Mansoura University	Mathematics (3)	Tuesday, 12/11/2019
Faculty of Engineering	MTH101	Time allowed: 60 min.
BME (Level 100)	Midterm Exam (A)	Full Mark: 20 marks

Choose the correct answer [2 marks each]

1 The solution of the DE is .....

$$dx + 3(1+x^2)y^2\,dy = 0$$

A	$\ln(1+x)+y^3=c$	B	$\tan^{-1}x+y^3=c$
C	$\ln(1+x^2)+y^3=c$	D	$\tan^{-1}x+y^2=c$

2 The DE is homogeneous if n =.....

$$(x\,y^n + y^3)\,dx + x^3\,dy = 0$$

A	0	B	1
C	2	D	3

3 The solution of the DE is .....

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

A	$\sin\left(\frac{x}{y}\right) = \ln y + c$	B	$-\cos\left(\frac{x}{y}\right) = \ln y + c$
C	$\tan\left(\frac{x}{y}\right) = \ln y + c$	D	$-\cot\left(\frac{x}{y}\right) = \ln y + c$

4 The integrating factor of the DE is .....

$$\cosh x\,\frac{dy}{dx} + y\,\sinh x = 1$$

A	$\cosh x$	B	$\sinh x$
C	$\cosh y$	D	$\sinh y$

5 If the following DE is exact, then $g(x)$ = ...

$$[xy^4 + g(y)]\,dx + [2x^2y^3 + 2x]\,dy = 0$$

A	$g(y) = 2y + c$	B	$g(y) = y^2 + c$
C	$g(y) = y^3 + c$	D	$g(y) = y^4 + c$

6 The following Bernoulli DE is reduced to linear DE if we substitute .....

$$3\,y^2\,dy + (y^3 - x)\,dx = 0$$

A	$z = y^2$	B	$z = y^3$
C	$z = y^4$	D	$z = y^5$

7 The solution of the IVP is .....

$$\frac{dT}{dt} = k(T-65) \text{ and } T(0) = 69$$

A	$T(t) = 65 + 4\,e^{kt}$	B	$T(t) = 69 + 3\,e^{kt}$
C	$T(t) = 72 + 2\,e^{kt}$	D	$T(t) = 74 + e^{kt}$

8 The general solution of the DE is .....

$$(D^4 - 1)y = 0$$

A	$y = c_1 + c_2\,x + c_3\,x^2 + c_4\,e^x$	B	$y = c_1 + c_2\,x + c_3\,e^{-x} + c_4\,e^x$
C	$y = c_1\cos x + c_2\sin x + c_3\,e^{-x} + c_4\,e^x$	D	$y = c_1\cos x + c_2\sin x + c_3 + c_4\,x$

$$y = c_1 + (c_2 + c_3\,x)\,e^{2x}$$

is the solution of the DE .....

	$y''' + 4y'' + 4y' = 0$	B	$y''' - 4y'' + 4y' = 0$
	$y''' + 2y'' + y' = 0$	D	$y''' - 2y'' + y' = 0$

10 The particular solution for the DE is .....

$$y'' - 2\,y' = 3x + \cosh x$$

A	$y_p = Axe^x + Bxe^{-x} + C\,x + d$	B	$y_p = Axe^x + Be^{-x} + C\,x^2 + d\,x$
C	$y_p = Ae^x + Bxe^{-x} + C\,x^2 + d\,x$	D	$y_p = Ae^x + Be^{-x} + C\,x^2 + d\,x$

With my best wishes

Dr. Mustafa El-Agamy

Mansoura University	Mathematics (3)	Tuesday, 12/11/2019
Faculty of Engineering	MTH101	Time allowed: 60 min.
BME (Level 100)	Midterm Exam (B)	Full Mark: 20 marks

Choose the correct answer [2 marks each]

1 The solution of the DE is .....

$$2x\,dx + 3(1+x^2)y^2\,dy = 0$$

A	$\ln(1+x)+y^3=c$	B	$\tan^{-1}x+y^3=c$
C	$\ln(1+x^2)+y^3=c$	D	$\tan^{-1}x+y^2=c$

2 The DE is homogeneous if n =.....

$$(x\,y^n + y^4)\,dx + x^4\,dy = 0$$

A	0	B	1
C	2	D	3

3 The solution of the DE is .....

$$\frac{dx}{dy} = \frac{x}{y} + \sec\left(\frac{x}{y}\right)$$

A	$\sin\left(\frac{x}{y}\right) = \ln y + c$	B	$-\cos\left(\frac{x}{y}\right) = \ln y + c$
C	$\tan\left(\frac{x}{y}\right) = \ln y + c$	D	$-\cot\left(\frac{x}{y}\right) = \ln y + c$

