



BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Diploma in Mechanical Engineering
Course Name – Mathematics II
Course Code - DME204
(Semester II)

Time allotted : 1 Hrs.15 Min.

Full Marks : 60

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question)

$1 \times 60 = 60$

Choose the correct alternative from the following :

(1) $\int \frac{dx}{x \log x} =$

- a) $\log x + c$
- b) $\log(\log x) + c$
- c) $e^x + c$
- d) None of these

(2) $\int \frac{3^x}{3^x + 1} dx =$

- a) $\log |3^x + 1| + c$
- b) $3^x + 1 + c$
- c) $\log_{\frac{1}{3}} |3^x + 1| + c$
- d) $\log_{10} |3^x + 1| + c$

(3) $\int \frac{\cos 2x dx}{(\sin x + \cos x)^2} =$

- a) $\log |\sin x + \cos x|$
- b) $\log |\sin x - \cos x|$
- c) $-\log |\sin x + \cos x|$
- d) None of these

(4) $\int \frac{dx}{\cos^2 x - \sin^2 x} =$

- a) $\log |\sec 2x + \tan 2x| + c$
- b) $\log |\sec 2x - \tan 2x| + c$
- c) $\frac{1}{2} \log |\sec 2x + \tan 2x| + c$
- d) $\frac{1}{2} \log |\sec 2x - \tan 2x| + c$

(5) $\int \frac{\sin^2 x dx}{\cos^4 x} = A \tan^3 x \text{ then } A \text{ is}$

- a) 3
- b)

c) -3

(6) $\int 2^{3x} dx =$

a) $\frac{2^{3x}}{3\log 2} + c$

c) $32^{3x} \log 2 + c$

b) $\frac{2^{3x+1}}{3x+1} + c$

d) None of these

(7) $\int \cot^2 x dx =$

a) $-(\cot x + x) + c$

c) $-\cot x + x + c$

b) $-(\cot x - x) + c$

d) None of these

(8) $\int 0 dx =$

a) 0

c) dx

b) x

d) constant

(9) $\int \frac{1}{x} \left(x + \frac{1}{x} \right) dx$

a) $\left(x - \frac{1}{x} \right) + c$

c) $\left(1 - \frac{1}{x^2} \right) + c$

b) $\left(x^2 - \frac{1}{x^2} \right) + c$

d) $\left(x + \frac{1}{x} \right) + c$

(10) $\int e^{3\log x} dx =$

a) $x^3 + c$

c) $\frac{x^4}{4} + c$

b) $\log x + c$

d) $x^4 + c$

(11) The formula $\int a^x dx = \frac{a^x}{\log a} + c$ is invalid for a =

a) 1

c) 3

b) 2

d) None of these

(12) If $\int \frac{dx}{x^2 + 25} = k \tan^{-1} \frac{x}{5}$ then k is

a) 1

c) $\frac{1}{5}$

b) 5

d) -5

(13) If $\int \frac{x \cos x + \sin x}{x \sin x} dx = f(x) + \log |\sin x| + c$ then f(x) is

a) x

c) $\log x$

b) e^x

d) None of these

(14) $\int e^{1-\log x} dx =$

a) $ex + c$

c) $x \log x + c$

b) $e \log x + c$

d) None of these

(15) $\int \sec 3x \tan 3x dx =$

a) $3 \sec 3x + c$

c) $\frac{1}{3} \sec x + c$

b) $\sec 3x + c$

d) $\frac{1}{3} \sec 3x + c$

(16) $\int x \sin x dx =$

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

c) $x \sin x + \sec x + c$

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

d) none of these

(17) $\int_0^{\frac{\pi}{2}} \cos 2x dx =$

a) 0

c) 2

b) 1

d) none of these

(18) $\int_1^e \frac{\log x}{x} dx =$

a) $\frac{1}{2}$

c) $\frac{1}{e}$

b) 2

d) e

(19) $\int_0^{\frac{\pi}{4}} (\sec x + \tan x) \sec x dx =$

a) $\sqrt{3}$

c) 1

b) 2

d) $\sqrt{2}$

(20) $\int_0^{\frac{\pi}{4}} \tan^2 x dx =$

a) $1 - \frac{\pi}{4}$

c) $-\frac{\pi}{4}$

b) $1 + \frac{\pi}{4}$

d) $\frac{\pi}{4}$

(21) $\int_0^1 \frac{dx}{1+x^2} =$

a) $\frac{\pi}{4}$

c) $\frac{2\pi}{3}$

b) $\frac{\pi}{2}$

d) none of these

(22) $\int_0^{\frac{\pi}{2}} \sin^2 x dx =$

a) 0

c) 2

b) 1

d) $\frac{\pi}{4}$

(23)

