

Roll No. ~~XXXXXXXXXX~~

ROYAL CIVIL SERVICE COMMISSION

Civil Service Common Examination for Technical Graduates 2007

Paper II: General Subject Knowledge

Date: 15th November 2007

Maximum Time – 90 min.

Roll No.: ~~XXXXXXXXXX~~

Maximum Marks – 100

INSTRUCTIONS

1. The writing time of this paper is **ONE AND A HALF HOURS**
 2. The paper is divided into 2 parts: Part I and Part II. All questions in both the parts are compulsory
 3. Correct answers to all questions in Part I will be awarded equal mark of ONE (1) each
 4. Correct and complete answers to all questions in Part II will be awarded equal marks of THREE (3) each
 5. This paper has 15 (fifteen) pages in total
-

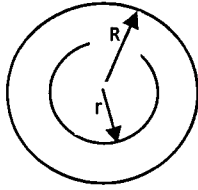
PART I – Multiple Choice

Choose (tick or circle) the Correct Answer

Section A - Mathematics

1. The cardinal number of the set of letters in the word BHUTANESE.
(A) 6 (B) 7 (C) 8 (D) 9
2. Find the ratio of a dozen and a score
(A) 3:5 (B) 4:5 (C) 3:6 (D) 4:6
3. What is the scale of a drawing if a line 3cm long on it represents 6m of the original?
(A) 1:2 (B) 1:20 (C) 1:200 (D) 1:2000
4. Mr. Gado, Mr. Kado and Mr. Nado purchased a big plot at Babesa. Mr. Gado has three-fifths of that plot while Mr. Kado has twice as much as plot belonging to Mr. Nado. What fraction of the plot belongs to Mr. Nado.
(A) $1/15$ (B) $2/15$ (C) $3/15$ (D) $4/15$
5. Find the area of a triangle whose vertices are A(-2,-3), B(3,2) and C(-1,-8)
(A) 10 (B) 15 (C) 20 (D) 25
6. In a simultaneous throw of two dice, the probability of getting a total of 7 is
(A) $4/6$ (B) $3/6$ (C) $2/6$ (D) $1/6$
7. if $f(x) = \begin{cases} 2x + 1, & \text{when } x \geq 2 \\ x, & \text{when } x < 2 \end{cases}$ then $f(2)$ will be
(A) 3 (B) 4 (C) 5 (D) 6
8. If half of five is three, what would a third of ten be?
(A) 3 (B) 4 (C) 5 (D) 6
9. if $y = \sqrt{\frac{1-\cos 2x}{1+\cos 2x}}$, then $\frac{dy}{dx}$ will be
(A) $\cos^2 x$ (B) $\sin^2 x$ (C) $\sec^2 x$ (D) $\operatorname{cosec}^2 x$
10. Two sides of a triangle have lengths a and b and the angle between them is θ . What value of θ will maximize the area of the triangle?
(A) π (B) $\pi/2$ (C) $\pi/3$ (D) $\pi/4$

11. If a pie of radius R is divided into two equal parts by a circular cut, what is the radius r of the circular cut?



- (A) $\frac{2R}{\sqrt{2}}$ (B) $\frac{R}{\sqrt{2}}$ (C) $\frac{R}{\sqrt[2]{2}}$ (D) $\frac{2R}{\sqrt[2]{2}}$

