

# **KEE – 2019 MODEL QUESTION PAPER**

# MATHEMATICS

# (Common to all Candidates)

- 1. If *I* is the unit matrix of order n, Where  $K \neq 0$  is a constant then adj(KI) =\_\_\_\_\_
  - a)  $K^n(adjI)$  b)  $K^{n-1}(adjI)$  c)  $K^2(adjI)$  d) K(adjI)
- 2. The equation  $\begin{vmatrix} 2x & 0 & 0 \\ x+2 & x+1 & 0 \\ x+3 & x+4 & x^2+1 \end{vmatrix} = 0$  has the solution
  - a) x = -1, -2, -3 b)  $x = 0, -1, \pm i$  c) x = -2, -3, -4 d) x = 0, 0, 0
- 3. If  $\rho(A) = \rho(A, B)$  then the system is
  - a) Consistent and has infinitely many solution
  - b) Consistent and has unique solution
  - c) Consistent
  - d) Inconsistent

$$\begin{vmatrix} \cos\frac{\pi}{12} + i\sin\frac{\pi}{12} & 0 & 0 \\ 0 & \cos\frac{\pi}{6} + i\sin\frac{\pi}{6} & 0 \\ 0 & 0 & \cos\frac{\pi}{8} + i\sin\frac{\pi}{8} \end{vmatrix} = \underline{\qquad}$$

4. The value of |

a) 
$$\frac{-1-i}{\sqrt{2}}$$
 b)  $\frac{1+i}{\sqrt{2}}$  c)  $\frac{-1+i}{\sqrt{2}}$  d)  $\frac{1-i}{\sqrt{2}}$ 

- 5. If A is square matrix then A A' + A'A is a
  - a) Unit Matrix b) Null Matrix c)Symmetric Matrix d)Skew Symmetric Matrix
- 6. If  $\vec{a}$  and  $\vec{b}$  are unit vectors having opposite directions, which one of the following is true?

a) 
$$\vec{a} \cdot \vec{b} = 1$$
 b)  $\vec{a} \cdot \vec{b} = 0$  c)  $\vec{a} \times \vec{b} = 0$  d)  $|\vec{a}| |\vec{b}| = 2$ 

7. If  $\vec{a}$  and  $\vec{b}$  are two unit vectors and  $\theta$  is the angle between them, then  $(\vec{a} \cdot \vec{b})$  is a unit vector if

a) 
$$\theta = \frac{\pi}{4}$$
 b)  $\theta = \frac{\pi}{2}$  c)  $\theta = \frac{\pi}{3}$  d)  $\theta = \frac{2\pi}{3}$ 

8. The angle between the planes x + y + z = 10 and z axis is\_\_\_\_\_

a) 
$$Sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$$
 b)  $Sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$  c)  $Sin^{-1}(2)$  d)  $Sin^{-1}(\sqrt{3})$ 

9. If  $\vec{a}$  is any vector, the value of  $|\vec{a} \times \vec{i}|^2 + |\vec{a} \times \vec{j}|^2 + |\vec{a} \times \vec{k}|^2$  is \_\_\_\_\_\_

a) 
$$a^2$$
 b)  $2a^2$  c)  $3a^2$  d)0

10. If  $|z - z_1| = |z - z_2|$  then the locus of z is

- a) a circle with centre at the origin
- b) a circle with centre at  $z_1$
- c) a straight line passing through the origin
- d) a perpendicular bisector of the line joining  $z_1$  and  $z_2$

11. If 
$$\frac{1+x}{1-x} = \cos 2\theta + i \sin 2\theta$$
, then x is equal to  
a)  $i \tan \theta$  b)  $i \tan 2\theta$  c)  $i \cot \theta$  d)  $i \cot 2\theta$ 

12. Which of the following is incorrect?

a) 
$$|z_1 + z_2| \le |z_1| + |z_2|$$
 b)  $|z_1 + z_2| \ge |z_1| + |z_2|$   
c)  $|z_1 - z_2| \le |z_1| + |z_2|$  d)  $|z_1 - z_2| \ge |z_1| - |z_2|$ 

13. If *n* is a positive integer than one and  $a = \cos \frac{2\pi}{n} + i \sin \frac{2\pi}{n}$  then  $1 + a + a^2 + \dots + a^{n-1} =$ a)0 b)1 c)-1 d)n

