

S. B. Roll. No.

APPLIED MATHEMATICS-I

1st Exam/Civil/Mech./ECE/Electrical/IT/CSE/Auto/Mechatronics/2952/Nov'19
(FOR 2018 BATCH ONWARDS)

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. a) Choose the correct answer:

15x1=15

- | | | | | |
|--|------------------|-------------------|-------------------|------------------|
| i. Slope of the line $3x + 2y + 1 = 0$ is | a) $\frac{3}{2}$ | b) $-\frac{2}{3}$ | c) $-\frac{3}{2}$ | d) $\frac{1}{2}$ |
| ii. The value of $\frac{5\pi}{12}$ radians in degree is | a) 60° | b) 75° | c) 90° | d) 120° |
| iii. The number of terms in the expansion of $(1 - 2x)^{-9}$ are | a) -9 | b) -10 | c) infinite | d) 9 |
| iv. Value of $\cos 90^\circ$ | a) 1 | b) 0 | c) -1 | d) none of these |
| v. The characteristic of $\log(0.0079)$ is | a) 0 | b) $\bar{3}$ | c) $\bar{2}$ | d) 2 |

b) State True or False.

- vi. The co-ordinate axis divides the plane into two parts called quadrants.
- vii. Perpendicular distance from the point (0, 4) to the straight line $8x + 15y + 1 = 0$ is 2.
- viii. A square matrix is singular matrix if $|A| = 0$
- ix. $0! = 1$
- x. $\frac{x^2-5}{x^2-3x+2}$ is improper fraction.

c) Fill in the blanks.

- xi. System has _____ solution if $D=D_1=D_2=D_3=0$.
- xii. $P(7, 3) =$ _____
- xiii. The distance between points (4, -3) from origin is _____ units.
- xiv. Two lines are _____ if their slopes are equal.
- xv. The revolving line is always _____

SECTION-B

Q2. Attempt any six questions.

6x5=30

- a. Resolve into partial fractions $\frac{2x+1}{x^2-3x+2}$
- b. Show that $\log_b a^2 \log_c b^3 \log_a c^4 = 24$
- c. $\cos 24^\circ + \cos 55^\circ + \cos 125^\circ + \cos 204^\circ + \cos 300^\circ = \frac{1}{2}$
- d. If $\tan A = \frac{a}{a+1}$, $\tan B = \frac{1}{2a+1}$, show that $A + B = \frac{\pi}{4}$
- e. Two vertices of a triangle are (6, 4) and (3, 2). If the centroid is (4, 0), find the third vertices.
- f. Given a triangle A (10, 4), B (-4, 9), C (-2, -1). Find the equation of median through A.
- g. Prove that $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta} = \tan \frac{\theta}{2}$
- h. Find the modulus and amplitude of $\sqrt{3} + i$.
- i. Solve by Cramer's rule the equations
 $7x - 2y = -7$
 $2x - y = 1$

SECTION-C

Q3. Attempt any three questions.

3x10=30

- i. Prove that $\tan(60^\circ + A) \tan(60^\circ - A) = \frac{2 \cos 2A + 1}{2 \cos 2A - 1}$
- ii. Obtain the equation of a circle passing through the points (4, 1); (-4, -3) and (2, -5).

S. B. Roll. No.....

iii. Solve the equations using matrix method

$$3x - 2y + 3z = 8$$

$$2x + y - z = 1$$

$$4x - 3y + 2z = 4$$

iv. If x is small, show that

$$\frac{(1 + \frac{2x}{3})^{-5} + (4 + 2x)^{\frac{1}{2}}}{(4 + x)^{\frac{3}{2}}} = \frac{1}{8} (3 - \frac{95x}{24}) \text{ (Nearly)}$$

A person standing on the bank of a river observes that the angle subtended by a tree on the opposite bank is 60° ; when he moves backward 20m from the bank, he finds the angle to be 30° . Find the height of the tree and the breadth of the river.

S.B. Roll No.....

APPLIED MATHEMATICS-I
1st Exam/Civil/Mech./ECE/Electrical/IT/CSE/Auto/Mechatronics/2952/May'19
(FOR 2018 BATCH)

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. a) Choose the correct answer.

