

Program: FE

Curriculum Scheme: Revised 2012

Examination: First Year Semester II

Course Code: FEC201

Course Name: Applied Mathematics-II

Time: 1 hour

Max. Marks: 50

=====  
Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	The second form of Gamma function is :
Option A:	$ \bar{n} = 2 \int_0^{\infty} e^{-x^2} \cdot x^{2n-1} dx$
Option B:	$ \bar{n} = \int_0^{\infty} e^{-x^2} \cdot x^{2n-1} dx$
Option C:	$ \bar{n} = 2 \int_0^{\infty} e^{-x} \cdot x^{n-1} dx$
Option D:	$ \bar{n} = \int_0^{\infty} e^{-x^2} \cdot x^{n-1} dx$
Q2.	Evaluate $\int_0^{\infty} \frac{x^7}{7^x} dx$
Option A:	$\frac{6!}{(\log 7)^8}$
Option B:	$\frac{7!}{(\log 8)^7}$
Option C:	$\frac{7!}{(\log 7)^8}$
Option D:	$\frac{6! 7!}{(\log 7)^8}$
Q3.	Evaluate $\int_0^1 x^6 (1-x^2)^{1/2} dx$
Option A:	$\frac{1}{4} \beta\left(\frac{7}{5}, \frac{3}{2}\right)$
Option B:	$\frac{1}{2} \beta\left(\frac{7}{2}, \frac{3}{2}\right)$
Option C:	$\frac{1}{2} \beta\left(\frac{9}{5}, \frac{3}{2}\right)$
Option D:	$\beta\left(\frac{7}{2}, \frac{3}{2}\right)$
Q4.	Evaluate $\int_0^{\infty} \frac{x^8(1-x^6)}{(1+x^{24})} dx$
Option A:	$\beta(9,15)$

Option B:	$\beta(8,6)$
Option C:	$\beta(24,5)$
Option D:	0
Q5.	Using DUIS Evaluate $\int_0^{\infty} \frac{e^{-x}}{x} (1 - e^{-ax}) dx, a > 0$
Option A:	$\log(1 - a)$
Option B:	$\log(1 + a)$
Option C:	$\log(1 + a) + \log(1 - a)$
Option D:	$5\log(1 + a)$
Q6.	What is the integrating factor of the equation, $(x^2 + y^2)dx - 2xy dy = 0$
Option A:	$\frac{-1}{x^2}$
Option B:	$\frac{1}{x^2}$
Option C:	$-x^2$
Option D:	$x^2$
Q7.	Find the solution of $(\sin x \cos y + e^{2x}) dx + (\cos x \sin y + \tan y) dy = 0$
Option A:	$-\cos x \cos y + \frac{e^{2x}}{2} + \log \sec y = c$
Option B:	$\cos x \cos y + \frac{e^{2x}}{2} + \log \sec y = c$
Option C:	$\cos x \cos y - \frac{e^{2x}}{2} + \log \sec y = c$
Option D:	None of these
Q8.	Solution of the differential equation $(x + y)dx - x dy = 0$ is,
Option A:	$\log x - \frac{y}{x} = c$
Option B:	$\log y - \frac{y}{x} = c$
Option C:	$\log x - \frac{y}{x} = c$
Option D:	None of these
Q9.	If roots of auxiliary equation of a linear differential equation with constant coefficient are $2 + 3i, 5, 5, 7$ then the C.F. is given by,
Option A:	$e^{3x} (c_1 \cos 2x + c_2 \sin 2x) + (c_3 + c_4 x)e^{5x} + c_5 e^{7x}$
Option B:	$e^{2x} (c_1 \cos 3x + c_2 \sin 3x) + (c_3 + c_4 x)e^{5x} + c_5 e^{7x}$
Option C:	$e^{2x} (c_1 \cos 3x + c_2 \sin 3x) + (c_3 + c_4 x)e^{7x} + c_5 e^{5x}$
Option D:	None of these

Q10.	Solution of $\frac{d^3 y}{dx^3} - y = 0$ is
Option A:	$(c_1 + c_2 x + c_3 x^2)e^x$
Option B:	$c_1 e^x + e^{\frac{-1}{2}x} \left( c_2 \cos \frac{\sqrt{3}}{2} x + c_3 \sin \frac{\sqrt{3}}{2} x \right)$
Option C:	Both of these
Option D:	None of these
Q11.	What is the solution of $(D+1)y = e^{-x}$
Option A:	$y = (c_1 + c_2 x)e^{-x} + e^{-x}$
Option B:	$y = (c_1 + c_2 x)e^{-x} + 0$
Option C:	$y = c_1 e^{-x} + 0$
Option D:	$(c_1 + x)e^{-x}$
Q12.	What is the P.I. of $(D+1)y = \sin x$
Option A:	$\frac{1}{2}[\sin x + \cos x]$
Option B:	$-\frac{1}{2}[\sin x - \cos x]$
Option C:	$\frac{1}{2}[\cos x - \sin x]$
Option D:	$\frac{1}{2}[\sin x - \cos x]$
Q13.	Find P.I. of $(D+1)y = e^{e^x}$
Option A:	$y = e^{-x} e^{e^x} + c$
Option B:	$y = e^x e^{e^x} + c$
Option C:	$y = e^{-x} e^{-e^x} + c$
Option D:	$y = e^{-x} e^{e^x} + c$
Q14.	Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dy dx$
Option A:	4/35
Option B:	3/35
Option C:	13/35
Option D:	0
Q15.	Evaluate $\iint xy(x+y) dx dy$ , where $R$ is the region bounded by $x^2 = y, x = y$ .
Option A:	3/56

