

KEA DCET - 2018 Question Paper

PART - A

It consists of 1- 40 questions

1. If $A = \begin{bmatrix} 3 & 0 \\ -2 & 1 \end{bmatrix}$, then $2A - 3A^T =$

a) $\begin{bmatrix} -3 & -6 \\ -4 & 1 \end{bmatrix}$ b) $\begin{bmatrix} -3 & 6 \\ -2 & 1 \end{bmatrix}$

c) $\begin{bmatrix} -3 & 6 \\ -4 & -1 \end{bmatrix}$ d) $\begin{bmatrix} -3 & 6 \\ 4 & -1 \end{bmatrix}$

2. If $[3 \ 4 \ x] \begin{bmatrix} -1 \\ 2 \\ 5 \end{bmatrix} = [2x + 8]$ then the value of $x =$

a) 1 b) -1

c) $-\frac{1}{2}$ d) $\frac{1}{2}$

3. If $\begin{vmatrix} 3 & m-1 \\ m+1 & 2 \end{vmatrix} = 3$, then the value of $m =$

a) ± 1 b) $\pm\sqrt{2}$

c) ± 3 d) ± 2

4. In solving simultaneous linear equations $x - y = 4$, $2y + 3z = -2$ and $3x + y + 2z = 1$ using Cramer's rule, the value of determinant of co-efficients of x , y and z is

a) 6 b) 12

c) -8 d) -16

5. If $A = \begin{bmatrix} -2 & 5 \\ 2 & -3 \end{bmatrix}$, then inverse of $A =$

a) $\frac{1}{4} \begin{bmatrix} 2 & -5 \\ -2 & 3 \end{bmatrix}$ b) $\frac{1}{4} \begin{bmatrix} -3 & -5 \\ -2 & -2 \end{bmatrix}$

c) $\frac{1}{4} \begin{bmatrix} -2 & 2 \\ 5 & -3 \end{bmatrix}$ d) $\frac{1}{4} \begin{bmatrix} 3 & 5 \\ 2 & 2 \end{bmatrix}$

6. The characteristic roots of the matrix $\begin{bmatrix} 4 & -2 \\ -3 & -1 \end{bmatrix}$

are

a) 2 and -5 b) -2 and 5

c) -2 and -5 d) 2 and 5

7. If $\vec{a} = 2\hat{i} - 3\hat{j} + 5\hat{k}$

$$\vec{b} = 3\hat{i} - 2\hat{j} - 5\hat{k}$$

$$\vec{c} = \hat{i} + 4\hat{k}$$

then the scalar product of $\vec{a} + \vec{b}$ and $\vec{b} - \vec{c}$ is

a) -9

b) 9

c) 20

d) -20

8. If A , B and C are three consecutive vertices of a parallelogram with position vectors $3\hat{i} - 2\hat{j} + \hat{k}$, $2\hat{i} + \hat{j} - \hat{k}$, and $\hat{i} - \hat{j} + \hat{k}$ then area of the parallelogram is

a) $3\sqrt{5}$ sq.units b) $5\sqrt{3}$ sq.units

c) $2\sqrt{5}$ sq.units d) $5\sqrt{2}$ sq.units

9. Work done by the force $2i - 3j + 5k$ in moving a particle from $(-3, 1, 2)$ to $(1, -1, 1)$ is

a) 3

b) 9

c) 6

d) 15

10. The probability of drawing a non-diamond card from a well shuffled deck of 52 cards is

a) $\frac{3}{4}$ b) $\frac{1}{2}$

c) $\frac{1}{4}$ d) $\frac{12}{13}$

11. If $\tan\theta = \frac{2}{3}$ and $\pi < \theta < \frac{3\pi}{2}$, then $\sin\theta + \cos\theta =$

a) $\frac{5}{\sqrt{13}}$ b) $\frac{-1}{\sqrt{13}}$

c) $\frac{1}{\sqrt{13}}$ d) $\frac{-5}{\sqrt{13}}$

12. If $\tan A + \tan B + \tan A \tan B = 1$, then $A + B =$

a) 180° b) 90°
c) 45° d) 360°

13. $\sqrt{\frac{1 - \cos 40^\circ}{1 + \cos 40^\circ}} =$

a) $\tan 20^\circ$ b) $\cot 40^\circ$
c) $\tan 10^\circ$ d) $\tan 40^\circ$

14. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{2}{3}$ then $\tan(A-B)$ is