15x1=15

- (i) Characteristic of $\log 0.0079$ is
(a) $\bar{2}$ (b) 0 (c) $\bar{3}$ (d) 2
- (ii) Period of $\sin_3 \theta$ is
(a) $\Pi/3$ (b) $\Pi/2$ (c) $2\Pi/3$ (d) Π
- (iii) If $n_{c_6} = n_{c_4}$ then n is equal to
(a) 10 (b) 12 (c) 32 (d) 14
- (iv) Conjugate of $3 - 2i$ is
(a) $-3-2i$ (b) $3+2i$ (c) $3i-2$ (d) $3i+2$
- (v) If A is non singular matrix then A^{-1} is
(a) $\text{adj}A$ (b) $\text{adj}A/|A|$ (c) $(\text{adj}A)^T$ (d) $|A|$

b).State True or False :

- (i) If $A = \begin{bmatrix} -2 & -3 \\ 5 & -2 \end{bmatrix}$ the $|A|$ is 19
- (ii) $3i^2 = 3$
- (iii) Value of $\cos 90^\circ = 1$
- (iv) Slope of straight line $3x + 2y - 7 = 0$ is $-\frac{3}{2}$; $2 \neq 0$
- (v) $\sin(A - B) = \sin A \cos B - \cos A \sin B$

c). Fill in the blanks :

- (i) Modulus of $1 + i\sqrt{3}$ is _____
- (ii) Number of terms in the expansion of $(2x+3y)^3$ is _____
- (iii) Two lines are _____. If their slopes are equal
- (iv) The centre of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is _____
- (v) $3\sin A - 4\sin^3 A =$ _____

SECTION-B

Q2. Attempt any six questions.

6x5=30

- (a) Resolve $\frac{x^2+1}{(x^2+2)(x^2+3)}$ into partial fractions.
- (b) Find the inverse of A if $A = \begin{bmatrix} 3 & 8 \\ 2 & 1 \end{bmatrix}$
- (c) Prove that $\sin 47^\circ + \cos 77^\circ = \cos 17^\circ$
- (d) If the points $(-2, -5), (2, -2), (8, a)$ are collinear then find the value of a
- (e) Prove that $7 \log \frac{10}{9} - 2 \log \frac{25}{24} + 3 \log \frac{81}{80} = \log 2$
- (f) Find the co-efficient of x^{16} in the expansion of $(x^2 - 2x)^{10}$.
- (g) Determine the polar co-ordinates for the point $(\sqrt{2}, \sqrt{2})$.
- (h) Find the equation of a straight line which passes through $(2, -3)$ and makes an angle of 45° with x-axis.

S.B. Roll No.....

APPLIED MATHEMATICS-I
1st Exam/Common/2455/0251/5402/May'19

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. a) Choose the correct one.

15x1=15

- | | | | | |
|--|-------------------------|-------------------------|-------------------------|---------------|
| i. If ${}^{18}C_r = {}^{18}C_{r+2}$, then $r =$ | a) 6 | b) 7 | c) 8 | d) 9 |
| ii. Simplified form of $(3+2i)^2$ is= | a) $5+12i$ | b) $5-12i$ | c) $12+5i$ | d) $12-5i$ |
| iii. If $\sin 120^\circ - \sin 60^\circ = \sin x$, then $x =$ | a) -30° | b) 0° | c) 30° | d) 60° |
| iv. The polar co-ordinates of (1,1) are | | | | |
| a) $(\sqrt{2}, \pi/4)$ | b) $(\sqrt{2}, 3\pi/4)$ | c) $(\sqrt{2}, 5\pi/4)$ | d) $(-\sqrt{2}, \pi/4)$ | |
| v. Value of $\sin 34^\circ - \cos 56^\circ$ is | a) -1 | b) 0 | c) $1/2$ | d) 1 |

b) State True or False.

- vi. Number of terms in the expansion of $(x - \frac{3}{x^2})^{18}$ is 19
- vii. $\sec^2 \theta - \tan^2 \theta = 0$
- viii. Slope of vertical line is 0.
- ix. 23rd term of an A.P. 13, 21, 29, - - - is 189.
- x. Radius of circle $x^2 + y^2 - 16x - 8y + 78 = 0$ is $\sqrt{2}$.

c) Fill in the blanks.

- xi. Value of $\frac{4\pi}{5}$ radians in degrees is _____.
- xii. Straight line parallel to X-axis and passing through (-2, 6) is _____.
- xiii. If the logarithm of N is -3.4257, then characteristic= _____.
- xiv. Value of $\tan(1020^\circ)$ is _____.
- xv. The centroid of triangle whose vertices are (4, -3), (-9, 7) and (8, 8) is _____.

SECTION-B

Q2. Attempt any six questions.

