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KEE - MODEL QUESTION PAPER

MATHEMATICS

(Common to all Candidates)

1. If  *I* is the unit matrix of order n, Where  *K* ≠ 0

*adj* (*KI* ) = \_\_\_\_\_\_\_\_

*n n*−1 2

is a constant then

a) *K* (*adjI* )

2*x*

2. The equation *x* + 2

*x* +3

a) *x* = −1,−2,−3

b) *K* (*adjI*) c) *K* (*adjI*) d) *K* (*adjI* )

0 0

*x* +1 0 = 0 has the solution

2

*x* + 4 *x* +1

b) *x* = 0,−1,±*i* c) *x* = −2,−3,−4 d) *x* = 0,0,0

3. If ρ(*A*) = ρ(*A*,*B*)then the system is

a) Consistent and has infinitely many solution

b) Consistent and has unique solution

c) Consistent

d) Inconsistent

π π

cos +*i*sin

12 12

0 cos

0

4. The value of

π

6

0

+*i*sin

0

π

6

cos

π

8

0

0

+*i*sin

= \_\_\_\_\_\_\_\_\_\_\_

π

8

a)

−1−*i* 1+*i*

b)

2 2

−1+*i*

c) d) 1−*i*

2 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 *a* and *b* are unit vectors having opposite directions, which one of the following is

true?

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a) *a*.*b* =1 b) *a*.*b* =0 c) *a* x *b* =0 d) *a b* =2

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7. If *a* and *b* are two unit vectors and θ is the angle between them, then (*a* -*b* ) is a

unit vector if

a) θ =

π

4

b) θ =

π

2

c) θ =

π

3

d) θ =

2π

3

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

−1⎛ 2 ⎞

a) *Sin* ⎜ ⎟ b)

⎝ 3 ⎠

−1⎛ 1 ⎞

*Sin* ⎜ ⎟ c) *Sin*

⎝ 3⎠

−1 −1

(2) d) *Sin* ( 3)

9. If *a* is any vector, the value of

2 2 2

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*a* x*i* 2 + *a* x *j* 2+ *a* x*k*

2

is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a) *a* b) 2*a* c) 3*a* d)0

10. If *z*−*z* = *z*− *z* then the locus of z is

1 2

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* and *z*

11. If

1+ *x*1−*x*

1 2

= cos2θ +*i*sin 2θ , then x is equal to

a) *i* tan θ b) *i* tan 2θ

12. Which of the following is incorrect?

a) *z*1 +*z*2 ≤ *z*1 + *z*2 b) *z*1 +*z*2 ≥

c) *z* −*z* ≤ *z* + *z* d) *z* −*z* ≥ *z*

c) *i* cot θ d) *i* cot 2θ

*z*1 + *z*2

− *z*

1 2 1 2 1 2 1 2

13. If  *n* is a positive integer than one and

2 *n*−1

2π

*a* = cos

*n*

+*i*sin

2π

*n*

then

1+ *a* + *a* + + *a* = \_\_\_\_\_\_\_\_\_

a)0 b)1 c)-1 d)n

14. The point of contact of the tangent *y* = *mx* + *c* and the parabola *y*

⎛ *a* 2*a*⎞ ⎛ 2*a a* ⎞ ⎛ *a* 2 ⎞

2

= 4*ax*is

⎛−*a* −2*a*⎞

a) ⎜ , ⎟ b)

2

⎜ , ⎟

2

c) ⎜ , *~~a~~*

2

⎟ d) ⎜ , ⎟

2

⎝ *m m* ⎠ ⎝ *m m* ⎠ ⎝ *m m* ⎠ ⎝ *m m* ⎠

15. The curve with parametric equation *x* = 1 + 4 cos θ , *y* = 2 + 3sin θ *is* \_\_\_\_\_\_\_\_

a) a circle b)a parabola c)an ellipse d)a hyperbola

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

2 1 −1 5 1

a) , , b) , ,−5

5 5 5 2 5

c) 2,1,−1 d) − 2,− ,

2 2

17. The condition that the line *lx* + *my* + *n* = 0 may be a normal to the hyperbola

is

2 2 2 2 2

*x*

*a*

2

− *~~y~~*

*b*

2

=1

a) *al*

3

+ 2*alm*

2

+ *m*

2

*n* = 0 b)

