Rough Work)

(Space for Rough Work)

ΠΣ

A-1



# COMMON ENTRANCE TEST - 2007

DATE	SUBJECT	TIME
09 - 05 - 2007	MATHEMATICS	02.00 PM to 03.20 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
	A - 1	553761

## IMPORTANT INSTRUCTIONS TO CANDIDATES

(Candidates are advised to read the following instructions carefully, before answering on OMR answer sheet.)

1. Ensure that you have entered your Name and Register Number of 2<sup>nd</sup> PUC Annual Examination / 12<sup>th</sup> Std. in the space provided on the OMR answer sheet.
2. Ensure that CET No. has been entered and shaded the respective circles on the OMR answer sheet.
3. **ENSURE THAT THE TIMING, MARKS PRINTED ON THE OMR ANSWER SHEET ARE NOT DAMAGED / MUTILATED / SPOILED.**
4. This Question Booklet is issued to you by the invigilator after the 2<sup>nd</sup> Bell. i.e., after 02.00 p.m.
5. Enter the Serial Number of this question booklet on the OMR answer sheet.
6. Carefully enter the Version Code of this question booklet on the OMR answer sheet and SHADE the respective circles completely.
7. As answer sheets are designed to suit the Optical Mark Reader (OMR) system, please take special care while filling and shading the CET NO. & Version Code of this question booklet.
8. **DO NOT FORGET TO SIGN AT THE BOTTOM PORTION OF OMR ANSWER SHEET IN THE SPACE PROVIDED.**
9. Until the 3<sup>rd</sup> Bell is rung at 02.10 p.m. :
  - Do not remove the seal 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.
10. After the 3<sup>rd</sup> Bell is rung at 02.10 p.m., remove the seal present on the right hand side of this question booklet and start answering on the OMR answer sheet.
11. This question booklet contains 60 questions and each question will have four different options / choices.
12. During the subsequent 70 minutes :
  - Read each question carefully.
  - Determine the correct answer from out of the four available options / choices given under each question.
  - **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 OF SHADING THE CIRCLE ON THE OMR SHEET IS AS SHOWN BELOW :**



13. Please note that even a minute unintended ink dot on the OMR sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
14. Use the space provided on each page of the question booklet for Rough work AND do not use the OMR answer sheet for the same.
15. After the last bell is rung at 03.20 p.m., stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
16. Hand over the OMR ANSWER SHEET to the room invigilator as it is.
17. After separating and retaining the top sheet (CET Cell Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
18. Preserve the replica of the OMR answer sheet for a minimum period of One year.

0-2-120

## MATHEMATICS

1.  ${}_7 2 \text{Log}_7^5$  is equal to
- 1) 5 2)  $\text{Log}_7 35$   
 3)  $\text{Log}_7 25$  4) 25
2. In the group  $(G \otimes_{15})$ , where  $G = \{3, 6, 9, 12\}$ ,  $\otimes_{15}$  is multiplication modulo 15, the identity element is
- 1) 6 2) 3  
 3) 9 4) 12
3. A group  $(G *)$  has 10 elements. The minimum number of elements of  $G$ , which are their own inverses is
- 1) 1 2) 2  
 3) 0 4) 9
4. If  $\vec{a}$  and  $\vec{b}$  are vectors such that  $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$ , then the angle between  $\vec{a}$  and  $\vec{b}$  is
- 1)  $60^\circ$  2)  $120^\circ$   
 3)  $30^\circ$  4)  $90^\circ$
5.  $\frac{3x^2 + 1}{x^2 - 6x + 8}$  is equal to
- 1)  $\frac{49}{2(x-4)} - \frac{13}{2(x-2)}$  2)  $3 + \frac{49}{2(x-4)} - \frac{13}{2(x-2)}$   
 3)  $\frac{49}{2(x-4)} + \frac{13}{2(x-2)}$  4)  $\frac{-49}{2(x-4)} + \frac{13}{2(x-2)}$

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(Space for Rough Work)

6. If  $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}$ ,  $\vec{b} = \hat{i} + 2\hat{j} - 5\hat{k}$ ,  $\vec{c} = 3\hat{i} + 5\hat{j} - \hat{k}$ , then a vector perpendicular to  $\vec{a}$  and in the plane containing  $\vec{b}$  and  $\vec{c}$  is