12. The slope of the tangent to the curve: $y = (2x^2 + 3 \sin x)$ at $x = 0$ is
(A) 1 (B) 2 (C) 3 (D) 4
13. The second derivative (y'') of the function $y = 3x^4 + 4x^3 - 8x^2 + 3$
(A) $36x^2 + 24x - 16$ (B) $36x^2 + 24x - 16 + 3$ (C) $12x^3 + 12x^2 - 16x$ (D) $12x^3 + 12x^2 - 16x + 3$
14. If $z_1 = 2 + 3i$ and $z_2 = 4 - 2i$, what is the value of $z_1 z_2$?
(A) $14 + 8i$ (B) $2 + 8i$ (C) $8 - 22i$ (D) $8 + 8i$
15. Which of the following is NOT a Surd?
(A) $\sqrt{7}$ (B) $\sqrt[5]{-32}$ (C) $\sqrt{100}$ (D) $\sqrt[3]{27}$
16. Which of the following equations represent a circle of radius is 8 and centre at $(-4, -6)$
(A) $(x-4)^2 + (y-6)^2 = 64$ (B) $(x+4)^2 + (y+6)^2 = 64$ (C) $(x-4)^2 + (y-6)^2 = 8$ (D) $(x+4)^2 + (y+6)^2 = 8$
17. What is the relation between Standard Deviation and Variance?
(A) Standard Deviation is equal to Variance
(B) Standard Deviation is the square of Variance
(C) Standard Deviation is the square root of Variance
(D) Standard Deviation is twice Variance
18. What is the maximum size of a square peg which can be inserted in a round hole of 2cm in diameter?
(A) $\sqrt{2}$ (B) 2 (C) 1 (D) $\sqrt[2]{2}$
19. If $2\sin\theta - 1 = 0$, the value of θ in degrees, where θ is an acute angle:
(A) 30° (B) 45° (C) 60° (D) 90°
20. The equation $y^2 = 4ax$ represents a:
(A) Hyperbola (B) Parabola (C) Ellipse (D) Circle

Section B - Physics

21. Which theory states that *“if a body is in equilibrium under the action of three coplanar and concurrent forces, each of the forces is proportional to the sine of the angle between the other two”*
- (A) Triangle Law of Forces
 - (B) Lami's Theorem
 - (C) Parallelogram Law of Forces
 - (D) Polygon Law of Forces
22. If the linear momentum is increased by 50%, the kinetic energy will increase by
- (A) 50% (B) 100% (C) 125% (D) 25%
23. If a particle moves in a circle, describing equal angles in equal intervals, the velocity vector
- (A) remains constant
 - (B) changes in direction
 - (C) changes in magnitude
 - (D) changes both in magnitude and direction
24. It is easier to draw up a wooden block along an inclined plane than to haul it up vertically principally because
- (A) the friction is reduced
 - (B) the mass becomes smaller
 - (C) only a part of the weight has to be overcome
 - (D) 'g' becomes less
25. The Center of Gravity of a triangular lamina lies at
- (A) incentre
 - (B) circum centre
 - (C) centroid
 - (D) ortho centre
26. If the radius of earth were to shrink by 1%, its mass remaining the same, the acceleration due to gravity on the earth's surface would
- (A) decrease by 9.8%
 - (B) decrease
 - (C) increase
 - (D) remain unchanged

27. A man standing in a lift falling freely under gravity releases a ball from his hand. As seen by him the ball
- (A) falls down
 - (B) remains stationary
 - (C) goes up
 - (D) executes simple harmonic motion
28. Young's Modulus of material of a wire is defined as
- (A) ratio of linear strain to normal stress
 - (B) ratio of normal stress to linear strain
 - (C) product of linear strain to normal stress
 - (D) square root of the ratio between normal stress and linear strain
29. The spherical shape of a rain drop is due to
- (A) density of the liquid
 - (B) gravity
 - (C) atmospheric pressure
 - (D) surface tension
30. The profile of advancing liquid through a tube is
- (A) straight line
 - (B) hyperbola
 - (C) parabola
 - (D) semicircle
31. At what temperature are numerical values on the Fahrenheit and Celcius scale is same
- (A) -0°
 - (B) 32°
 - (C) 180°
 - (D) -40°
32. When light wave suffers reflection at the interface between air and glass, the change of phase of the reflected wave is equal to
- (A) 0
 - (B) $\pi/2$
 - (C) π
 - (D) 2π
33. Rising and setting sun appears to be reddish because
- (A) diffraction sends red rays to the earth at these times
 - (B) scattering due to dust particles and air molecules are responsible for this effect
 - (C) refraction is responsible for this effect
 - (D) polarization is responsible for this effect

