M18001002

Registration No: | | | | | | | | | | |

Total Number of Pages : 02 **B.TECH**

B.TECH 2ND SEMESTER REGULAR EXAMINATIONS, MAY 2018
ENGINEERING MATHEMATICS-II
Subject Code:BBSBS2010
Time: 3 Hours
Max Marks : 100

CO1 To Solve Ordinary differential and integral equation by using Laplace transform.
CO2 To execute the technique of Fourier Integral and transform for learning in advanced Engineering Mathematics.
CO3 To relate gradient, curl and divergence and its application in fluid dynamic.
CO4 To evaluate multiple integrals by using Green's, Stokes' and divergence theorem to give physical interpretation of the curl and divergence of a vector field .

PART-A (10X1 = 10 MARKS)

Answer *All* Questions.

a) The value of div(gradf)= _____ [CO2]
$i)\ \frac{\partial^2 f}{\partial x^2}\quad ii)\ \frac{\partial^2 f}{\partial y^2}\quad iii)\ \frac{\partial^2 f}{\partial z^2}\quad iv)\ \nabla^2 f$

b) The Laplace Transform of U(t- a) = _____. [CO1]
$i) e^{-as}\quad ii)\ \frac{e^{-as}}{s}\quad iii)\ \frac{1}{s}\quad iv)\ \frac{1}{s^2}$

c) The Laplace Transform of 2^t is _____. [CO1]
$i) \frac{1}{s-2}\quad ii)\ \frac{1}{s-ln2}\quad iii)\ \frac{1}{s^2}\quad iv)\ \frac{1}{s(s-2)}$

d) The value of Curl (r) = _____. [CO2]
$i)\ 1\quad ii)\ -1\quad iii)\ 0\quad iv)\ +1,-1$

e) The Laplace Transform of _____ function does not exists. [CO1]
$i)\ e^t\quad ii)\ e^{-t}\quad iii)\ e^{t^2}$ iv) non of these.

f) The vector field is irrotational , if curl(v)= _____. [CO2]
i) 0 ii) 1 iii) -1 iv) 2

g) The gradient of a scalar function is _____. [CO3]
i) vector ii) scalar iii) even iv) odd

h) The Fourier Integral of an odd function is _____.
i) fourier cosine integral ii) fourier sine integral iii) fourier integral iv) non of these. [CO3]

i) The transformation between line integral and double integral is _____.
i) Green's Theorem ii) Divergence Theorem iii) stokes theorem iv) non of these. [CO4]

j) The unit normal vector of a plane parallel to z =1 is
i) I ii) J iii) k iv) 0 [CO4]

PART-B (15 x 2 = 30 MARKS)

Answer any fifteen questions from the following.

1. State First shifting property. [CO1]
2. State Unit step function. [CO1]
3. Find $L^{-1}\left(\ \frac{e^{-\pi s}s}{s^2+1}\ \right)$ [CO1]
4. Find L (sin wt * cos wt). [CO1]
5. Find the Laplace Transform of t u(t-1). [CO1]
6. Write the formula for Fourier Sine Integral of a function. [CO2]
7. Write the formula for Fourier Transformation of a function. [CO2]

8. Find the Fourier Sine Integral of f(x) = $\begin{cases} k & 0 < x < 1 \\ 0 & x > 1 \end{cases}$ [CO2]

9. Find the Fourier Cosine Transform of f(x) = $\begin{cases} 1 & 0 < x < 1 \\ -0 & x > 1 \end{cases}$ [CO2]

10. Find the Fourier Transformation of f(x) = f(x) = $\begin{cases} -1 & -a < x < a \\ 0 & otherwise \end{cases}$ [CO2]

11. Find the angle between two vector s I +J +K and I + 2J + 3K [CO3]
12. Find the unit normal to the surface $x^2 + y^2 = 25$ *at* (3,4). [CO3]
13. Find $\nabla^2 f$ *where* $f = e^{2x} sin2y$ [CO3]
14. Find the length of the curve $r(t) = t\ I + t^3\ J$ *at* (1,1,1) [CO3]
15. Find the curl of the vector $r = x\,I + y\,J + z\,K$ [CO3]
16. Find the Parametric form of $x^2 + y^2 + z^2 = 1$ [CO4]
17. State Stokes theorem. [CO4]
18. Find the normal vector of r(u,v)=[a cos u, b sin v , u] [CO4]
19. Evaluate $\iint_R dxdy$, *where* R: $x^2 + y^2 = 4$ [CO4]
20. Evaluate $\int_{-1}^{1}\int_{-2}^{2}\int_{-3}^{3} z\ dxdydz$ [CO4]

PART-C (6 x 5 = 30 MARKS)

Section-i **Answer any Six questions**

1. Find the Inverse Laplace Transform of $\ln \frac{s^2+1}{(s-1)^2}$ [CO1]
2. Find the Laplace Transform of $te^{-t}\cos t$ [CO1]
3. Find the Fourier cosine integral of f(x) = $\begin{cases} x^2 & 0 < x < 1 \\ 0 & x > 1 \end{cases}$ [CO2]
4. Find the Fourier Transform of f(x) = $\begin{cases} e^x & -a < x < a \\ 0 & otherwise \end{cases}$ [CO2]
5. Find the directional derivative of $f = \frac{1}{\sqrt{x^2+y^2+z^2}}$ at the point (3,0,4) in the direction I+J+K. [CO3]
6. Determine the constant a, so that the vector V= (x+3y)I +(y-2z)J +(x+az) K is Solenoidal. [CO3]
7. Find $\int_c f(r)ds$, *where* $f = \sqrt{2 + x^2 + 3y^2}$, $c : r = [\ t, t, t^2\ ]$, $0 \le t \le 3$ [CO4]
8. Find the area of x = a cos t, y = b sin t, , $0 \le t \le 2\pi$ by using line integral. [CO4]

Section-ii **Answer any Two questions** **(2 x 15 = 30 MARKS)**

1. a) Solve the integral equation y(t)= $te^t - 2e^t \int_0^t e^{-u}y(u)du$ [CO1]
   b) Using Convolution Theorem , Find the Inverse Laplace Transform of $\frac{s}{(s^2+a^2)^2}$ [CO1]
2. a) Prove that $\int_0^\infty \frac{w^3 sinwx}{w^4+4} dw = \frac{\pi}{2} e^{-\pi}\cos x,\ x \ge 0$ [CO2]
   b) Find the Fourier Transform of f(x) = $\begin{cases} e^x & if\ x > 0 \\ 0 & if\ x < 0 \end{cases}$ [CO2]
3. a) Find the scalar potential function from the vector field V = $\left[\frac{y}{z}, \frac{x}{z}, \frac{-xy}{z^2}\right]$ [CO3]
   b) Prove that div(u x v) = v curl u - u curl v [CO3]
4. a) Calculate $\int_c Fdr$, *where* $F = [2z,\ x, -y]$, $c : r = [cost,\ sint, 2t]$ *from* (0,0,0) *to* (1,0,4π) [CO4]
   b) Evaluate $\int_1^2 \int_0^{x^2} (1 + 2x)e^{x+y} dxdy$ [CO4]

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