14. The point of contact of the tangent y = mx + c and the parabola  $y^2 = 4ax$  is

a) 
$$\left(\frac{a}{m^2}, \frac{2a}{m}\right)$$
 b)  $\left(\frac{2a}{m^2}, \frac{a}{m}\right)$  c)  $\left(\frac{a}{m}, \frac{2a}{m^2}\right)$  d)  $\left(\frac{-a}{m^2}, \frac{-2a}{m}\right)$ 

15. The curve with parametric equation  $x = 1 + 4\cos\theta$ ,  $y = 2 + 3\sin\theta$  isa) a circleb)a parabolac)an ellipsed)a hyperbola

16. The intercept cut off by the plane 2x + y - z = 5 with the axes is

a) 
$$\frac{2}{5}, \frac{1}{5}, \frac{-1}{5}$$
 b)  $\frac{5}{2}, \frac{1}{5}, -5$  c) 2,1,-1 d) -2,-1,1

17. The condition that the line lx + my + n = 0 may be a normal to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ 

is

a) 
$$al^{3} + 2alm^{2} + m^{2}n = 0$$
  
b)  $\frac{a^{2}}{l^{2}} + \frac{b^{2}}{m^{2}} = \frac{(a^{2} + b^{2})^{2}}{n^{2}}$   
c)  $\frac{a^{2}}{l^{2}} + \frac{b^{2}}{m^{2}} = \frac{(a^{2} - b^{2})^{2}}{n^{2}}$   
d)  $\frac{a^{2}}{l^{2}} - \frac{b^{2}}{m^{2}} = \frac{(a^{2} + b^{2})^{2}}{n^{2}}$ 

18. The hyperbola with foci at (0,-1),(0,3) and one vertex at the origin is\_\_\_\_\_

a)  $3y^2 - x^2 - 6y = 0$ b)  $3x^2 - y^2 + 6x = 0$ c)  $3x^2 - y^2 + 6y = 0$ d)  $3x^2 - y^2 - 6x = 0$ 

19.  $x = x_0$  is a root of even for the equation f'(x) = 0 then  $x = x_0$  is a

a) Maximum point b) Minimum point c) Inflexion point d) Critical point

20. The area of the largest rectangle that can be inscribed in the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is\_\_\_\_\_

a) ab b) 
$$a^2b^2$$
 c)2ab d)  $\sqrt{2}ab$ 

21. If the length of the diagonal of a square is increasing at the rate of 0.2m/sec, what is the rate of increase of its area when the side is  $\frac{30}{\sqrt{2}}$  cm?

a) 
$$3 \text{ cm}^2/\text{sec}$$
 b)  $6\sqrt{2} \text{ cm}^2/\text{sec}$  c)  $3\sqrt{2} \text{ cm}^2/\text{sec}$  d)  $6 \text{ cm}^2/\text{sec}$ 

22. In the law of mean, the value of ' $\theta$  'satisfies the condition

a) 
$$\theta > 0$$
 b)  $\theta < 0$  c)  $\theta < 1$  d)  $0 < \theta < 1$ 

23. If there is an error of 0.01 cm in the diameter of sphere when its radius is 5 cm, then the percentage error in its surface area is

24. In which region the curve  $y^2(a + x) = x^2(3a - x)$ 

a) 
$$X > 0$$
 b)  $x \le -a$  and  $x > 3a$  c)  $-a < x < 3a$  d)  $0 < x < 3a$ 

25. The curve  $x^3 + y^3 = 3axy$  is symmetrical about \_\_\_\_\_.

37. An element of order 2 in the group  $(C - \{0\}, \bullet)$  is \_\_\_\_\_.

a) 1-i b) 2+i c) 
$$e^{i\pi}$$
 d)  $\frac{2-i}{\sqrt{3}}$ 

38. The set  $G = \{1, \omega, \omega^2\}$  of all the cube roots of unity forms an abelian group with

respect to multiplication. Then the inverse of  $\frac{1+\omega+\omega^2-\omega^7}{1+\omega}$  is \_\_\_\_\_.

a) 
$$-(1+\omega^2)$$
 b)  $-(1+\omega)$  c)  $\omega$  d)  $-\omega$ 

39. If a,b,c are any three elements of the group (G,\*) and (a\*b)\*x = c then

x=\_\_\_\_\_:  
a) 
$$c * (a^{-1} * b^{-1})$$
 b)  $c * (b^{-1} * a^{-1})$  c)  $(a^{-1} * b^{-1}) * c$   
d)  $(b^{-1} * a^{-1}) * c$ 