4 The integrating factor of the DE is .. ..

$$\sinh x\,\frac{dy}{dx} + y\,\cosh x = 1$$

A	$\cosh x$	B	$\sinh x$
C	$\cosh y$	D	$\sinh y$

5 If the following DE is exact, then $g(x)$ = ...

$$[xy^4 + g(y)]\,dx + [2x^2y^3 + 2xy]\,dy = 0$$

A	$g(y) = 2y + c$	B	$g(y) = y^2 + c$
C	$g(y) = y^3 + c$	D	$g(y) = y^4 + c$

6 The following Bernoulli DE is reduced to linear DE if we **substitute** .....

$$4\,y^3\,dy + (y^4 - x)\,dx = 0$$

A	$z = y^2$	B	$z = y^3$
C	$z = y^4$	D	$z = y^5$

7 The solution of the IVP is .....

$$\frac{dT}{dt} = k(T-74) \text{ and } T(0) = 75$$

A	$T(t) = 65 + 4\,e^{kt}$	B	$T(t) = 69 + 3\,e^{kt}$
C	$T(t) = 72 + 2\,e^{kt}$	D	$T(t) = 74 + e^{kt}$

8 The general solution of the DE is .....

$$(D^4 - D^3)y = 0$$

A	$y = c_1 + c_2\,x + c_3\,x^2 + c_4\,e^x$	B	$y = c_1 + c_2\,x + c_3\,e^{-x} + c_4\,e^x$
C	$y = c_1\cos x + c_2\sin x + c_3\,e^{-x} + c_4\,e^x$	D	$y = c_1\cos x + c_2\sin x + c_3 + c_4\,x$

$$y = c_1 + (c_2 + c_3\,x)\,e^x$$

is the solution of the DE .....

	$y''' + 4y'' + 4y' = 0$	B	$y''' - 4y'' + 4y' = 0$
	$y''' + 2y'' + y' = 0$	D	$y''' - 2y'' + y' = 0$

10 The particular solution for the DE is .....

$$y'' - y' = 3x + \cosh x$$

A	$y_p = Axe^x + Bxe^{-x} + C\,x + d$	B	$y_p = Axe^x + Be^{-x} + C\,x^2 + d\,x$
C	$y_p = Ae^x + Bxe^{-x} + C\,x^2 + d\,x$	D	$y_p = Ae^x + Be^{-x} + C\,x^2 + d\,x$

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Mansoura University	Mathematics (3)	Tuesday, 12/11/2019
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BME (Level 100)	Midterm Exam (C)	Full Mark: 20 marks

Choose the correct answer [2 marks each]

1 The **solution** of the DE is .....

$$dx + 3(1+x)y^2\,dy = 0$$

A	$\ln(1+x)+y^3=c$	B	$\tan^{-1}x+y^3=c$
C	$\ln(1+x^2)+y^3=c$	D	$\tan^{-1}x+y^2=c$

2 The DE is homogeneous if n =.....

$$(x\,y^n + y^2)\,dx + x^2\,dy = 0$$

A	0	B	1
C	2	D	3

3 The **solution** of the DE is .....

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

A	$\sin\left(\frac{x}{y}\right)=\ln y+c$	B	$-\cos\left(\frac{x}{y}\right)=\ln y+c$
C	$\tan\left(\frac{x}{y}\right)=\ln y+c$	D	$-\cot\left(\frac{x}{y}\right)=\ln y+c$

4 The **integrating factor** of the DE is .....

$$\sinh y\,\frac{dx}{dy} + x\cosh y = 1$$

A	$\cosh x$	B	$\sinh x$
C	$\cosh y$	D	$\sinh y$

5 If the following DE is exact, then $g(x)$ = ...

$$[xy^4 + g(y)]\,dx + [2x^2y^3 + 4xy^3]\,dy = 0$$

A	$g(y)=2y+c$	B	$g(y)=y^2+c$
C	$g(y)=y^3+c$	D	$g(y)=y^4+c$

6 The following Bernoulli DE is reduced to linear DE if we **substitute** .....

$$2\,y\,dy + (y^2 - x)\,dx = 0$$

A	$z=y^2$	B	$z=y^3$
C	$z=y^4$	D	$z=y^5$

7 The **solution** of the IVP is .....

$$\frac{dT}{dt} = k(T-72) \text{ and } T(0)=74$$

A	$T(t)=65+4\,e^{kt}$	B	$T(t)=69+3\,e^{kt}$
C	$T(t)=72+2\,e^{kt}$	D	$T(t)=74+e^{kt}$

8 The general **solution** of the DE is .....

$$(D^4 - D^2)y = 0$$

A	$y=c_1+c_2x+c_3x^2+c_4e^x$	B	$y=c_1+c_2x+c_3e^{-x}+c_4e^x$
C	$y=c_1\cos x+c_2\sin x+c_3e^{-x}+c_4e^x$	D	$y=c_1\cos x+c_2\sin x+c_3+c_4x$

9 $y = c_1 + (c_2 + c_3 x)\,e^{-x}$

is the solution of the DE .....