- 1)  $17\hat{i} + 21\hat{j} - 123\hat{k}$                       2)  $-17\hat{i} + 21\hat{j} - 97\hat{k}$   
 3)  $-17\hat{i} - 21\hat{j} - 97\hat{k}$                       4)  $-17\hat{i} - 21\hat{j} + 97\hat{k}$

7.  $\vec{OA}$  and  $\vec{OB}$  are two vectors of magnitudes 5 and 6 respectively. If  $\angle BOA = 60^\circ$ , then  $\vec{OA} \cdot \vec{OB}$  is equal to

- 1) 15    2) 0  
 3)  $15\sqrt{3}$                                       4) -15

8. A vector perpendicular to the plane containing the points  $A(1, -1, 2)$ ,  $B(2, 0, -1)$ ,  $C(0, 2, 1)$  is

- 1)  $8\hat{i} + 4\hat{j} + 4\hat{k}$                               2)  $4\hat{i} + 8\hat{j} - 4\hat{k}$   
 3)  $\hat{i} + \hat{j} - \hat{k}$                                       4)  $3\hat{i} + \hat{j} + 2\hat{k}$

9.  $\frac{1}{2.5} + \frac{1}{5.8} + \frac{1}{8.11} + \dots + \frac{1}{(3n-1)(3n+2)} =$

- 1)  $\frac{n}{6n+3}$                                       2)  $\frac{n}{6n-4}$   
 3)  $\frac{n+1}{6n+4}$                                       4)  $\frac{n}{6n+4}$

10. The ninth term of the expansion  $\left(3x - \frac{1}{2x}\right)^8$  is

- 1)  $\frac{-1}{512x^9}$                                       2)  $\frac{1}{512x^9}$   
 3)  $\frac{1}{256 \cdot x^8}$                                       4)  $\frac{-1}{256 \cdot x^8}$

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(Space for Rough Work)

11. If  $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ ,  $10B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$  and  $B$  is the inverse of  $A$ , then the value of  $\alpha$  is

- 1) 0  
2) 2  
3) 4  
4) 5

12. If  $A = \begin{bmatrix} 0 & x & 16 \\ x & 5 & 7 \\ 0 & 9 & x \end{bmatrix}$  is singular, then the possible values of  $x$  are

- 1) 0, 1, -1  
2) 0, +12, -12  
3) 0, 5, -5  
4) 0, 4, -4

13. If  $A = \begin{bmatrix} 1 & -2 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ , then  $A \cdot \text{adj}(A)$  is equal to

- 1)  $\begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$   
2)  $\begin{bmatrix} 5 & 1 & 1 \\ 1 & 5 & 1 \\ 1 & 1 & 5 \end{bmatrix}$   
3)  $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$   
4)  $\begin{bmatrix} 8 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 8 \end{bmatrix}$

14. If  $f: R \rightarrow R$  is defined by  $f(x) = |x|$ , then,

- 1)  $f^{-1}(x) = \frac{1}{|x|}$   
2)  $f^{-1}(x) = -x$   
3)  $f^{-1}(x) = \frac{1}{x}$   
4) The function  $f^{-1}(x)$  does not exist.

15. The value of  $\begin{vmatrix} x & p & q \\ p & x & q \\ p & q & x \end{vmatrix}$  is

- 1)  $(x-p)(x-q)(x+p+q)$   
2)  $x(x-p)(x-q)$   
3)  $pq(x-p)(x-q)$   
4)  $(p-q)(x-q)(x-p)$

(Space for Rough Work)

16. The number of common tangents to the circles  $x^2 + y^2 = 4$  and  $x^2 + y^2 - 6x - 8y - 24 = 0$  is,
- 1) 4                                  2) 3  
3) 1                                  4) 2
17. If  $3x + y + k = 0$  is a tangent to the circle  $x^2 + y^2 = 10$ , the values of  $k$  are,
- 1)  $\pm 5$                                 2)  $\pm 7$   
3)  $\pm 9$                                 4)  $\pm 10$
18. The negation of the proposition "If 2 is prime, then 3 is odd" is
- 1) 2 is prime and 3 is not odd      2) If 2 is not prime then 3 is not odd  
3) If 2 is not prime then 3 is odd    4) 2 is not prime and 3 is odd.
19. The equation to two circles which touch the Y-axis at (0, 3) and make an intercept of 8 units on X-axis are
- 1)  $x^2 + y^2 \pm 6x - 10y + 9 = 0$       2)  $x^2 + y^2 \pm 10x - 6y + 9 = 0$   
3)  $x^2 + y^2 + 10x \pm 6y + 9 = 0$       4)  $x^2 + y^2 - 8x \pm 10y + 9 = 0$
20. The orthocentre of the triangle with vertices  $A(0, 0)$ ,  $B(0, \frac{3}{2})$ ,  $C(-5, 0)$  is
- 1)  $(-\frac{5}{2}, \frac{3}{4})$                             2)  $(\frac{5}{2}, \frac{3}{4})$   
3)  $(0, 0)$                                 4)  $(-5, \frac{3}{2})$

