Program: BE Electronics Engineering

Curriculum Scheme: Revised 2012

Examination: Second Year Semester III

Course Code: EXS301 Course Name: Applied Mathematics-III

Time: 2 hour Max. Marks: 80

Q.1 Multiple Choice Questions

Q1.	Find L[$\sin^2 t$]
Option A:	$\frac{1}{2}\left[\frac{1}{s} - \frac{s}{s^2+4}\right]$
Option B:	$\frac{s}{s^2+4}$
Option C:	$\frac{1}{2}\frac{s}{s^2+4}$
Option D:	$\frac{1}{s}$
Q2.	Find L[cos2t sint]
Option A:	$\frac{3}{s^2+9}$
Option B:	$-\frac{1}{s^2+1}$
Option C:	$\frac{s^2+1}{9}$
Option D:	$\frac{1}{2}\left[\frac{3}{s^2+9} - \frac{1}{s^2+1}\right]$

Q3. Find L[e^t cost]

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Option A:	$\frac{1}{(s+2)^2+5}$
Option B:	$\frac{2}{(s+1)^2}$
Option C:	$\frac{s}{(s-1)^2+1}$
Option D:	$\frac{2}{s}$
Q4.	Find L[e^t]
Option A:	$1 / (s-1)^2$
Option B:	1 / (s-1)
Option C:	2 / s
Option D:	$3 / (s-1)^2$
Q5.	Find $L^{-1}\left[\frac{s}{s^2+4}\right]$
Option A:	e^{-t} sin2t
Option B:	cos2t
Option C:	sin2t
Option D:	e^{-t}

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Q6.	Find $L^{-1}\left\lfloor \frac{1}{\sqrt{s+5}} \right\rfloor$
Option A:	$(1 - e^{25t})$
Option B:	e^{-5t}
Option C:	$1 - e^{-5t}$
Option D:	$e^{-5t} / 5$
Q7.	Find half range sine series for f(x) = x in $(0, \pi)$
Option A:	$-\sum_{n=1}^{\infty} \frac{2(-1)}{n} \sin nx$
Option B:	$\sum_{n=1}^{\infty} \frac{1-(-1)^n}{2n} \cos nx$
Option C:	$\sum_{n=1}^{\infty} \frac{1-(-1)}{2n}$
Option D:	$\sum_{n=1}^{\infty} \cos nx$
Q8.	Which of the following function is odd?
Option A:	$f(x) = x^2$
Option B:	$f(x) = x^2 - x$
Option C:	$f(x) = x$
Option D:	$f(x) = x^3 + x$

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Q9.	The function f(x) = sinx is periodic function with period π
Option A:	
Option B:	2π
Option C:	3π
Option D:	4π
Q10.	A vector $\overline{F}$ is Irrotational if $curl\overline{F}$ is
Option A:	1
Option B:	0
Option C:	2
Option D:	4
Q11.	Find the analytic function whose real part is $x^3 - 3xy^2$
Option A:	z^3+c
Option B:	z+c
Option C:	z-c
Option D:	3z+c
Q12.	The integral of the normal component of the curl of a vector over a surface *S* is equal to the line integral of the tangent component of around the curve bounding *S i.e.*

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	$\bar{N} \cdot (\nabla \times \bar{F}) ds = \int_C \bar{F} \cdot d\bar{r}$ where is the unit outward normal vector to the element ds.
Option A:	Stoke's Theorem
Option B:	Green's Theorem
Option C:	Gauss-Divergence Theorem
Option D:	Pythagoreans Theorem
Q13.	If $f(z) = r^2 \cos 2\theta + ir^2 \sin p\theta$ is analytic then the value of 'p' is
Option A:	3
Option B:	2
Option C:	4
Option D:	-2
Q14.	Find a_0 of the function $f(x) = \frac{1}{4}(\pi - x)^2$
Option A:	$\frac{\pi^2}{6}$
Option B:	$\frac{\pi^2}{12}$
Option C:	$\frac{5\pi^2}{6}$

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Option D:	$\frac{5\pi^2}{12}$
Q15.	If $\overline{F} = x^2 i + xy\, j + y^2 k$ then $div\overline{F}$ is
Option A:	X
Option B:	2x
Option C:	3x
Option D:	4x
Q16.	Translation transformation w = z+c preserve
Option A:	Shape & Size
Option B:	Shape
Option C:	Size
Option D:	Neither Shape nor Size
Q17.	Find grad(ϕ) if $\phi = 2x^2 + y^2$
Option A:	x i – y j – z k
Option B:	4x i +2 y j
Option C:	x i + y j + z k
Option D:	x i – z k
Q18.	If $div\overline{F} = 0$ then $\overline{F}$ is
Option A:	Soleinodal

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Option B:	Irrotational
Option C:	Convergent
Option D:	Constant
Q19.	Evaluate $\int_A^B (2\,y\,dx + x\,dy)$ along $y = x$ from A(0,0) to B(2,2)
Option A:	1
Option B:	6
Option C:	-1
Option D:	3
Q20.	If $\overline{F} = i - xy\,j + y^2\,k$ then $curl\overline{F}$ is
Option A:	(2y - x) i + y j – 2y k
Option B:	x i + y j + z k
Option C:	z i – y k
Option D:	i + 3 j + 2 k

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Q.2 Attempt any Four [20 M]

A) Find $L^{-1}\left[\frac{s^2}{(s+a)^2}\right]$ using convolution theorem [05 M]

B) Find Fourier series for $f(x) = x^2$ in $(0, 2\pi)$ [05 M]

C) Evaluate by Green's theorem $(x^2 - xy)dx + (x^2 - y^2)dy$
where C is the closed curve bounded by $x^2 = 2y$ and $x = y$ [05 M]

D) Show that $\bar{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j$
$+(3xy - 2xz + 2z)k$ is both solenoidal and irrotational. [05 M]

E) Obtain complex form of fourier series for $f(x) = e^{ax}$ in $(-\pi, \pi)$ [05 M]

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Q.3 Attempt any Four [20 M]

A) Find the bilinear transformation which maps 2,I, -2 onto the points 1, i, -1.

B) Find $J_{1/2}(x)$. 2).

C) Show that $u = x^3y - xy^3$ is a harmonic function. Find its harmonic conjugate and analytic function

D) If $\bar{F} = (axy + bz^3)\mathrm{i} + (3x^2 - cz)\mathrm{j} + (3xz^2 - y)\mathrm{k}$

is irrotational, find the value of a, b & c.

E) Find $L\left[\frac{\sin^2 t}{t}\right]$