A	$y'''+4y''+4y'=0$	B	$y'''-4y''+4y'=0$
C	$y'''+2y''+y'=0$	D	$y'''-2y''+y'=0$

10 The **particular solution** for the DE is .....

$$y'' - y = 3x + \cosh x$$

A	$y_p=Axe^x+Bxe^{-x}+Cx+d$	B	$y_p=Axe^x+Be^{-x}+Cx^2+dx$
C	$y_p=Ae^x+Bxe^{-x}+Cx^2+dx$	D	$y_p=Ae^x+Be^{-x}+Cx^2+dx$

With my best wishes

Dr. Mustafa El-Agamy

Mansoura University	Mathematics (3)	Tuesday, 12/11/2019
Faculty of Engineering	MTH101	Time allowed: 60 min.
BME (Level 100)	Midterm Exam (D)	Full Mark: 20 marks

Choose the correct answer [2 marks each]

1 The solution of the DE is .....

$$dx + 2(1+x^2)y\,dy = 0$$

A	$\ln(1+x)+y^3=c$	B	$\tan^{-1}x+y^3=c$
C	$\ln(1+x^2)+y^3=c$	D	$\tan^{-1}x+y^2=c$

2 The DE is homogeneous if n =.....

$$(x\,y^n + y)\,dx + x\,dy = 0$$

A	0	B	1
C	2	D	3

3 The solution of the DE is .....

$$\frac{dx}{dy} = \frac{x}{y} + \csc\left(\frac{x}{y}\right)$$

A	$\sin\left(\frac{x}{y}\right) = \ln y + c$	B	$-\cos\left(\frac{x}{y}\right) = \ln y + c$
C	$\tan\left(\frac{x}{y}\right) = \ln y + c$	D	$-\cot\left(\frac{x}{y}\right) = \ln y + c$

4 The integrating factor of the DE is .....

$$\cosh y\,\frac{dx}{dy} + x\,\sinh y = 1$$

A	$\cosh x$	B	$\sinh x$
C	$\cosh y$	D	$\sinh y$

5 If the following DE is exact, then $g(x)$ = ...

$$[xy^4 + g(y)]\,dx + [2x^2y^3 + 3xy^2]\,dy = 0$$

A	$g(y) = 2y + c$	B	$g(y) = y^2 + c$
C	$g(y) = y^3 + c$	D	$g(y) = y^4 + c$

6 The following Bernoulli DE is reduced to linear DE if we substitute .....

$$5\,y^4\,dy + (y^5 - x)\,dx = 0$$

A	$z = y^2$	B	$z = y^3$
C	$z = y^4$	D	$z = y^5$

7 The solution of the IVP is .....

$$\frac{dT}{dt} = k(T-69) \text{ and } T(0) = 72$$

	$T(t) = 65 + 4\,e^{kt}$	B	$T(t) = 69 + 3\,e^{kt}$
	$T(t) = 72 + 2\,e^{kt}$	D	$T(t) = 74 + e^{kt}$

8 The general solution of the DE is .....

$$(D^4 + D^2)y = 0$$

A	$y = c_1 + c_2\,x + c_3\,x^2 + c_4\,e^x$	B	$y = c_1 + c_2\,x + c_3\,e^{-x} + c_4\,e^x$
C	$y = c_1\cos x + c_2\sin x + c_3\,e^{-x} + c_4\,e^x$	D	$y = c_1\cos x + c_2\sin x + c_3 + c_4\,x$

$$y = c_1 + (c_2 + c_3\,x)\,e^{-2x}$$

is the solution of the DE .....

$y''' + 4y'' + 4y' = 0$	B	$y''' - 4y'' + 4y' = 0$
$y''' + 2y'' + y' = 0$	D	$y''' - 2y'' + y' = 0$

10 The particular solution for the DE is .....

$$y'' + y' = 3x + \cosh x$$

A	$y_p = Axe^x + Bxe^{-x} + C\,x + d$	B	$y_p = Axe^x + Be^{-x} + C\,x^2 + d\,x$
C	$y_p = Ae^x + Bxe^{-x} + C\,x^2 + d\,x$	D	$y_p = Ae^x + Be^{-x} + C\,x^2 + d\,x$

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