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(Space for Rough Work)

21.  $x^2 + y^2 - 6x - 6y + 4 = 0$ ,  $x^2 + y^2 - 2x - 4y + 3 = 0$ ,  $x^2 + y^2 + 2kx + 2y + 1 = 0$  If the Radical centre of the above three circles exists, then which of the following cannot be the value of  $k$  ?
- 1) 1  
2) 2  
3) 4  
4) 5
22. If the circles  $x^2 + y^2 - 2x - 2y - 7 = 0$  and  $x^2 + y^2 + 4x + 2y + k = 0$  cut orthogonally, then the length of the common chord of the circles is
- 1) 2  
2)  $\frac{12}{\sqrt{13}}$   
3) 8  
4) 5
23. The co-ordinates of the foot of the perpendicular drawn from the point  $(3, 4)$  on the line  $2x + y - 7 = 0$  is
- 1)  $(1, 5)$   
2)  $\left(\frac{9}{5}, \frac{17}{5}\right)$   
3)  $(1, -5)$   
4)  $(-5, 1)$
24. The area enclosed by the pair of lines  $xy = 0$ , the line  $x - 4 = 0$  and  $y + 5 = 0$  is
- 1) 10 sq. units.  
2) 20 sq. units  
3) 0 sq. units.  
4)  $\frac{5}{4}$  sq. units.
25. If the area of the auxillary circle of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  ( $a > b$ ) is twice the area of the ellipse, then the eccentricity of the ellipse is
- 1)  $\frac{\sqrt{3}}{2}$   
2)  $\frac{1}{\sqrt{2}}$   
3)  $\frac{1}{2}$   
4)  $\frac{1}{\sqrt{3}}$
- 

(Space for Rough Work)

26. A graph  $G$  has ' $m$ ' vertices of odd degree and ' $n$ ' vertices of even degree. Then which of the following statements is necessarily true ?

- 1)  $m + n$  is an even number                      2)  $m + n$  is an odd number  
3)  $m + 1$  is an odd number                      4)  $n + 1$  is an even number

27. If  $p$  is any point on the ellipse  $\frac{x^2}{36} + \frac{y^2}{16} = 1$ , and  $S$  and  $S'$  are the foci, then  $PS + PS' =$

- 1) 8    2) 4  
3) 12    4) 10

28. The value of  $\text{Sin} \left[ 2\text{Cos}^{-1} \frac{\sqrt{5}}{3} \right]$  is

- 1)  $\frac{2\sqrt{5}}{3}$     2)  $\frac{\sqrt{5}}{3}$   
3)  $\frac{2\sqrt{5}}{9}$     4)  $\frac{4\sqrt{5}}{9}$

29. If  $\frac{x^2}{36} - \frac{y^2}{k^2} = 1$  is a hyperbola, then which of the following statements can be true ?

- 1) (3, 1) lies on the hyperbola                      2) (-3, 1) lies on the hyperbola  
3) (5, 2) lies on the hyperbola                      4) (10, 4) lies on the hyperbola

30. The focus of the parabola is

- 1)  $\left( \frac{1}{3}, \frac{-3}{2} \right)$     2)  $\left( \frac{-1}{3}, \frac{3}{2} \right)$   
3)  $\left( \frac{1}{3}, \frac{-1}{2} \right)$     4)  $\left( \frac{1}{3}, \frac{3}{2} \right)$

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(Space for Rough Work)



