S.E/SEM III/Rev. 2012 (CBSGS)/I.T./MAY 2018

Applied Maths III

**Q.P. Code :23005**

**[Time: Three Hours]** **[ Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. Question no. 1 is compulsory.
2. Attempt any three of the remaining.
3. Figures to the right indicate full marks.

Q1 a) Find the Laplace transform of $e^{-4t}$ sinh t sin t. 05

b) Find half-range sine series for f(x) = $\frac{\pi}{4}$ in $(0, \pi)$. 05

c) Find the values of Z for which the following function is not analytic. 05
Z= sin hu cos v + i cos hu sinv.

d) Show that $\nabla\left[\frac{(\bar{a}\,.\,\bar{r})}{r^n}\right] = \frac{\bar{a}}{r^n} - \frac{n(\bar{a}\,.\,\bar{r})\bar{r}}{r^{n+2}}$, where $\bar{a}$ is a constant vector. 05

Q2 a) Find the inverse Z- transform of $F(z) = \frac{1}{(z-3)(z-2)}$ if $|z| < 2$. 06

b) Verify Laplace's equation for $u = \left(r + \frac{a^2}{r}\right)\cos\theta$ also find v and f(z). 06

c) Find the Fourier series for the periodic function 08

$$f(x) = \begin{cases} -\pi & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$

State the value of f(x) at x=0 and hence, deduce that

$$\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} = \frac{\pi^2}{8}$$

Q3 a) Find $L^{-1}\left[\frac{1}{(S-3)(S-3)^2}\right]$ using convolution theorem. 06

b) Show that the set of functions sin x , sin 2x , sin 3x, ---------- is orthogonal on the interval $[0,\pi]$ 06

c) Verify Green's Theorem for $\int_C \bar{F}\,.\,d\bar{r}$ where $\bar{F} = x^3 i + xyj$ and c is the triangle whose vertices are (0,2) , (2,0) and (4,2) . 08

Q.4

a) Find Laplace transform of $f(t) = \begin{cases} a \sin p\, t, & 0 < t < \frac{\pi}{p} \\ 0, & \frac{\pi}{p} < t < \frac{2\pi}{p} \end{cases}$ 06

and $f(t) = f\left(t + \frac{2\pi}{p}\right)$.

b) Show that $\bar{F} = (y^2-z^2+3yz-2x)i + (3xz+2xy)j + (3xy-2xz+2z)k$ is both solenoidal and irrotational. 06

c) Find half range cosine series for $f(x) = x$, $0<x<2$.
Hence deduce that $\frac{\pi^4}{90} = \frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \frac{1}{4^4} + - - - - -$ 08

Q.5

a) Show that $\iint_S (\nabla r^n).\, d\bar{s} = n(n+1) \iiint_V r^{n-2}\, dv$ using Gauss's Divergence theorem. 06

b) Find the Z-transform of $\{k^2 e^{-ak}\}$, $k \geq 0$. 06

c) (i) Find $L^{-1}\left[\frac{s^2+2s+3}{(s^2+2s+2)(s^2+2s+5)}\right]$ 08

( ii) Find $L^{-1}\left[\frac{s^2+a^2}{\sqrt{s+b}}\right]$

Q.6

a) Use Laplace transform to solve,
$\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 1$ where, $y(0) = 0$, $y'(0) = 1$ 06

b) Find the bilinear transformation which maps the points $z=\infty, i, 0$ onto the points $0, i, \infty$ respectively of w-plane. 06

c) Express the function $f(x) = \begin{cases} \frac{\pi}{2}, & for\ 0 < x < \pi \\ 0, & for\ x > \pi \end{cases}$ 08

for Fourier Sine Integral and Show that

$\int_0^\infty \frac{1-\cos\pi w}{w} \sin wx\ dw = \frac{\pi}{2}$ when $0<x<\pi$

**********All THE BEST**********

S.E/SEM III (CBSGS) / I.T. / MAY 2018

ADC

**Q. P. Code: 36192**

**(3 Hours)** **[Total Marks: 80**

N.B.: (1) Question No. **1** is **compulsory.**
(2) Solve any **three** questions out of remaining **five.**
(3) Figures to **right** indicate **full** marks.
(4) Assume suitable **data** where **necessary.**

Q1. Solve

a) i) Convert $(13.078125)_{10}$ to binary.
ii) Convert $(B73D)_H$ into octal.
iii) Convert $(436)_8$ into hexadecimal.
iv) Convert $(845)_{10}$ into gray code. (4)

b) Sketch typical illumination characteristics for a photodiode and explain the theory of device. (4)

c) Derive the equation of stability factor for voltage divider bias circuit. (4)

d) Implement a full adder using 8:1 Demultiplexer. (4)

e) Write truth table and excitation table of JK flip flop. (4)

2. a) Explain inverting summing amplifier using op-amp. Derive the expression for output voltage. (8)

b) What are different methods used to improve CMRR in differential amplifier. (8)

c) Draw circuit diagram & waveforms of monostable multivibtrator using IC555. (4)

3. a) Design 2 bit magnitude comparator. (10)
b) Using K-map realize the following expression
$Y = \sum m(1, 3, 4, 5, 7, 9, 11, 13, 15)$ (5)

(c) Convert JK FF to D FF. (5)

4.a) With the help of neat circuit diagram explain the operation of Zener diode regulator for variable input voltage and variable load. (8)
b) Explain dataflow modeling style with suitable example. (6)
c) Compare schottky diode with PN junction diode (3 points) (6)

5. (a) Design a MOD-12 Asynchronous down counter. (8)
(b) What do you mean by operational amplifier? Explain the block diagram of opamp. (8)
(c) Write VHDL for full adder. (4)

6.(a) Write a short note on ASCII code and Excess-3 code. (8)
(b) What do you mean by universal gate? Implement NOT,AND,OR gates using NAND gates only. (8)
(c) Explain the difference between the integrator & differentiator .Give one application of each. (4)

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S.E. Sem III (IT)(CBSGS)
DBMS.

June 2018.

**QP CODE : 39738**

**(3 hours)** **[Total Marks: 80]**

**NB :**

1. Question 1 is compulsory.
2. Out of remaining attempt any three
3. Assume suitable data wherever required.
4. Figures to the right indicate full marks.

Q 1 a Differentiate between File system with database management system [5]

b Describe roles of DBA [5]

c Explain aggregate functions of DBMS [5]

d Describe Generalization and specialization with example. [5]

Q 2 a Consider following database tables [10]

Emp (eid , ename , salary , Address , deptid)

Dept ( Deptid , Dname , Address)

Construct the following SQL queries for this relational database.

i) Find name of employee whose address is "Bandra"

ii) Find name of employee earning highest salary

iii) Find all employee working for "HR" department

iv) Delete record of employee with minimum salary

v) Display Name of departments of the company

b Explain operations of file in details [10]

Q 3 a Describe design guide lines for relational schema with example [10]

b List various types of constraints in Database? Explain any two. [10]

Q 4 a Why joins are required? What are the types of Joins? Explain each with example. [10]

b Explain Stored Procedure & Function with example [10]

Q 5 a Draw and explain Database Management System Architecture [10]

b Explain conflict and view serializability with example [10]

Q 6 Write short note on following

a Role and Responsibilities of DBA. [5]

b Single Level Indexes [5]

c Hashing Technique [5]

d Set Operations [5]

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