34. If the distance between two charges is doubled the electrostatic force between the charges will be
- (A) will decrease two times
 - (B) will increase two times
 - (C) four times less
 - (D) four times more
35. An electric iron is marked 220Volts 500W. The units consumed by it in using it for 24 hours will be
- (A) 12
 - (B) 24
 - (C) 5
 - (D) 1100
36. Photo electric cell is a device which converts
- (A) chemical energy into electrical energy
 - (B) light energy into electric energy
 - (C) electric energy into light energy
 - (D) magnetic energy into electrical energy
37. The equation of motion of matter wave was derived by
- (A) Heisenberg
 - (B) Bohr
 - (C) de Broglie
 - (D) Schrodinger
38. A bimetallic strip is made of two strips of different materials A and B , with coefficients of linear expansion $\alpha_A < \alpha_B$, if the strip is heated
- (A) it will bend but will not elongate
 - (B) it will bend with A on the outer side of the arc
 - (C) it will bend with B on the outer side of the arc
 - (D) it will only elongate with a coefficient equal to the average value of the two
39. An observer looks at a tree of height 15 meters with a telescope of magnifying power 10. To him the tree appears
- (A) 10 times nearer
 - (B) 15 times nearer
 - (C) 100 times nearer
 - (D) 150 times nearer

40. The power factor is equal to

- (A) Z/R
- (B) R/Z
- (C) $R \times Z$
- (D) $V \times I$

Section C - Chemistry

41. Copper is extracted from its ore by

- (A) Electrolytic reduction
- (B) Auto reduction
- (C) Cyanide process
- (D) Magnetic separation

42. Hydrogen molecule is

- (A) non-polar
- (B) polar covalent
- (C) ionic
- (D) Dipolar

43. Among the following gases, the least soluble in water is

- (A) SO_2
- (B) H_2S
- (C) CO_2
- (D) NH_3

44. The lustre of a metal is due to:

- (A) Its high density
- (B) High polishing
- (C) Its chemical inertness
- (D) Presence of free electrons

45. Mixture used for the tip of matchstick is:

- (A) $S + K$
- (B) Sb_2S_3
- (C) $K_2Cr_2O_7 + S + white\ P$
- (D) $K_2Cr_2O_7 + K + S$

46. Which of the following is the strongest acid?

- (A) Formic acid
- (B) Acetic acid
- (C) Propionic acid
- (D) n- Butyric acid

47. Charring of sugar is due to:
- (A) Oxidation
 - (B) Reduction
 - (C) Dehydration
 - (D) Reduction and Hydration
48. Alums purify muddy water by:
- (A) Dialysis
 - (B) Adsorption
 - (C) Coagulation
 - (D) Forming a true solution
49. Fog is a colloidal solution of:
- (A) Gas in liquid
 - (B) Liquid in gas
 - (C) Gas in solid
 - (D) Solid in gas
50. Which statement about H_2S is false?
- (A) It is a covalent compound
 - (B) It is a gas with bad smell
 - (C) It is a stronger reducing agent than water
 - (D) It is a weaker base in water
51. A fizzy sound is formed while opening a soft drink, this is due to?
- (A) Henrys' Law
 - (B) Nernst Law
 - (C) Raoults Law
 - (D) Paretos Law
52. Galvanized iron sheets are coated with:
- (A) Sn
 - (B) Zn
 - (C) Cu
 - (D) Ni
53. Rust is a mixture of:
- (A) FeO and $Fe(OH)_3$
 - (B) FeO and $Fe(OH)_2$
 - (C) Fe_2O_3 and $Fe(OH)_3$
 - (D) Fe_3O_4 and $Fe(OH)_3$

54. The first use of quantum theory to explain the structure of atom was made by:

- (A) Heisenberg
- (B) Bohr
- (C) Planck
- (D) Einstein

55. How many kinds of space lattices are possible in a crystal?

- (A) 23
- (B) 7
- (C) 230
- (D) 14

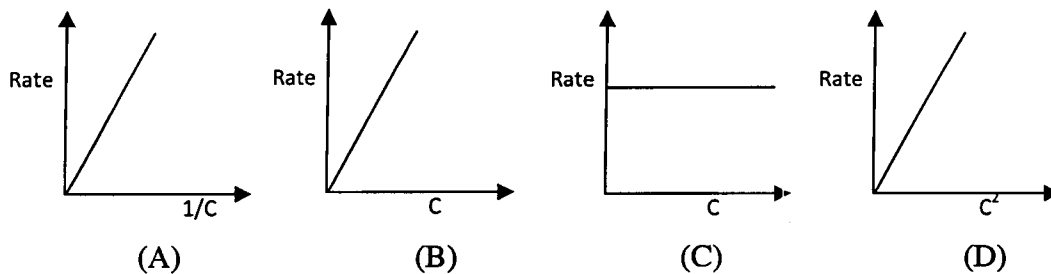
56. Equal amounts of which of the following will cause greatest cooling?