31. The solution of  $\tan^{-1}x + 2\cot^{-1}x = \frac{2\pi}{3}$  is

1)  $\frac{1}{\sqrt{3}}$

2)  $-\frac{1}{\sqrt{3}}$

3)  $\sqrt{3}$

4)  $-\sqrt{3}$

32.  $\sin^2 17.5^\circ + \sin^2 72.5^\circ$  is equal to

1)  $\tan^2 45^\circ$

2)  $\cos^2 90^\circ$

3)  $\sin^2 45^\circ$

4)  $\cos^2 30^\circ$

33. The conjugate of the complex number  $\frac{(1+i)^2}{1-i}$  is

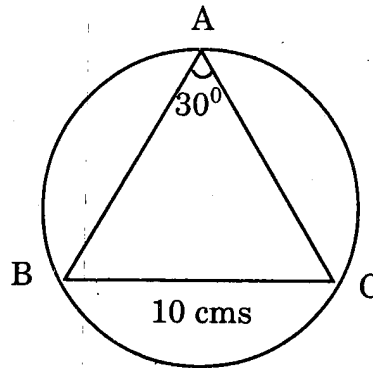
1)  $1+i$

2)  $1-i$

3)  $-1-i$

4)  $-1+i$

34.  $ABC$  is a triangle with  $\angle A = 30^\circ$   $BC = 10$  cms  
The area of the circum-circle of the triangle is



1) 5 sq. cms.

2)  $100\pi$  sq. cms.

3)  $\frac{100\pi}{3}$  sq. cms.

4) 25 sq. cms.

35. If  $\sin 3\theta = \sin \theta$ , how many solutions exist such that  $-2\pi < \theta < 2\pi$ ?

1) 9

2) 8

3) 7

4) 5

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(Space for Rough Work)

36. The imaginary part of  $i^i$  is

- 1) 1  
2) 0  
3) -1  
4) 2

37. The amplitude of  $(1+i)^5$  is

- 1)  $\frac{-3\pi}{4}$   
2)  $\frac{3\pi}{4}$   
3)  $\frac{5\pi}{4}$   
4)  $\frac{-5\pi}{4}$

38.  $ABC$  is a triangle.  $G$  is the centroid.  $D$  is the mid point of  $BC$ . If  $A = (2, 3)$  and  $G = (7, 5)$ , then the point  $D$  is

- 1)  $\left(\frac{19}{2}, 6\right)$   
2)  $\left(\frac{9}{2}, 4\right)$   
3)  $\left(8, \frac{13}{2}\right)$   
4)  $\left(\frac{11}{2}, \frac{11}{2}\right)$

39.  $\lim_{x \rightarrow 1} \frac{\tan(x^2 - 1)}{x - 1}$  is equal to

- 1)  $\frac{1}{2}$   
2) 2  
3)  $\frac{-1}{2}$   
4) -2

40. If  $y = 2^{\log x}$ , then  $\frac{dy}{dx}$  is

- 1)  $2^{\log x} \cdot \log 2$   
2)  $\frac{2^{\log x}}{\log 2}$   
3)  $\frac{2^{\log x} \cdot \log 2}{x}$   
4)  $\frac{2^{\log x}}{x}$

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(Space for Rough Work)

41. If  $\text{Sec}^{-1}\left(\frac{1+x}{1-y}\right) = a$ , then  $\frac{dy}{dx}$  is

1)  $\frac{y+1}{x-1}$

2)  $\frac{y-1}{x+1}$

3)  $\frac{x-1}{y+1}$

4)  $\frac{x-1}{y-1}$

42. If  $y = \text{Cos}^2 \frac{3x}{2} - \text{Sin}^2 \frac{3x}{2}$ , then  $\frac{d^2y}{dx^2}$  is

1)  $9y$

2)  $-3\sqrt{1-y^2}$

3)  $3\sqrt{1-y^2}$

4)  $-9y$

43. If the function  $f(x) = \begin{cases} \frac{1-\text{Cos } x}{x^2} & \text{for } x \neq 0 \\ k & \text{for } x = 0 \end{cases}$  is continuous at  $x = 0$ , then the value of  $k$  is

1) 0

2) 1

3) -1

4)  $\frac{1}{2}$

44. If  $1, w, w^2$  are the cube roots of unity then  $(1+w)(1+w^2)(1+w^4)(1+w^8)$  is equal to

1) 0

2) 1

3)  $w$

4)  $w^2$

45. If  $x^x = y^y$  then  $\frac{dy}{dx}$  is

1)  $-\frac{x}{y}$

2)  $-\frac{y}{x}$

3)  $\frac{1+\text{Log } x}{1+\text{Log } y}$

4)  $1+\text{Log}\left(\frac{x}{y}\right)$

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(Space for Rough Work)