40. In congruence modulo5,  $x \in \mathbb{Z} / x = 5k + 4, k \in \mathbb{Z}$  represents

a)[0] b)[5] c)[4] d)[2]

41. If  $f(x) = k \sin \frac{\pi x}{5}$ ,  $0 \le x \le 5$  is a p.d.f. then the value of k=\_\_\_\_\_.

a) 
$$\frac{2\pi}{5}$$
 b)  $\frac{3\pi}{10}$  c)  $\frac{\pi}{10}$  d)  $\frac{\pi}{5}$ 

42. In a Poisson distribution if standard deviation is  $\sqrt{2}$  then  $P(X \ge 1)$  is\_\_\_\_\_.

a) 
$$1 - e^{-2}$$
 b)  $1 + e$  c)  $1 - e^{2}$  d)  $1 - e^{-1}$ 

43. A die is thrown 100 times. If getting an odd number is success, then the variance of the number of success is \_\_\_\_\_.

44. If 2 cards are drawn from a well shuffled pack of 52 cards, the probability that they are of the same colours with replacement is

a) 
$$\frac{1}{2}$$
 b)  $\frac{25}{51}$  c)  $\frac{26}{51}$  d)  $\frac{25}{102}$ 

45. The binomial distribution have the mean

a)  $n^2p$  b) np c) npq d)  $np^2$ 

# PHYSICS

- 1. Three small identical balls have charges  $-3 \times 10^{-12}$  C,  $8 \times 10^{-12}$  C and  $4 \times 10^{-12}$  C respectively. They are brought in contact and then separated. Calculate the charge on each ball.
- (a)  $3 \ge 10^{-12} C$
- (b) 0.3 x 10-<sup>12</sup> C
- (c)  $30 \ge 10^{-12} C$
- (d) 0.03 x 10<sup>-12</sup> C
- 2. A dipole is placed in a uniform electric field with its axis parallel to the field. It experiences
- (a) Only a net force
- (b) Only a torque
- (c) Both a net force and torque
- (d) Neither a net force nor a torque
- 3. A charge of 60 C passes through an electric lamp in 2 minutes. Then the current in lamp is
- (a) 30 A
- (b) 1 A
- (c) 0.5 A
- (d) 5 A
- 4. Peltier coefficient at a junction of a thermocouple depends on
- (a) The current in the thermocouple
- (b) The time for which current flows
- (c) The temperature of the junction
- (d) The charge that passes through the thermocouple
- 5. A coil of area of cross section  $0.5 \text{ m}^2$  with 10 turns is in a plane which is perpendicular to an uniform magnetic field of 0.2 Wb m<sup>-2</sup>. The flux through the coil is
- (a) 100 Wb
- (b) 10 Wb
- (c) 1 Wb
- (d) Zero
- 6. The self inductance of a straight conductor is
- (a) Zero
- (b) Infinity

- (c) Very large
- (d) Very small
- 7. If the wavelength of the light is reduced to one fourth, then the amount of scattering is
- (a) Increased by 16 times
- (b) Decreased by 16 times
- (c) Increased by 256 times
- (d) Decreased by 256 times
- 8. The first excitation potential energy or the minimum energy required to excite the atom from ground state of hydrogen atom is
- (a) 13.6 eV
- (b) 10.2 eV
- (c) 3.4 eV
- (d) 1.89 eV
- 9. X-ray is
- (a) Phenomenon of conversion of kinetic energy into radiation
- (b) Conversion of momentum
- (c) Conversion of energy into mass
- (d) Principle of conversation of charge
- 10. Calculate the de Broglie wave length of an electron of kinetic energy 120 eV.
- (a) 11.21 Å
- (b) 1.121 Å
- (c) 112.1 Å
- (d) 1121 Å
- 11. The nuclear radius of 4Be8 nucleus is
- (a) 1.3 fm
- (b) 2.6 fm
- (c) 13 pm
- (d) 26 pm
- 12. The explosion of atom bomb is based on the principle of
- (a) Uncontrolled fission reaction
- (b) Controlled fission reaction
- (c) Fusion reaction
- (d) Thermonuclear reaction

- 13. Avalanche breakdown is primarily dependent on the phenomenon of
- (a) Collision
- (b) Ionization
- (c) Doping
- (d) Recombination
- 14. According to the laws of Boolean algebra, the expression (A+AB) is equal to
- (a) A
- (b) B
- (c) AB
- (d) BA
- 15. In amplitude modulation, the band width is
- (a) Equal to the signal frequency
- (b) Twice the signal frequency
- (c) Thrice the signal frequency
- (d) Four times the signal frequency