a) -1 b) 1

c) $\frac{-1}{8}$ d) $\frac{1}{8}$

15. The numerical value of $\sin 10^\circ \sin 50^\circ \sin 70^\circ =$

a) $\frac{\sqrt{3}}{8}$ b) $\frac{1}{8}$

c) $\frac{3}{16}$ d) $\frac{1}{16}$

16. $\frac{\sin 12^\circ + \cos 12^\circ}{\sin 12^\circ - \cos 12^\circ} =$

a) $\cot 33^\circ$ b) $-\tan 33^\circ$
c) $-\tan 57^\circ$ d) $\tan 57^\circ$

17. The polar form of the complex number $\sqrt{3} - i$ is

a) $2\left[\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right]$ b) $2\left[\cos\frac{\pi}{6} - i\sin\frac{\pi}{6}\right]$

c) $2\left[\cos\frac{\pi}{3} - i\sin\frac{\pi}{3}\right]$ d) $2\left[\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right]$

18. The value of $\lim_{x \rightarrow \infty} x\left[\sqrt{x^2 + 1} - x\right]$ is

a) 1 b) 2

c) $\frac{1}{2}$ d) 0

19. The value of $\lim_{x \rightarrow 3} \frac{x\sqrt{x} - 3\sqrt{3}}{\sin(x-3)}$ is

a) $\frac{3\sqrt{3}}{2}$ b) $3\sqrt{3}$

c) $\frac{2}{3\sqrt{3}}$ d) $\frac{1}{3\sqrt{3}}$

20. The value of $\lim_{x \rightarrow 0} \frac{1 - \sqrt{\cos x}}{x^2}$ is

a) 1 b) $\frac{1}{4}$

c) 2 d) $-\frac{1}{2}$

21. The equation of line passing through the point $(1, -$

$3)$ and having slope $\frac{1}{2}$ is

a) $x - 2y - 7 = 0$ b) $2x - y + 7 = 0$

c) $x - 2y - 4 = 0$ d) $x - y - 4 = 0$

22. The equation of line passing through the point $(-2, 3)$ and parallel to the line $5x + 3y + 5 = 0$ is,

a) $5x + 3y - 19 = 0$ b) $5x + 3y + 1 = 0$

c) $5x + 3y + 19 = 0$ d) $3x - 5y + 1 = 0$

23. If $y = e^x \log x$ then $\frac{dy}{dx}$ is

a) $e^x \left[\frac{1}{x} + \log x\right]$ b) $e^x \left[\frac{1}{x} - \log x\right]$

c) $e^x \cdot \frac{1}{x}$ d) $e^x + \frac{1}{x}$

24. If $y = \log(\tan x + \sec x)$, then $\frac{dy}{dx}$ is,

- a) $-\sec x$ b) $\sec x$
 c) $\frac{\sec x}{\tan x + \sec x}$ d) $\log(\sec^2 x + \tan x \sec x)$

25. If $\frac{x^2}{2} + \frac{y^2}{2} = 1$ then $\frac{dy}{dx}$ is

- a) $\frac{1+x}{y}$ b) $\frac{x}{y}$
 c) $\frac{-x}{y}$ d) $\frac{1-x}{y}$

26. If $x = \frac{1}{t}$; $y = 3t^3$ then $\frac{dy}{dx}$ is,

- a) $-6t^4$ b) $-9t^4$
 c) -6 d) -9

27. If $y = (\sin x)^{\log x}$ then $\frac{dy}{dx}$ is

- a) $(\sin x)^{\log x} \left[\log x \cos x + \frac{\log \sin x}{x} \right]$
 b) $(\sin x)^{\log x} \left[\frac{\log x}{\sin x} + \frac{\log \sin x}{x} \right]$
 c) $(\sin x)^{\log x} - [-\log x \cot x + \log \sin x]$
 d) $(\sin x)^{\log x} \left[\log x \cot x + \frac{\log \sin x}{x} \right]$