- (A) $\text{Al}_2(\text{SO}_4)_3$
- (B) KCl
- (C) Glucose
- (D) NaCl

57. When a solid melts, there is:

- (A) no increase in enthalpy
- (B) increase in enthalpy
- (C) decrease in enthalpy
- (D) decrease in entropy

58. Which of the following graphs correspond to first order reaction:



59. The formula of Prussian blue is:

- (A) $\text{Fe}_3[\text{Fe}(\text{CN})_6]_2$
- (B) $\text{Fe}_2[\text{Fe}(\text{CN})_6]_3$
- (C) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$
- (D) $\text{Fe}_3[\text{Fe}(\text{CN})_6]_4$

60. When lead storage battery discharges:

- (A) SO₂ is evolved
- (B) PbSO₄ is consumed
- (C) Lead is formed
- (D) H₂SO₄ is consumed

Section D – General IT

61. HTTP stands for:

- (A) Hyper Text Transfer Protocol
- (B) Hyper Timed Text Protocol
- (C) Hopper Transfer Text Protocol
- (D) Hopper Text Timer Protocol

62. The capacity of 3-1/2 inch floppy is:

- (A) 1.33MB
- (B) 1.44MB
- (C) 1.34MB
- (D) 1.43MB

63. A character has how many bits:

- (A) 4
- (B) 8
- (C) 12
- (D) 16

64. A program that allows us to do specific tasks is:

- (A) Application software
- (B) System software
- (C) Windows 2000
- (D) Windows Xp

65. Process of copying or loading programs from secondary storage device onto the RAM?

- (A) Installing
- (B) Booting
- (C) Exploring
- (D) Storing

66. A standard computer keyboard has how many keys?

- (A) 84
- (B) 94
- (C) 104
- (D) 114

67. What do you mean by a 'Drive' in computer?

Ans: _____

68. _____ are used to measure the amount of information a device can store in a computer.

69. _____ is a device that stores data, instruction and information magnetically.

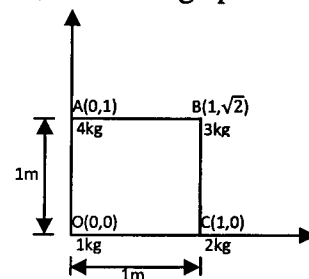
70. _____ is a device that allows you to connect and communicate with other computers via telephone.

PART I – Short Answer Type

Answer the following questions (Each question carries 3 marks)

1. Two particles A and B are in motion. If the wavelength associated with the particle A is $5 \times 10^{-8} \text{m}$, calculate the wave length of particle B if its momentum is half of A

2. Locate the centre of mass of a system of the particles of masses 1, 2, 3 and 4 kgs placed at the corners of a square side 1m



3. The head of a drop hammer is raised 2.5m and then falls freely to strike the die. If the net mass of the hammer is 350kgs and the penetration of the hot metal is 17.5mm, what is the average force?

4. An electric heater and an electric bulb are rated 500W-220V and 100W-220V respectively. Both are connected in series to 220V a.c mains. Calculate the powers consumed by heater and the bulb?

5. A force of 10 N displaces a body by a distance of 2000mm at an angle 60° to its own direction. Find the amount of work done?
6. During a thunderstorm, the rain water contains nitric acid. How is nitric acid formed? Write the reactions.
7. A metal cube of 50 mm and density 0.0079 kg/cm^3 is suspended by a thread and is immersed completely in a liquid of density 1.1 g/cm^3 . Find the tension in the thread.

8. A uniform seesaw, 4m long is supported at its centre. A boy weighing 40 kgs sits at a distance of 1 m from the centre of seesaw. Find where a girl of weight 20 kgs must sit on the other side of the seesaw so as to balance the weight of the boy? And also calculate the mechanical advantage? To which class of levers does it belong?

9. A bullet of mass 5 g travels with a speed of 500m/s. if it penetrates a fixed target which offers a constant resistive force of 1000 N to the motion of bullet, find (i) the initial KE of the bullet, (ii) the distance through which the bullet has penetrated.

10. Is there any connection between Global Warming and the Ozone Layer? Explain briefly