Option B:	4/56
Option C:	13/5
Option D:	56/3
Q16.	Evaluate $\int_0^1 \int_0^x e^{x+y} dy dx$
Option A:	0
Option B:	$\frac{(e-1)^2}{2}$
Option C:	$\frac{(e-1)}{2}$
Option D:	$(e-1)$
Q17.	Change to polar co-ordinate and evaluate $\int \int \sin(x^2 + y^2) dx dy$ over the circle $x^2 + y^2 = a^2$ .
Option A:	$\pi(1 - \cos a)$
Option B:	$\pi(1 - \cos a^2)$
Option C:	$\pi(1 - 2\cos a^2)$
Option D:	$2\pi(1 - \cos a^2)$
Q18.	Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x dx dy dz$
Option A:	35/4
Option B:	5/4
Option C:	4/35
Option D:	0
Q19.	To change cartesian co-ordinate $(x, y, z)$ to spherical co-ordinate polar co-ordinate $(r, \theta, \phi)$
Option A:	$x = r \sin \theta \sin \phi$ , $y = r \cos \theta \cos \phi$ , $z = r \cos \theta$
Option B:	$x = r \sin \theta \cos \phi$ , $y = r \cos \theta \sin \phi$ , $z = r \cos \theta$
Option C:	$x = r \sin \phi \sin \theta$ , $y = r \sin \theta \cos \phi$ , $z = r \cos \theta$
Option D:	$x = r \sin \theta \cos \phi$ , $y = r \sin \theta \sin \phi$ , $z = r \cos \theta$
Q20.	Evaluate $\int \int \int (x^2 + y^2 + z^2) dx dy dz$ over the first octant of the sphere $x^2 + y^2 + z^2 = a^2$
Option A:	$\frac{\pi a^5}{10}$
Option B:	$\frac{\pi a}{10}$
Option C:	$\frac{a^5}{10}$
Option D:	$\frac{2\pi a^5}{10}$
Q21.	The arc length 's' of the curve $y = f(x)$ from $x = x_1$ to $x = x_2$ is given by

Option A:	$s = \int_{x_1}^{x_2} \sqrt{\left(1 + \frac{dy}{dx}\right)^2} dx$												
Option B:	$s = \int_{x_1}^{x_2} \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$												
Option C:	$s = \int_{x_1}^{x_2} \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dx$												
Option D:	None of these												
Q22.	<p>If the ordinates at different points of the curve are</p> <table border="1" style="margin-left: 20px;"> <tr> <td>x</td> <td>0</td> <td>0.25</td> <td>0.5</td> <td>0.75</td> <td>1</td> </tr> <tr> <td>y</td> <td>1</td> <td>0.8</td> <td>0.667</td> <td>0.5714</td> <td>0.5</td> </tr> </table> <p>Then by Trapezoidal Rule, the area under the curve bounded by x-axis and ordinates at x=0 and x=1 is</p>	x	0	0.25	0.5	0.75	1	y	1	0.8	0.667	0.5714	0.5
x	0	0.25	0.5	0.75	1								
y	1	0.8	0.667	0.5714	0.5								
Option A:	0.5782												
Option B:	0.6121												
Option C:	0.6970												
Option D:	0.7825												
Q23.	<p>The formula for Simpson's 1/3<sup>rd</sup> Rule is given by  (X:sum of extreme ordinates  T:sum of ordinates multiples of 3  O:sum of odd ordinates  E:sum of even ordinates  R:sum of remaining ordinates)</p>												
Option A:	$\int_a^b f(x)dx = \frac{h}{3} [X + 2T + 3R]$												
Option B:	$\int_a^b f(x)dx = \frac{h}{3} [X + 3T + 2R]$												
Option C:	$\int_a^b f(x)dx = \frac{h}{3} [X + 2O + 4E]$												
Option D:	$\int_a^b f(x)dx = \frac{h}{3} [X + 2E + 4O]$												
Q24.	<p>If <math>\frac{dy}{dx} = f(x, y)</math> is a differential equation with initial condition <math>y(x_0) = y_0</math>, then by Euler's Method, y at <math>x_n</math> is obtained by the formula</p>												
Option A:	$y_n = y_{n-1} + hf(x_{n-1}, y_{n-1})$												
Option B:	$y_n = y_{n-1} + \frac{h}{2} f(x_{n-1}, y_{n-1})$												
Option C:	$y_n = y_{n-1} + hf(x_n, y_{n-1})$												
Option D:	None of these												
Q25.	<p>If <math>\frac{dy}{dx} = 1 + xy</math> with <math>y(0) = 2</math> then to find the value of y(0.1) by Runge- Kutta method of Fourth Order, the value of <math>k_2</math> will be</p>												
Option A:	0.1503												

Option B:	0.1103
Option C:	0.2112
Option D:	0.1821