28. If $y = e^{5x} + e^{-5x}$ then $\frac{d^2y}{dx^2}$ at $x = 0$ is,

- a) 25 b) -25
 c) 50 d) -50

29. The rate of change of volume of a sphere with respect to radius, when its radius 3 cm is

- a) 3π b) 6π
 c) 18π d) 36π

30. The equation of normal to the curve $y = x^2$ at $(2, 2)$ is

- a) $x - 4y - 10 = 0$ b) $x - 4y + 10 = 0$
 c) $x + 4y - 10 = 0$ d) $x + 4y + 10 = 0$

31. The value of $\int e^{5 \log x} dx$ is

- a) $5x^4 + C$ b) $\frac{x^6}{6} + C$
 c) $6x^6 + C$ d) $\frac{x^5}{5} + C$

32. The value of $\int \frac{\cos x - \sin x}{\cos x} dx$ is

- a) $x - \cos x + C$ b) $x + \cos x + C$
 c) $x - \log \sec x + C$ d) $x - \log \sec x + C$

33. The value of $\int (2 + \sin^3 x) \cos x dx$ is,

- a) $2 \sin x + \frac{(\sin x)^4}{4} + C$
 b) $\frac{\sin^4 x}{4} + C$
 c) $2 \cos x + \frac{(\cos x)^4}{4} + C$
 d) $\frac{\cos^4 x}{4} + C$

34. The value of $\int \frac{x+5}{x^2+10x-5} dx$ is

- a) $\log(x^2 - 10x - 5)^2 + C$
 b) $\frac{1}{2} \log(x^2 + 10x - 5)^2 + C$
 c) $\frac{1}{2} \log(x+5) + C$
 d) $\log(x+5)^2 + C$

35. The value of $\int 4x \log 5x dx$ is,

- a) $\frac{x^2 \log 5x}{2} - \frac{x^2}{5} + C$

b) $\frac{x \log 5x}{5} + \frac{x^2}{5} + C$

c) $5x \log 5x + 1 + C$

d) $2x^2 \log 5x - x^2 + C$

36. $\int_0^{\pi/4} \frac{\sec^2 x}{1 + \tan x} dx =$

a) $-\log 2$ b) $\log 2$

c) $\log 3$ d) $\log 4$

37. The volume of a solid generated by revolving the curve $y = \tan x$ about x -axis between the lines $x = 0$

and $x = \frac{\pi}{4}$ is,

a) $\pi + \frac{\pi^2}{4}$ cu. units b) $1 + \frac{\pi}{4}$ cu. units

c) $1 - \frac{\pi}{4}$ cu. units d) $\pi - \frac{\pi^2}{4}$ cu. units

38. Order and degree of differential equation

$$\frac{d^2 y}{dx^2} = \sqrt{1 - \frac{dy}{dx}} \text{ are}$$

a) 2 and 2 respectively

b) 2 and 1 respectively

c) 1 and 2 respectively

d) 1 and 1 respectively

39. The differential equation obtained by eliminating the arbitrary constants from the equation $y^2 = a \sin x + b \cos x$ is

