

# KEA DCET - 2019 Question Paper

## PART - A

It consists of 1- 40 questions

- When a wave travels through the medium, the particles of the medium are
  - displaced in the direction of wave
  - displaced opposite to the direction of wave
  - mean position remains same
  - starts rotating
- Two waves with very little difference in their frequencies overlap on one another to produce
  - Stationary waves
  - Progressive waves
  - Beats
  - Transverse waves
- The acceleration of the particle executing simple harmonic motion is directly proportional to its
  - displacement from its mean position
  - period of motion
  - frequency of vibration
  - amplitude of wave
- In the expression for velocity of sound in air  $V = \sqrt{\frac{\gamma P}{\rho}}$ , notation  $\gamma$  is equal to
  - $C_p + C_v$
  - $C_p - C_v$
  - $C_p \times C_v$
  - $\frac{C_p}{C_v}$
- Velocity of sound in outer space is
  - $3 \times 10^8$  m/s
  - 330 m/s
  - zero
  - 360 m/s
- A string of length 1m and mass 0.04 kilogram vibrates with fundamental frequency of 100 Hz then the tension in the string is
  - 4000 N
  - 1600 N
  - 400 N
  - 1000 N
- Nodes and antinodes are characteristics of
  - Stationary waves
  - Longitudinal waves
  - Transverse waves
  - Beats
- Natural frequency of a string does not vary with
  - thickness
  - applied force
  - tension
  - length
- The electromagnetic radiation used in Forensic Department to study the finger print is
  - Ultraviolet Ray (UV Ray)
  - Radio wave
  - Micro wave
  - X-ray
- The type of light used to study Holography is
  - Visible light
  - Laser light
  - Sodium light
  - Mercury light
- Which technology is used to develop Sun Screen lotion and cosmetics?
  - Geo-technology
  - Nano-technology
  - Electro-technology
  - Micro-technology
- The process of separating the information signal from the carrier wave at the receiver is known as
  - Amplification
  - Modulation
  - Attenuation
  - Demodulation
- Optical fibre is used in
  - Pressure sensors
  - Drilling
  - Holography
  - Welding
- The mass of copper deposited on the cathode of a copper voltmeter by a current of 2 amperes in 30 minutes is

- (Given ece of copper (Z) = 0.0003 gm / coulomb)
- a) 3.2 gm                      b) 4.3 gm  
c) 1.08 gm                     d) 2.5 gm
15. The process of coating zinc over iron or steel is known as  
a) Galvanizing                b) Tinning  
c) Alloying                    d) Non-Metallic coating
16. SOFC is a type of  
a) Primary cell                b) Secondary cell  
c) Fuel cell                    d) Solar cell
17. Magnalium is an alloy made by the combination of aluminium and  
a) Phosphorous                b) Zinc  
c) Tin                            d) Magnesium
18. Zinc-carbon battery is an example for  
a) Secondary Battery  
b) Fuel cell  
c) Primary Battery  
d) Solar cell
19. Which of the following is not a polymer?  
a) Teflon                        b) Nylon  
c) Bakelite                     d) Glass
20. Ceramic is which type of material?  
a) Composite material  
b) Alloy  
c) Polymer  
d) Bio-material
21. The pH value of distilled water is  
a) 13                              b) 7  
c) 2                                d) 11
22. One of the basic unit in SI is  
a) Newton                        b) Joule  
c) Kilometer                    d) Ampere
23. The pitch of screw is  $\frac{1}{2}$  mm. The number of divisions on head scale of screw gauge is 50. The least count of screw gauge is  
a) 0.1 mm                      b) 0.5 mm  
c) 0.01 mm                     d) 0.05 mm
24. Which one of the following is a vector quantity?  
a) Speed                        b) Density  
c) Velocity                      d) Mass
25. The magnitude of resultant of forces  $\vec{P}$  &  $\vec{Q}$  acting perpendicular to each other is  
a)  $\sqrt{P^2 + Q^2}$                 b)  $\sqrt{P^2 - Q^2}$   
c)  $P^2 - Q^2$                     d)  $P^2 + Q^2$
26. A force of 50 N acts at a point making an angle of  $30^\circ$  with the horizontal. The vertical component is  
a) 50 N                          b) 25 N  
c) 150 N                        d) 1.6 N
27. A couple produces  
a) pure linear motion  
b) pure rotational motion  
c) both linear and rotational motion  
d) neither linear nor rotational motion
28. The resultant of two like parallel of forces acts in the direction of  
a) same as that of two forces  
b) opposite to two forces  
c) perpendicular to two forces  
d) direction cannot be specified
29. The reciprocal of bulk modulus of elasticity is called  
a) Compressibility  
b) Rigidity  
c) Modulus of elasticity  
d) Viscosity
30. A steel wire has a cross sectional area of  $0.05 \text{ m}^2$ . If the maximum stress of steel wire is  $1000 \text{ N/m}^2$ . The force is  
a)  $20 \times 10^3 \text{ N}$                 b) 50 N  
c) 200 N                        d) 20 N
31. The pressure at a point on surface of a liquid is  
a) minimum                      b) maximum  
c) zero                            d) infinity
32. The pressure exerted by sea water of density  $1025 \text{ kg/m}^3$  on a fish at a depth of 10 m ( $g = 10 \text{ m/s}^2$ ) is