The order and degree of the differential equation $\left(\frac{dy}{dx}\right)^2 - 2\frac{dy}{dx} = 3x$ are

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

(24) The order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right) = \left(1 + \frac{dy}{dx}\right)^{\frac{2}{3}}$ are

- a) 2,3
- b) 3,2
- c) 1,3
- d) None of these

(25) The differential equation whose general solutions are $y=Asinx+Bcosx$ is

- a) $\frac{d^2y}{dx^2} = y$
- b) $\frac{d^2y}{dx^2} = -y$
- c) $\frac{d^2y}{dx^2} = 0$
- d) none of these

(26) The differential equation whose general equation is $y=kx+6$ is

- a) $y = x \frac{dy}{dx}$
- b) $y = \frac{dy}{dx} + 6$
- c) $y = x \frac{dy}{dx} + 6$
- d) none of these .

(27) The differential equation whose general solutions are $y=Asinmx+Bcosmx$ is

- a) $\frac{d^2y}{dx^2} + m^2y = 0$
- b) $\frac{d^2y}{dx^2} + y = 0$
- c) $\frac{d^2y}{dx^2} + m^2 = 0$
- d) none of these

(28) The general solution of $xdy-ydx=0$ is

- a) $y^2 + x^2 = c^2$
- b) $y^2 = Ax^2$
- c) $y^2 = Ax$
- d) $y^2 = -x$

(29) The general solution of $x dx + y dy = 0$ is

- a) $x^2 - y^2 = c^2$
- b) $x^2 + y^2 = c^2$
- c) $x^2 y^2 = c^2$
- d) none of these

(30) If $\frac{dy}{dx} = 2x$ and $y=0$ at $x=0$ then $y=$

- a) x
- b) $2x$
- c) $3x^2$
- d) x^2

(31) If $\frac{dy}{dx} = -y$ and $y=1$ at $x=2$ then $x=$

- a) $\log y$
- b) $\log y + 1$
- c) $\log y + 2$
- d) $2 - \log y$

(32) The general solution of the differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ is

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

(33) Integrating factor of $(x^2 + y^2 + x) dx + xy dy = 0$ is

- a) x
c) x^2

- b) y
d) y^2

(34) Solution of $\frac{ydx - xdy}{y^2} + \sin x dx + dy = 0$

a) $\frac{x}{y} - \cos x + y = C$

b) $\frac{x}{y} + \cos x + y = C$

c) $\frac{x}{y} - \cos x - y = C$

d) none of these

(35) The integrating factor of the equation $\frac{dx}{dy} + \frac{x}{1+y^2} = \frac{e^{-\tan^{-1}y}}{1+y^2}$ is

a) $\tan^{-1} y$

b) $e^{\tan y}$

c) $e^{\sin^{-1}y}$

d) $e^{\tan^{-1}y}$

(36) The integrating factor of the equation $\frac{dy}{dx} + 2xy = x^3$ is

a) e^x

b) x^2

c) e^{x^2}

d) e^{x^3}

(37) $\frac{1}{D}\left(\frac{s}{x^2}\right) =$

a) $\frac{7}{2}x^{\frac{7}{2}}$

b) $\frac{2}{7}x^{\frac{7}{2}}$

c) $x^{\frac{7}{2}}$

d) $\frac{7}{x^2}$

(38)