# CHEMISTRY

- 1. Sommerfield's theory suggests \_\_\_\_\_ orbits for atomic structure.
  - (a) Spherical (b) circular (c) elliptical (d) dumb-bell
- 2. In filling u of electrons in orbitals, electrons will pair up only when all the available orbitals have at least one electron each. This is called \_\_\_\_\_.
  - (a) Afbau's principle (b) Pauli's exclusion principle (c) Hund's rule (d) Sommerfield's theory
- 3. Octet rule is deviated in \_\_\_\_\_.
  - (a) XeF<sub>4</sub> (b) PCl<sub>4</sub> (c) PCl<sub>5</sub> (d) OsO<sub>4</sub>
- 4. The imperfect crystallization with a few atoms missed in the crystal lattice is called \_\_\_\_\_.
  (a) Sckottky defect (b) Frenkel defect (c) Screw dislocation (d) Fresnel defect
- 5. A sample of Strontium–90 is found to have decayed to one eighth of its original amount after 87.3 years. What is the half life of Strontium–90?

(a) 40 years (b) 35.6 years (c) 29.1 years (d) 43.6 years

6. The Arrhenius equation is \_\_\_\_\_.

(a)  $k = A. e^{RT/tQ}$  (b)  $k = A. e^{RT/Ea}$  (c)  $k = A. e^{Ea/RT}$  (d)  $k = A. e^{-Ea/RT}$ 

7. The possible number of stereoisomers for the following compound is \_\_\_\_\_.

(a) 2 (b) 6 (c) 12 (d) 8

8. The IUPAC name of the following compound is \_\_\_\_\_.

$$\bigvee$$

- (a) 4,5-Dimethylhexan-2-one(b) 1,2-Dimethylhexan-4-one(c) 4,5-Dimethylpentan-2-one(d) 1,2-Dimethylpentan-3-one
- 9. One of the following compound forms a Schiff's base. Indentify the compound.
  - (a) Alcohol (b) ether (c) aldehyde (d) ester
- 10. In Rosenmund reduction, the catalyst used is \_\_\_\_\_.
  (a) Pd/Ba(NO<sub>3</sub>)<sub>2</sub> (b) Pd/CuSO<sub>4</sub> (c) Ni/Pt (d) Pd/BaSO<sub>4</sub>
- 11. The carbonyl group can be converted into a -CH<sub>2</sub>- group by \_\_\_\_\_ reduction.
  (a) Catalytic (b) Clemmenson (c) Wolf-Kishner (d) Rosenmund

- 12. Carbylamine reaction is associated with \_\_\_\_\_.(a) Urea (b) aniline (c) benzophenone (d) benzaldehyde
- 13. Aromatic nitrocompounds are \_\_\_\_.(a) Yellow in color (b) blue in color (c) pleasant in smell (d) highly volatile
- 14. Addition of Conc. Sulphuric acid to glucose leads to \_\_\_\_\_.(a) gluconic acid (b) glutaric acid (c) charring of glucose (d) explosion
- 15. All the amino acids in the human body are \_\_\_\_\_.(a) D-amino acids (b) L-amino acids (c) DL-amino acids (d) deoxy amino acids

### **CHRISTIAN VALUES**

#### (for Christian candidates only)

- Moses gave birth to a child in the land of Midian and named it \_\_\_\_\_ meaning "I have been a sojourner in a foreign land".
  - (a) Gershom (b) Joseph (c) David (d) Levi
- 2. What is the age of Joseph when he stood before Pharaoh?(a) 25 (b) 30 (c) 45 (d) 24
- 3. Who were the sisters of Lazarus whom Jesus Christ raised from the death after four days?
  - (a) Martha and Mary (b) Elizabeth and Esther(c) Deborah and Diana (d) Hannah and Victoria
- 4. Which disciple of Jesus Christ did not believe that He rose from the death?
  - (a) Thomas (b) John (c) Peter (d) Judas
- 5. One character of God as depicted in Psalm 90 is
  - (a) From the beginning of the world, He is God
  - (b) From everlasting to the present time, He is God
  - (c) From everlasting to everlasting, He is God
  - (d) From certain time in past to everlasting, He is God
- 6. \_\_\_\_\_ was a mighty hunter before God.
  - (a) Nimrod (b) Ludim (c) Cush (d) Seba
- 7. Which chapter in the Bible is known as the "Faith chapter"?
- a) I John 3 b) I Corinthians 13 c) I Peter 3 d) Hebrews 11
- 8. These two persons blessed baby Jesus when he was taken to Jerusalem temple to present Him to the Lord
- (a) Samuel and Deborah (b) Paul and Esther (c) Peter and Nancy (d) Simeon and Anna
- Paul was finally taken to this city \_\_\_\_\_, when he was arrested at the end of his missionary career.
- (a) Tarsus (b) Joppa (c) Rome (d) Patmos
- 10. The last book in the Old Testament is
- (a) Jonah (b) Malachi (c) Amos (d) Ezra