46. The point on the curve  $y^2 = x$ , the tangent at which makes an angle  $45^\circ$  with X-axis is

1)  $(\frac{1}{2}, \frac{1}{4})$

2)  $(\frac{1}{4}, \frac{1}{2})$

3)  $(\frac{1}{2}, \frac{1}{2})$

4)  $(\frac{1}{2}, -\frac{1}{2})$

47. The length of the subtangent to the curve  $x^2y^2 = a^4$  at  $(-a, a)$  is

1)  $2a$

2)  $\frac{a}{2}$

3)  $\frac{a}{3}$

4)  $a$

48. The number of positive divisors of 252 is

1) 5

2) 9

3) 10

4) 18

49. The remainder obtained when  $5^{124}$  is divided by 124 is

1) 0

2) 5

3) 1

4) 2

50. Which of the following is not a group with respect to the given operation ?

1) The set of odd integers under addition.

2) The set of even integers under addition.

3)  $\{1, -1\}$  under multiplication.

4)  $\{0\}$  under addition.

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(Space for Rough Work)

51. The range in which  $y = -x^2 + 6x - 3$  is increasing is

1)  $x > 3$

2)  $x < 3$

3)  $5 < x < 6$

4)  $7 < x < 8$

52. The value of the integral  $\int_0^{\pi/2} (\sin^{100} x - \cos^{100} x) dx$  is

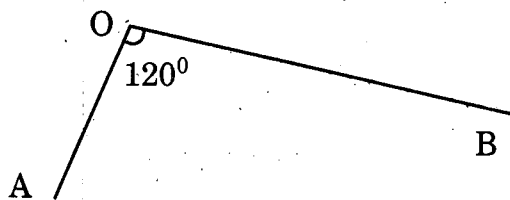
1)  $\frac{100!}{(100)^{100}}$

2)  $\frac{1}{100}$

3) 0

4)  $\frac{\pi}{100}$

53.  $OA$  and  $OB$  are two roads enclosing an angle of  $120^\circ$ .  $X$  and  $Y$  start from 'O' at the same time.  $X$  travels along  $OA$  with a speed of 4 km/hour and  $Y$  travels along  $OB$  with a speed of 3 km/hour. The rate at which the shortest distance between  $X$  and  $Y$  is increasing after 1 hour is



1) 37 km/hour

2)  $\sqrt{37}$  km/hour

3)  $\sqrt{13}$  km/hour

4) 13 km/hour

54. If  $k \int_0^1 x \cdot f(3x) dx = \int_0^3 t \cdot f(t) dt$ , then the value of  $k$  is

1) 3

2) 9

3)  $\frac{1}{3}$

4)  $\frac{1}{9}$

55. The value of  $\int \frac{1}{1 + \cos 8x} dx$  is

1)  $\frac{\tan 8x}{8} + C$

2)  $\frac{\tan 2x}{8} + C$

3)  $\frac{\tan 4x}{8} + C$

4)  $\frac{\tan 4x}{4} + C$

(Space for Rough Work)

56. The value of  $\int e^x (x^5 + 5x^4 + 1) \cdot dx$  is

1)  $e^x \cdot x^5 + e^x + C$

2)  $e^x \cdot x^5$

3)  $5x^4 \cdot e^x$

4)  $e^{x+1} \cdot x^5 + C$

57. The value of  $\int \frac{x^2+1}{x^2-1} dx$  is

1)  $\text{Log} \left( \frac{x+1}{x-1} \right) + C$

2)  $\text{Log} \left( \frac{x-1}{x+1} \right) + C$

3)  $\text{Log} (x^2 - 1) + C$

4)  $x + \text{Log} \left( \frac{x-1}{x+1} \right) + C$

58. The area bounded by the curve  $x = 4 - y^2$  and the Y-axis is

1) 32 sq. units

2) 16 sq. units

3)  $\frac{16}{3}$  sq. units

4)  $\frac{32}{3}$  sq. units

59. The differential equation of the family of straight lines whose slope is equal to y-intercept is

1)  $(x+1) \frac{dy}{dx} + y = 0$

2)  $(x+1) \frac{dy}{dx} - y = 0$

3)  $\frac{dy}{dx} = \frac{x+1}{y+1}$

4)  $\frac{dy}{dx} = \frac{x-1}{y-1}$

60. The order and degree of the differential equation  $\left[ 1 + \left( \frac{dy}{dx} \right)^5 \right]^{\frac{1}{3}} = \frac{d^2y}{dx^2}$  are respectively

1) 2, 1

2) 1, 5

3) 2, 3

4) 2, 5

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(Space for Rough Work)

(Space for Rough Work)

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