If $P(A+B) = \frac{2}{7}$ then the probability of $P(\bar{A} \cdot \bar{B})$ is

a) $\frac{1}{7}$

b) $\frac{2}{7}$

c) $\frac{5}{7}$

d) None of these

(39) The probability of any event A satisfies

a) $P(A) \geq 1$

b) $P(A) < 0$

c) $0 \leq P(A) \leq 1$

d) None of these

(40) Two events A and B are mutually exclusive if

a) $P(A \cap B) = P(A) \cdot P(B)$

b) $P(A \cap B) = 1$

c) $P(A \cap B) = 0$

d) none of these

(41) If $P(A \cup B) = \frac{7}{8}$, $P(A \cap B) = \frac{1}{4}$, $P(A^c) = \frac{5}{8}$ then $P(B) =$

a) $\frac{3}{8}$

b) $\frac{3}{4}$

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

d) $\frac{1}{4}$

(42) Probability of an impossible event is

- a) $-\infty$
b) 1
c) 0
d) none of these

(43) One card is drawn from a standard pack of 52. The probability which is either king or a queen is

- a) $\frac{1}{3}$
b) $\frac{2}{13}$
c) $\frac{3}{13}$
d) none of these

(44) Two unbiased coins are tossed. Then the probability of obtaining at least one tail is

- a) $\frac{4}{3}$
b) $\frac{3}{4}$
c) $\frac{1}{3}$
d) none of these

(45) Two unbiased coins are tossed one after another , the probability that one is head and other is tail is

- a) $\frac{1}{4}$
b) $\frac{1}{2}$
c) $\frac{3}{4}$
d) none of these

(46) An unbiased die is rolled , the probability that an odd point or a six will appear on the top of the die is

- a) $\frac{1}{2}$
b) $\frac{1}{3}$
c) $\frac{2}{3}$
d) none of these

(47) Let A and B be two events and $P(\bar{A})=0.3, P(B)=0.4, P(A \bar{B})=0.5$; then $P(A+B)=$

- a) 0.5
b) 0.8
c) 1
d) none of these

(48) An urn contains 4 white and 6 black balls. Two balls are drawn one after another without replacement. Probability of one ball white and one black is

- a) $\frac{1}{24}$
b) $\frac{4}{15}$
c) $\frac{8}{15}$
d) none of these

(49) Median of the frequency distribution

$$\begin{array}{llll} x_i & : 3 & 2 & 5 \\ f_i & : 2 & 1 & 1 & 3 \end{array}$$

- a) 5
b) $\frac{16}{7}$
c) $\frac{1}{2}$
d) $\frac{7}{16}$

(50) The A.M OF $x-2, 10, x+3, 7$ is 9 . The value of x is

- a) 10
b) 9
c) 0
d) 11

(51) The A.M of the datas 13,15,17,19,23,30 is

- a) 19
b) 19.5
c) 20.5
d) none of these

(52) If $y=3x-100$ and $\bar{x}=50$ then the value of \bar{y}

- a) 60
- b) 30
- c) 100
- d) 50

(53) Median from the data : 10,5,9,4,8,7,6 is...

- a) 5
- b) 7
- c) 6
- d) 8

(54) For a distribution having single mode , the mean is 42.58, median is 42.1 , mode is

- a) 41.14
- b) 38
- c) 40
- d) none of these

(55) The mode of the frequency distribution

| | | | | | |
|---------|----|----|----|----|----|
| x_i : | 0 | 1 | 2 | 3 | 4 |
| f_i : | 23 | 24 | 21 | 25 | 20 |

- a) 0
- b) 1
- c) 2
- d) 3

(56) $2x+y=3$ is the relation between two variables x and y . If $\sigma_x = 3$ then $\sigma_y =$

- a) 3
- b) 4
- c) 6
- d) none of these

(57) Two variables x and y are related by $y=10-3x$. If the SD of x is 4 then SD of y is

- a) 10
- b) 11
- c) 12
- d) 20

(58) Mean and Median of 3,6,24,18,0 are

- a) 10.2 , 3
- b) 10.2,6
- c) 20.25 , 6
- d) none of these

(59) If $\text{var}(x)=5$ and $y=5x+6$ then $\text{var}(y)=$

- a) 125
- b) 150
- c) 6
- d) none of these

(60) Which are the following digits are not significant of the number 0.025

- a) 0
- b) 2
- c) 5
- d) none of these