# **ETHICS**

# (for Non-Christian candidates only)

1. Differences of opinion in work places

a) Always builds up relationship b) Always hinders relationship c) Helps to learn the right from the wrong d) Helpless in any sense

2. Parents may correct their children

a) At school level b) Up to college level c) Until they are married d) All their life time.

3. Older people in the family

a) Always a burden to children b) Can be a blessing c) Always troublesome d) Not helpful

- 4. Aged parents are sent to home for the aged; because
  - a) They do not know how to mingle with the new generation
  - b) Lack of facility in the home
  - c) No time to take care for them
  - d) They failed to cultivate good values in their children
- 5. The aim of education is

a) Preparing educationalists b) To develop the society c) Preparing engineers and doctors d) To provide job opportunity.

- 6. Often we avoid self-assessment; because
  - a) It creates thoughts of failure
  - b) It is a waste of time
  - c) We prefer not to be reminded of our failures if any
  - d) We want to show ourselves as winners
- 7. The aim of the moral teaching is to
  - a) Make the poor to become rich b) Lead the people to paradise
  - c) Fulfill the responsibility of a person d) Encourage the person to do right
- 8. The future generation shall turn to values
  - a) When seeing the values in their ancestors
  - b) When they experience the ups and downs in their own life.
  - c) By reading its importance
  - d) To develop their facilities
- 9. The Reward follows
  - a) After education b) After hard work c) After responsibility d) After duty

- 10. What are values?
  - A) Morals approved by the good people of the world
  - B) Holding the precious metals
  - C) Honored by all people
  - D) The importance of luxurious life

#### **GENERAL APTITUDE**

#### (for all candidates)

- Find the missing number in the series 54, 49, \_\_\_\_, 39, 34
   a. 47 b. 44 c. 45 d. 46
- SCD, TEF, UGH, \_\_\_\_, WKL
   a. CMN b. UJI c. VIJ d. IJT
- 3. Here are some words translated from an artificial language

moolokarn means blue sky

wilkospadi means bicycle race

moolowilko means blue bicycle

Which word could mean "racecar"

a. wilkozwet b. spadiwilko c. haploch d. spadivolo

# Find the necessary part of the underlined word.

4. HARVEST

a. autumn b. stockpile c. tractor d. crop

# Find out the correct words for the following

5. ORDAIN

a. arrange b. command c. contribute d. establish

6. ADAGE

a. advice b. proverb c. enlargement d. advantage

7. BEHEST

a. behaviour b. hold down c. hold up d. relieve

8. Two bus tickets from city A to B and three tickets from city A to C cost `. 77. But three tickets from city A to B and tow tickets from city A to C cost `. 73. What are the fares for cities B and C from A?

a. Rs. 4, & Rs. 23 b. Rs. 13, & Rs. 17 c. Rs.15, & Rs. 14 d. Rs. 17, & Rs. 13

- 9. What least value must be assigned to \* so that the number 197\*5462 is divisible by 9?a. 2 b. 4 c. 6 d. 8
- 10. As 'wheel' is related to 'Vehicle' similarly 'clock' is related to what?a. Needle b. Nail c. Stick d. None of these
- 11. Blueberries cost more than strawberriesBlueberries cost less than raspberriesRaspberries cost more than both strawberries and blueberriesIf the first tow statements are true, the third statement is

a. True b. False c. Uncertain d. None

12. A, B, C, D, and E play a game of cards. A says to B, "If you give me three cards, you will have as many as E has and if I give you three cards, you will have as many as D has. "A and B together have 10 cards more than what D and E together have. If B has two cards more than what C has and the total number of cards be 133, how many cards does B have?

a. 22 b. 23 c. 25 d. 35

13. King: Throne, Rider: ?

a. Seat b. Horse c. Saddle d. Chair

- 14. Find the next letter of the following series J, F, M, A, M, J, J \_\_\_\_\_\_ a. J b. A c. S d. O