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

Total Number of Pages : 02 **B.Arch.**
AH213

2nd Semester Back Examination 2017-18
MATHEMATICS- II
BRANCH : B.Arch
Time : 3 Hours
Max Marks : 70
Q.CODE : C596

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Q1 **Answer the following questions:** **(2 x 10)**

a) The eigenvalues of idempotent matrix are _____
b) What is the determinant value of odd order skew symmetric matrix?
c) Find the fundamental period of f(x)= $\sin 2018x$.
d) Let A = $[a_{IJ}]$ be a 5× 5 matrix such that rank of A = 3, then what is the number of linearly independent solutions of the homogeneous system of equations Ax =0.
e) If Trace(A)=3 Then what is the value of the Trace($3A^T$).
f) Find the value of $\int_C F(r)\cdot dr, where\ F = [e^x, -e^{-y}, e^z]$ and C: $r = [t, t^2, t]$ from (0, 0,0) to (1, 1, 1).
g) Let f(x) be a even function of period 2π then in the fourier series what is the value of coefficient of $\sin nx$.
h) What is the parametric representation of equation of plane $x + y + z = 1$?
i) Find the Directional derivative of the function f $= x^2 + y^2$ at a point p $(1,1)$ in the direction $\vec{a} = 2\hat{\imath} - 4\hat{\jmath}$.
j) Find the Fourier sine series of the function f(x)= $-k\ (-\pi < x < 0)$; f(x)= $k(0 < x < \pi)$

Q2 **a)** Solve the system of linear equations 4y + 3z = 8 , 2x – z = 2 , 3x + 2y = 5 by Gauss elimination method. **(5)**

b) Find the eigenvalues and eigenvector of the matrix **(5)**

A = $\begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}$

Q3 **a)** Prove that Eigenvalues of Unitary matrix have absolute value one. **(5)**

b) Prove that a square matrix of order three is the sum of Hermitian and Skewhermitianmatrix. **(5)**

Q4 **a)** Find the Fourier series expansion of $f(x) = \begin{cases} 0 & if\ -2 < x < 0 \\ 2\ if & 0 < x < 2 \end{cases}$ with period P = 2L = 4. **(5)**

b) Find the Fourier series expansion of $f(x) = \begin{cases} x & if\ -\frac{\pi}{2} < x < 0 \\ 0\ if & 0 < x < \frac{\pi}{2} \end{cases}$ with period P = 2π . **(5)**

Q5 **a)** Find the coordinates of the center of gravity of a mass of density $f(x, y) = 1$ in the region R : $x^2 + y^2 \leq 1$ in the first octant . **(5)**

b) Evaluate the line integral $\oint_C F(r) \cdot dr$, Where $F = [x, y, z], C: r = [t, t^2, t^3]$ from $(0,0,)to(2,4,8)$ **(5)**

Q6 **a)** Using Green's Theorem find the value of line integral $\oint_C (xy + y^2)dx + x^2 dy$, where 'C' is the closed curve of the region bounded by the line $y = x$. **(5)**

b) Find the area bounded by one arch of the cycloid $x = a(t - \sin t), y = a(1 - \cos t)$; $0 \leq t \leq 2\pi$ **(5)**

Q7 Verify Stokes Theorem, when $F = y\hat{\imath} + (x - 2xz)\hat{\jmath} - xy\hat{k}$ and surface 'S' is the part of the sphere $x^2 + y^2 + z^2 = a^2$ above the xy plane. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Diagonalize the matrix P = $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$

b) Discuss the solution of the following system of equations
7x +16y - 7z = 4 , 2x + 5y –3 z = -3 and x + y + 2z = 4

c) Find Fourier series of f(x) = x ($0 < x < 2\pi$)

d) Evaluate the value of $\int_C F(r) \cdot dr, where\ F = [y^2, -x^2]$ and C: Be the line segment from (0, 0) to (2, 4).