*a*

2

+

*b*

2

=

(*a* + *b* )

2

*l m n*

2 2 2 2 2 2 2 2 2 2

*a b* (*a* −*b* ) *a b* (*a* +

c)

*l*

2

+

*m*

2

=

*n*

2

d)

*l*

2

−

*m*

2

=

*n*

*b* )

2

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

a) 3*y*

2

−*x*

2

−6*y* = 0 b) 3*x*

2

−*y*

2

+ 6*x* = 0

c) 3*x*

2

−*y*

2

+ 6*y* = 0 d) 3*x*

2

−*y*

2

−6*x* = 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   
point

*x*

d) Critical

2 2

20. The area of the largest rectangle that can be inscribed in the ellipse

*a*

is\_\_\_\_\_\_\_

2

2

+ *~~y~~*

*b*

2

=1

a) ab b) *a* 2*b* c)2ab d) 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 ~~ଷ଴~~ ܿ݉?

√ଶ

a) 3 cm2/sec b) 6√2 cm2/sec c) 3√2 cm2/sec d) 6 cm2/sec

22. In the law of mean, the value of ‘ș ‘satisfies the condition

a) ș > 0 b) ș < 0 c) ș < 1 d) 0 < ș < 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

a) 0.1 % b) 0.2 % c) 0.02 % d) 2.0 %

24. In which region the curve ݕଶሺܽ ൅ ݔሻ ൌ ݔଶሺ3ܽ െ ݔሻ

a) X> 0 b) x  -a and x > 3a c) -a < x < 3a d) 0 < x< 3a

25. The curve ݔଷ ൅ ݕଷ ൌ 3ܽݔݕ is symmetrical about \_\_\_\_\_\_\_\_\_.

a) a) x= 0 b) y=0 c) both axis d) y=x

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݂ሺ2ܽ െ ݔሻ݀ݔ ൌ \_\_\_\_\_\_\_\_\_௔׬൅

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a)

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|ݔ ൅ 1|݀ݔ

b)

is

݂ሺݔሻ݀ݔ௔׬2

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c)

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݂ሺݔሻ݀ݔ

׬d)

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a)

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b) ଵ c) 2 d) -2

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28. The volume of the solid obtained when the area between the line joining the points   
 (0,0) and (2, 3) and x—axis is rotated about x-axis is \_\_\_\_\_\_\_\_\_\_

a) 2ߨ b) 4ߨ c) 8ߨ d) 6ߨ

29. The area between the parabolas ݕଶ ൌ 16ݔ and the line y =x is \_\_\_\_\_\_\_\_

a) ~~ସସଶ~~ b) ~~ସସଵ~~ c) ~~ଵଶ଼~~ d) ~~ଶହ଺~~

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30. The differential equation formed by eliminating A and B from the relation

y= ݁௫ (A cos 3x + B sin 3x) is

a) ݕ*′′* െ 2ݕ*′* െ 10ݕ ൌ 0 b) ݕ*′′* െ 2ݕ*′* ൅ 10ݕ ൌ 0 c) ݕ*′′* ൅ 2ݕ*′* ൅ 10ݕ ൌ

d) ݕ*′′* ൅ 2ݕ*′* െ 10ݕ ൌ 0

31. If y =݁ିସ௫ሺ ܣ cos 3ݔ ൅ ܤ sin 3ݔሻ then

a) ሺܦଶ െ ܦ െ 12ሻݕ ൌ 0 b) ( ܦଶ ൅ 8ܦ ൅ 25ሻy = cos 3x + sin 3x

c) (ܦଶ ൅ 8ܦ ൅ 25ሻ ݕ ൌ 0 d) (ܦଶ െ 8ܦ ൅ 25ሻ ݕ ൌ ݁ିସ௫

32. The differential equation satisfied by the all straight in xy plane is \_\_\_\_\_\_\_\_\_

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a) = a constant b)

0

ௗ௫

33. The particular integral of

ௗ௫మ = 0 c) y + ௗ௫  = 0 d) ௗ௫మ + y = 0

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+ 9y = 1+ sin 3x is \_\_\_\_\_\_\_\_\_

ௗ௫మ

a)

ି௫௖௢௦ ଷ௫

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+ ଵ b)  ~~௫ୱ୧୬ଷ௫~~ c)