a) $2 \frac{d^2 y}{dx^2} + 2 \left(\frac{dy}{dx} \right)^2 - y^2 = 0$

b) $\frac{d^2 y}{dx^2} + \left(\frac{dy}{dx} \right)^2 + y^2 = 0$

c) $2y \frac{d^2 y}{dx^2} - 2 \left(\frac{dy}{dx} \right)^2 + y^2 = 0$

d) $2y \frac{d^2 y}{dx^2} + 2 \left(\frac{dy}{dx} \right)^2 + y^2 = 0$

40. The solution of differential equation

$$x \frac{dy}{dx} + y = x - 1 \text{ is}$$

a) $xy = x - \frac{x^2}{2} + C$ b) $xy = \frac{x^2}{2} - x + C$

c) $xy + \frac{x^2}{2} + x = C$ d) $xy - \frac{x^2}{2} - x = C$

PART - B

It consists of 41- 80 questions

41. The value of 20 peta Hertz is

a) 20×10^9 Hz b) 20×10^{12} Hz

c) 20×10^{15} Hz d) 20×10^{18} Hz

42. The total reading for Screw Gauge is found by

a) $TR = PSR + (HSR \times LC) \pm ZE$

b) $TR = PSR + (HSR \times LC) \pm ZC$

c) $TR = (PSR + HSR) \times LC \pm ZE$

d) $TR = (PSR + HSR) \times LC \pm ZE$

43. The least count of a slide calipers is 0.01 cm. In a setting the zero of the Vernier Scale lies between 3.2 cm and 3.3 cm and 5th division of the Vernier co-incides with the main scale division. The total reading is

a) 3.35 cm b) 3.35 mm

c) 3.25 cm d) 3.25 mm

44. The rectangular component of a vector R are

a) $R_x = R \cos \theta, R_y = R \sin \theta$

b) $R_x = R \sin \theta, R_y = R \cos \theta$

c) $R_x = R \cos \theta, R_y = R \sin \theta$

d) $R_x = R \cos \theta, R_y = R \sin \theta$

45. A body of weight 5 kg is suspended by means of a light string. It is pulled horizontally until the string makes an angle of 30° with the vertical. Then the horizontal force applied is

- a) $\frac{1}{\sqrt{3}}$ kg wt b) 5 kg wt
- c) $5\sqrt{3}$ kg wt d) $\frac{5}{\sqrt{3}}$ kg wt
- 46.** Among these which is the vector quantity?
 a) Work b) Energy
 c) Surface tension d) Power
- 47.** The resultant of two like parallel forces P and Q acting at point is
 a) $P + Q$ away from P
 b) $P + Q$ away from Q
 c) $P - Q$ in between P and Q
 d) $P + Q$ in between P and Q
- 48.** Shock absorbers in automobiles is an example for
 a) Tensile stress b) Compressive stress
 c) Shear stress d) Breaking stress
- 49.** The elasticity of steel compared to rubber is
 a) More b) Less
 c) Equal d) Less than or equal
- 50.** The stress-strain graph for an elastic body within elastic limit is
 a) Linear b) Curved
 c) Parabola d) Hyperbola
- 51.** The maximum stress of steel wire is 500 N/mm^2 , if the area of cross section of wire is 0.05 m^2 then the force is
 a) 25 N b) 25 KN
 c) 25 MN d) 250 N
- 52.** In case of concave meniscus, the angle of contact is
 a) Acute b) Right angle
 c) Linear d) Obtuse
- 53.** The surface tension of a liquid varies as
 a) Directly with temperature, inversely with density
 b) Directly with both temperature and density
 c) Inversely with both temperature and density
 d) Inversely with temperature and directly with density
- 54.** The thrust on the bottom of a container having base area 0.5 m^2 filled with water to a height of 6 cm is
 a) 147 N b) 294 N
 c) 147 dynes d) 294 dynes
- 55.** The fastest mode of transfer of heat is
 a) Conduction b) Convection
 c) Radiation d) Transmission
- 56.** Pressure is directly proportional to absolute temperature at constant volume is a statement of
 a) Charle's law b) Boyle's law
 c) Gay-Lussac's law d) Boltzmann's law
- 57.** Boyle's law is applicable for
 a) Isothermal process b) Isobaric process
 c) Isochoric process d) Isotonic process
- 58.** At absolute zero temperature, the pressure and volume of a given mass of gas is
 a) 1 b) 273
 c) -273 d) 0
- 59.** In cold countries, the windows are provided with double doors because
 a) Air between two windows behaves as a perfect insulator
 b) Air between two windows behaves as a perfect conductor
 c) To strengthen the windows
 d) Security purpose
- 60.** The sound waves and light waves can be differentiated by
 a) Interference b) Diffraction
 c) Reflection d) Polarization
- 61.** The velocity of sound in gas is independent of
 a) Temperature b) Pressure
 c) Humidity d) Density
- 62.** The superposition of two waves of same frequency moving in opposite direction is
 a) Progressive wave b) Transverse waves
 c) Sound wave d) Stationary wave
- 63.** For every degree raise of temperature, the velocity of sound waves in gas is increased by