- a) 1025 kPa      b) 10.25 kPa  
c) 1.025 kPa      d) 102.5 kPa
33. A drop of rain assumes spherical shape due to  
a) Density      b) Viscosity  
c) Surface tension      d) Humidity
34. The phenomenon of rise or fall of liquid in capillary tube is  
a) Viscosity      b) Capillarity  
c) Density      d) Elasticity
35. The S.I. unit of coefficient of viscosity is  
a) Ns/m<sup>2</sup>      b) Ns<sup>2</sup>/s      c) m<sup>2</sup>s/N      d) Ns/m
36. The expression that represents Boyle's law is (T)  
a) PV = constant      b) PT = constant  
c) VT = constant      d) PVT = constant
37. The volume of gas at 30°C is 2 litres. To what temperature the gas must be heated for its volume to become 4 litres at constant pressure.  
a) 300°C      b) 273°C  
c) 333°C      d) 606°C
38. Working of pressure cooker is based on the principle of  
a) Boyle's law      b) Charle's law  
c) Laplace's law      d) Gay-Lussac's law
39. Land and sea breeze is an example of  
a) Conduction      b) Convection  
c) Condensation      d) Radiation
40. The measure of average kinetic energy of all particles in a gas is  
a) Heat      b) Mechanical energy  
c) Chemical energy      d) Temperature

### PART - B

It consists of 41- 80 questions

41. The slope and y-intercept of the line  $6x - 4y + 3 = 0$  are respectively  
a)  $\frac{3}{2}$  and  $\frac{3}{4}$       b)  $\frac{2}{3}$  and  $\frac{4}{3}$   
c)  $-\frac{3}{2}$  and  $\frac{4}{3}$       d)  $\frac{3}{2}$  and  $\frac{2}{3}$

42. The equation of the line joining the points (1, 3) and (2, -4) is  
a)  $7x - y - 10 = 0$       b)  $7x + y - 10 = 0$   
c)  $x + 7y + 10 = 0$       d)  $x - 7y - 10 = 0$
43. If  $y = e^{-2x} + 4a^x$ , then  $\frac{dy}{dx} =$   
a)  $\frac{e^{-2x}}{2} + \frac{4a^x}{\log a}$       b)  $e^{-2x} + 4x a^{x-1}$   
c)  $-2e^{-2x} + 4a^x \log a$       d)  $2e^{-2x} - 4a^x \log a$
44. If  $y = \log(\log 3x)$  then  $\frac{dy}{dx} =$   
a)  $\frac{1}{x \log 3x}$       b)  $\frac{3}{x \log 3x}$   
c)  $2 \log 3x$       d)  $\frac{1}{\log x}$
45. If  $xy = x + y^2$ , then  $\frac{dy}{dx} =$   
a)  $\frac{x-2y}{1-y}$       b)  $\frac{1-y}{x-2y}$   
c)  $\frac{2y-x}{y-1}$       d)  $\frac{1+y}{x+2y}$
46. If  $x = \tan^{-1} t$  and  $y = 3t + t^3$  then  $\frac{dy}{dx} =$   
a) 3      b)  $3(1+t^2)^2$   
c)  $\frac{3}{(1+t^2)^2}$       d)  $\frac{1}{3(1+t^2)^2}$
47. If  $y = (x)^{\frac{1}{x}}$ , then  $\frac{dy}{dx} =$   
a)  $y \left[ \frac{1 + \log x}{x^2} \right]$       b)  $\frac{1 + \log x}{x^2 y}$   
c)  $\frac{1 - \log x}{x^2 y}$       d)  $\frac{y[1 - \log x]}{x^2}$

48. Which of the following equations satisfy for the function  $y = e^{\tan^{-1} x}$  with usual notations?

- a)  $(1+x^2)y_2 + (2x-1)y_1 = 0$   
 b)  $(1+x^2)y_2 + 2xy_1 = 0$   
 c)  $(1-x^2)y_2 - xy_1 - y = 0$   
 d)  $xy_2 - 2y_1 - xy = 0$