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+ ~~ଵ~~ d) ~~௫ୡ୭ୱଷ௫~~ + 9

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34. If x~~ௗ௬~~ = y (log y -log x +1) then the solution of the equation is

ௗ௫

a) x log ~~௬~~ = cy b) y log ~~௫~~

௫ ௬

= cx c) log ~~௫~~ = cy d) log ~~௬~~ = cx

௬ ௫

2

35. The complementary function of differential equation (*D* −1) *y* = cos*x* is

*x x* −*x x* 2*x x x x*

a) *Ae* + *Be*− b) *Ae* + *Be*− c) *Ae* +

36. The particular integral of the differential equation

*x*

*Be*−2 d) *Ae* + *Be*

(*D*3+1) *y* = *x* is

a) *x* b) − *x* c) 2*x* d)

2

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37. An element of order 2 in the group (*C* −{0},•) is \_\_\_\_\_\_\_\_\_\_\_.

*i*π 2−*i*

a ) 1-i b ) 2+i

38. The set *G*= 1 ω,ω

c) *e* d)

3

2

} of all the cube roots of unity forms an abelian group with

2 7

1+ ω + ω − ω

respect to multiplication. Then the inverse of

2

a) −(1+ ω ) b) −(1+ ω) c) ω

39. If a,b,c are any three elements of the group

x=\_\_\_\_\_\_\_\_\_.   
 −1 −1 −1 −1

is \_\_\_\_\_\_\_\_\_.

1+ ω

d) −ω

(*G*,∗) and (*a* ∗ *b*) ∗ *x* = *c* then

−1 −1

a) *c* ∗(*a*

−1

d) (*b*

∗ *b* ) b) *c*

−1

∗ *a* )∗ *c*

∗(*b* ∗ *a* ) c) (*a* ∗*b* )∗*c*

40. In congruence modulo5, *x* ∈ *Z* / *x* = 5*k* + 4, *k* ∈ *z*} represents

a ) [0] b) [5]

π*x*

41. If *f* (*x*) = *k*sin

5

2π 3π

a)

,0

c) [4]

≤*x*≤ 5

d)[2]

is a p.d.f. then the value of k=\_\_\_\_\_\_\_\_.

π π

d)

5 b) 10 c) 10

42. In a Poisson distribution if standard deviation is   
 −2 2

5

2 then *P*(*X* ≥ 1) is\_\_\_\_\_\_\_\_.   
 −1

a) 1−*e* b) 1+ *e* c) 1−*e* d) 1−*e*

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

a) 50 b) 40 c)25 d) 20

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

1 25 26

a) 2 b) 51 c) 51

45. The binomial distribution have the mean

a) n2p b)np c) npq

PHYSICS

1. Three small identical balls have charges -3 x 10-12 C, 8 x 10-12 C and 4 x 10-12 C   
 respectively. They are brought in contact and then separated. Calculate the charge on   
 each ball.

(a) 3 x 10-12 C

(b) 0.3 x 10-12 C

(c) 30 x 10-12 C

(d) 0.03 x 10-12 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 m2 with 10 turns is in a plane which is

perpendicular to an uniform magnetic field of 0.2 Wb m-2. 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

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(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

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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

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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) XeF4 (b) PCl4 (c) PCl5 (d) OsO4

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. eRT/tQ (b) k = A. eRT/Ea (c) k = A. eEa/RT (d) k = A. e-Ea/RT

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

O

H OH

H OH

H OH

OH

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

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

O

(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(NO3)2 (b) Pd/CuSO4 (c) Ni/Pt (d) Pd/BaSO4

11. The carbonyl group can be converted into a -CH2- group by \_\_\_\_\_\_ reduction.

(a) Catalytic (b) Clemmenson (c) Wolf-Kishner (d) Rosenmund

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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

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GENERAL APTITUDE   
 (for all candidates)

1. Find the missing number in the series 54, 49, \_\_\_, 39, 34

a. 47 b. 44 c. 45 d. 46

2. 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 strawberries   
 Blueberries cost less than raspberries

Raspberries cost more than both strawberries and blueberries   
If the first tow statements are true, the third statement is

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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

15. Find the first number in the series: ……….19, 23, 29, 31

a. 12 b. 15 c. 16 d. 17