- a) 6 m/s b) 60 m/s
c) 0.6 s/m d) 0.6 m/s
64. The angle between the particle vibration and wave propagation in a transverse wave is
a) 0° b) 45°
c) 90° d) 180°
65. The original tension in the string if the frequency of a sonometer wire is doubled, when the tension is increased by 12 kg wt is
a) 2 kg wt b) 4 kg wt
c) 8 kg wt d) 12 kg wt
66. At resonance, the body vibrates with
a) Small amplitude
b) Large amplitude
c) Zero amplitude
d) Same amplitude
67. Beats occurs in mining due to the presence of
a) Ore b) Water
c) Contaminated air d) Fossils
68. The statement which is correct in these is
a) X-rays have longer wavelength than microwaves
b) Gamma rays have shorter wavelength than microwaves
c) UV-rays have shorter wavelength than violet rays
d) Red rays have longer wavelength than infrared rays
69. LASER is used in
a) LIDAR b) RADAR
c) SONAR d) GPS
70. Nano means
a) One hundredth of meter
b) One thousandth of meter
c) One millionth of meter
d) One billionth of meter
71. Microphone is a
a) Transducer b) Receiver
c) Channel d) Transmitter
72. The principle behind optical fibre is
a) Total internal refraction
b) Total internal reflection
c) Reflection
d) Refraction
73. Faraday's law of electrolytes is represented mathematically as
a) $M = ZQ$ b) $Z = MQ$
c) $Q = MZ$ d) $M = \frac{Z}{Q}$
74. A galvanic cell setup between two dissimilar metals in contact is called
a) Concentration cell b) Composition cell
c) Stress Cell d) Secondary cell
75. In which of these cells the reaction can be reversed?
a) Primary cell b) Secondary cell
c) Solar cell d) Photo cell
76. The statement which is true for fuel cell is
a) They make more pollution
b) They produce noise
c) They liberate more heat
d) They are heavy in weight
77. Alloy of steel is a mixture of
a) Chromium, iron and nickel
b) Chromium, iron and zinc
c) Chromium, iron and aluminium
d) Chromium, iron and tin
78. The materials with weak intermolecular forces of attraction between polymer chains are
a) Elastomers b) Fibres
c) Thermoplastic d) Thermosetting polymers
79. The type of composite material to which reinforced concrete belongs is
a) Laminate b) Particulate
c) Short fibre d) Long fibre
80. pH value of a solution is given by
a) $-\log_{10}[H^+]$ b) $-\log_e[OH^-]$
c) $-\log_e[H^+]$ d) $\log_{10}[H^+]$

KEY ANSWERS

- | | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|-----------|---------|---------|
| 1. (c) | 2. (a) | 3. (d) | 4. (c) | 5. (d) | 6. (b) | 7. (c) | 8. (a) | 9. (b) | 10. (a) |
| 11. (d) | 12. (c) | 13. (a) | 14. (c) | 15. (b) | 16. (c) | 17. (b) | 18. (c) | 19. (a) | 20. (b) |
| 21. (a) | 22. (b) | 23. (a) | 24. (b) | 25. (c) | 26. (b) | 27. (d) | 28. (c) | 29. (d) | 30. (c) |
| 31. (b) | 32. (d) | 33. (a) | 34. (b) | 35. (d) | 36. (b) | 37. (d) | 38. (a) | 39. (d) | 40. (b) |
| 41. (c) | 42. (b) | 43. (c) | 44. (a) | 45. (d) | 46. (c) | 47. (d) | 48. (b) | 49. (a) | 50. (a) |
| 51. (c) | 52. (a) | 53. (d) | 54. (b) | 55. (c) | 56. (c) | 57. (a) | 58. (d) | 59. (a) | 60. (d) |
| 61. (b) | 62. (b) | 63. (d) | 64. (c) | 65. (b) | 66. (b) | 67. (c) | 68. (b/c) | 69. (a) | 70. (d) |
| 71. (a) | 72. (b) | 73. (a) | 74. (b) | 75. (b) | 76. (c) | 77. (a) | 78. (a) | 79. (b) | 80. (a) |