49. The equation of a normal to the curve  $y = 4x^3 + 3x^2 + 4$  at the point  $(-1, 3)$  is

- a)  $6x + y - 19 = 0$     b)  $x + 6y - 17 = 0$   
 c)  $x - 6y + 17 = 0$     d)  $6x - y + 19 = 0$

50. The rate of change of surface area of a sphere is  $12 \text{ cm}^2/\text{s}$ . The rate at which the radius is changing when the radius of the sphere is  $2 \text{ cm}$  is equal to

- a)  $\frac{\pi}{4} \text{ cm/s}$                   b)  $\frac{3\pi}{4} \text{ cm/s}$   
 c)  $3\pi \text{ cm/s}$                   d)  $\frac{3}{4\pi} \text{ cm/s}$

51.  $\int \left(1 + x - \frac{1}{x} + e^x\right) dx$

- a)  $1 - \frac{1}{x^2} + e^x + c$   
 b)  $1 + \frac{x^2}{2} - \frac{1}{x^2} + e^x + c$   
 c)  $x + \frac{x^2}{2} - \log x + e^x + c$   
 d)  $x + 1 - \frac{1}{x^3} - e^x + c$

52.  $\int e^{\tan x} \cdot \sec^2 x dx =$

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

53.  $\int \cot^2 x dx =$

- a)  $-\operatorname{cosec} x + c$     b)  $-\cot x - x + c$   
 c)  $-\cot x + x + c$     d)  $\cot x + x + c$

54.  $\int x \sin x dx =$

- a)  $x \sin x - \cos x + c$     b)  $x \cos x - \sin x + c$   
 c)  $x \sin x + \cos x + c$     d)  $-x \cos x + \sin x + c$

55.  $\int \sqrt[3]{x^2} dx =$

- a)  $\frac{5}{2}x^{\frac{5}{2}} + c$                   b)  $\frac{3}{5}x^{\frac{5}{3}} + c$   
 c)  $\frac{5x^{\frac{5}{2}}}{2} + c$                   d)  $\frac{x^2}{2} + c$

56.  $\int_0^{\pi/2} \cos^2 x dx =$

- a)  $\frac{\pi}{2}$                                   b)  $\frac{\pi}{6}$   
 c)  $\frac{\pi}{3}$                                   d)  $\frac{\pi}{4}$

57. The volume of a solid generated when the every

$y = \sqrt{x^2 + 4}$  is rotated about x-axis between the ordinates  $x = -1$  and  $x = 1$  is

- a)  $\frac{23\pi}{3}$  cubic units    b)  $\frac{26\pi}{3}$  cubic units  
 c)  $\frac{16\pi}{3}$  cubic units    d) 0

58. The order and degree of the differential equation

$\frac{dy}{dx} = \sqrt{1 + \frac{d^2y}{dx^2}}$  respectively are

- a) 1 and 1                          b) 1 and 2  
 c) 2 and 1                          d) 2 and 2

59. The differential equation formed from the equation  $y = ae^x + be^{-x}$  by eliminating arbitrary constants is

- a)  $\frac{d^2y}{dx^2} - y = 0$     b)  $\frac{d^2y}{dx^2} + y = 0$   
 c)  $\frac{dy}{dx} + y = 0$     d)  $\frac{dy}{dx} - y = 0$

60. Solution of the differential equation  $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$  is

- a)  $\tan^{-1} y + \tan^{-1} x = k$
- b)  $\tan^{-1} y - \tan^{-1} x = k$
- c)  $\sin^{-1} y + \sin^{-1} x = k$
- d)  $\sin^{-1} y - \sin^{-1} x = k$

61. If  $A = \begin{bmatrix} -3 & 4 \\ 2 & 0 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 2 \\ -2 & 1 \end{bmatrix}$  then  $B^T \cdot A^T$  is

- a)  $\begin{bmatrix} 3 & 8 \\ -4 & 0 \end{bmatrix}$
- b)  $\begin{bmatrix} -5 & -2 \\ -2 & 4 \end{bmatrix}$
- c)  $\begin{bmatrix} 5 & 2 \\ -2 & -4 \end{bmatrix}$
- d)  $\begin{bmatrix} 5 & 2 \\ 2 & 4 \end{bmatrix}$

62. The value of the  $\begin{vmatrix} \tan\theta & 0 & -1 \\ 1 & 0 & \tan\theta \\ 2 & -1 & 3 \end{vmatrix}$  is

- a)  $-\sec^2 \theta$
- b)  $\operatorname{cosec}^2 \theta$
- c) 1
- d)  $\sec^2 \theta$

63. The values of x and y in the simultaneous equations  $2x - 3y = 13$  and  $3x + 4y = -6$  are

- a)  $x = -3, y = 2$
- b)  $x = -2, y = -3$
- c)  $x = 2, y = -3$
- d)  $x = 2, y = 3$

64. If  $\begin{vmatrix} 3 & -2 & 4 \\ 4 & 0 & x \\ 2 & -5 & 4 \end{vmatrix} = -4$ , then the value of x is

- a) 4
- b) -4
- c)  $\frac{44}{19}$
- d)  $-\frac{44}{19}$

65. The characteristics roots of the matrix  $\begin{bmatrix} 2 & 0 \\ 0 & -3 \end{bmatrix}$  are

- a)  $\lambda = 2$  and  $\lambda = 3$
- b)  $\lambda = -2$  and  $\lambda = -3$
- c)  $\lambda = 2$  and  $\lambda = -3$
- d)  $\lambda = -2$  and  $\lambda = 3$

66. The adjoint of the matrix  $\begin{bmatrix} 4 & 2 \\ -3 & 1 \end{bmatrix}$  is

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

67. If  $A = (1, 2, -3)$  and  $B = (2, 0, -1)$  then  $\vec{AB}$  is

- a)  $i - 2j + 2k$
- b)  $-i + 2j - 2k$
- c)  $3i + 2j - 4k$
- d)  $i + 2j - 2k$

68. The work done by the force  $\vec{F} = 2i + 6j - 8k$ ,

whose displacements is  $\vec{S} = -2i + 3j - k$  is

- a) 26 units
- b) -22 units
- c) 22 units
- d) 30 units

69. The vector product of  $\vec{a} = 4i - j + k$  and

$\vec{b} = 3i - 2k$  is

- a)  $2i - 11j + 3k$
- b)  $2i + 11j + 3k$
- c)  $2i + 5j + 3k$
- d)  $2i + 11j - 3k$

70. When a fair coin is tossed two times, the event A "getting exactly one tail" is given by

- a)  $\{HT, TH\}$
- b)  $\{TT\}$
- c)  $\{TH\}$
- d)  $\{TT, HT\}$

71. If  $\tan \theta = \frac{5}{12}$  and  $\pi < \theta < \frac{3\pi}{2}$ , then the value of  $\sin \theta - \cos \theta$  is

- a)  $\frac{17}{13}$
- b)  $\frac{7}{13}$
- c)  $-\frac{17}{13}$
- d)  $-\frac{7}{13}$

72. The value of  $\tan 225^\circ \times \cot 405^\circ$  is

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

73. The value of  $\sin 50^\circ \cos 20^\circ - \cos 50^\circ \cdot \sin 20^\circ$  is

- a)  $\sin 70^\circ$       b)  $\frac{\sqrt{3}}{2}$   
 c)  $\frac{1}{2}$             d)  $-\frac{1}{2}$

74. If  $\cos A = \frac{15}{17}$  and  $\sin B = \frac{3}{5}$ , then the value of  $\cos(A+B)$  is

- a)  $\frac{84}{85}$     b)  $-\frac{36}{85}$     c)  $-\frac{84}{85}$     d)  $\frac{36}{85}$

75. The value of  $\sqrt{\frac{1+\sin 2A}{1-\sin 2A}}$  is

- a)  $\cot\left(\frac{\pi}{4} + A\right)$     b)  $\cot\left(\frac{\pi}{4} - A\right)$   
 c)  $\tan\left(\frac{\pi}{4} - A\right)$     d)  $\cot\left(\frac{\pi}{4} - A\right)$

76. The value of  $\cos 40^\circ + \sin 10^\circ$  is

- a)  $\sin 20^\circ$             b)  $-\cos 20^\circ$   
 c)  $\cos 20^\circ$             d)  $-\sin 20^\circ$

77. The value of  $i + i^2 + i^3 + i^4$  is

- a)  $i$                       b)  $-i$   
 c) 1                      d) 0

78.  $\lim_{x \rightarrow 0} \frac{x}{\sqrt{1+x}-1}$  is equal to

- a) 0                      b) 1  
 c) 2                      d)  $\infty$

79.  $\lim_{x \rightarrow \infty} \frac{3x^3 + 4x + 7}{(6+x^2)(x-1)} =$

- a) 3                      b) -3  
 c)  $\frac{1}{2}$                       d)  $\frac{1}{6}$

80.  $\lim_{x \rightarrow 0} \frac{3x + \sin 4x}{\sin 3x - 5x}$

- a)  $\frac{4}{3}$                       b) 7  
 c)  $\frac{3}{5}$                       d)  $\frac{7}{11}$

### KEY ANSWERS

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