6x5=30

- a. Resolve $\frac{2x+1}{x^2-3x+2}$ into partial fractions.
- b. Find the number of different 8 letter words formed from the word 'TRIANGLE' if each word is to begin with 'T'.
- c. If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$, show that $x^x \cdot y^y \cdot z^z = 1$
- d. Prove that $\cos 20^\circ + \cos 50^\circ + \cos 200^\circ + \cos 230^\circ + \cos 300^\circ = \frac{1}{2}$
- e. Prove that $\tan 65^\circ = \tan 25^\circ + 2 \tan 40^\circ$.
- f. Prove that $\tan(\frac{\pi}{4} + \theta) - \tan(\frac{\pi}{4} - \theta) = 2 \tan 2\theta$
- g. Find the equation of line passing through (4, 5) and perpendicular to line joining (1, 2) and (5, 6).
- h. If A (10, 4), B (-4, 9), C (-2, -1) are vertices of a triangle. Find the equation of altitude through C.
- i. Find the equation of a circle having diameter on the line joining the points (0, 1) and (1, 1).

SECTION-C

Q3. Attempt any three questions.

3x10=30

- i. If x is so small that its squares and higher powers are neglected, prove that

$$\frac{\sqrt{9+7x} - (16+3x)^{\frac{1}{4}}}{4+5x} = \frac{1}{4} - \frac{17}{384}x$$

- ii. Sum the series $7 + 77 + 777 + \dots$ up to n terms.
- iii. Prove that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$
- iv. A person standing on the bank of a river observes that the angle subtended by a tree on the opposite bank is 60° . When he retires 40m from the bank, he finds the angle to be 30° . Find the height of the tree and breadth of the river.
- v. Find the equation of circle which passes through (4, 2) and (-6, -2) and has center on X-Axis.

APPLIED MATHEMATICS-I
1st Exam/Common/2455/5402/0251/May'18

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. Choose the correct answer.

5x1=5

- (i) The modulus of $1 + i\sqrt{3}$ is
a) $\sqrt{2}$ b) -1 c) 2 d) 0
- (ii) The value of $3\pi/12$ radians in degree is
a) 60° b) 45° c) 90° d) 120°
- (iii) Characteristic of $\log 0.07426$ is
a) $\bar{1}$ b) $\bar{2}$ c) 0 d) 1
- (iv) If $\sin(A-B) = \frac{1}{2}$ and $\cos(A+B) = \frac{1}{2}$ then value of A and B will be
a) $A=15^\circ, B=45^\circ$ b) $A=45^\circ, B=15^\circ$ c) $A=45^\circ, B=45^\circ$ d) $A=30^\circ, B=60^\circ$
- (v) The centroid of a triangle with two vertices (3,4) (-1,-9) is (2, -4) then third vertex is
a) (-4, -7) b) (4, -7) c) (4,7) d) (-4,7)

Q2. State True or False.

5x1=5

- a. The series of the R.H.S of the expansion $(1+x)^n$ extends to infinity
- b. If k, k+1, k+3 are in G.P, then k=2
- c. Value of $\tan 120^\circ$ is $\sqrt{3}$
- d. $\sec(270^\circ + \theta) = \operatorname{cosec}\theta$
- e. The point (3,4); (7,7); (x,4) are collinear, if x=3

Q3. Fill in the blanks.

5x1=5

- i. Radius is a ----- angle.
- ii. The revolving line is always -----
- iii. If $\cos A = \frac{1}{2}$ then $\cos 3A =$
- iv. The conic is parabola if -----
- v. Equation of line perpendicular to line $ax+by+c=0$ is -----

SECTION-B

Q4. Attempt any six questions.

6x5=30

- a. In how many ways, 3 boys and 3 girls are seated at round table, so that no two girls sit together.
- b. Find the co-ordinates of the incentre of the triangle whose vertices are (-36,7), (20,7) and (0,-8)
- c. Resolve $\frac{(3x+7)}{(x+3)(x^2+1)}$ into partial fractions.
- d. A (10, 4); B (-4, 9); C (-2,-1) are the vertices of a triangle ABC, find the equation of the median through A.
- e. Prove that $\cos \alpha + \cos(\alpha+2\pi/3) + \cos(\alpha+4\pi/3) = 0$
- f. If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$ then show that $x^x y^y z^z = 1$
- g. Prove that $\frac{\sin A + \sin 3A + \sin 5A + \sin 7A}{\cos A + \cos 3A + \cos 5A + \cos 7A} = \tan 4A$
- h. Prove that $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cos \theta}{\sin \theta}$
- i. How many terms of the series 3+8+13+18+ ----- must be taken so that their sum is 1010?

S.B. Roll No.....

APPLIED MATHEMATICS-I
1st Exam/Common/2455/0251/5402/Nov'18

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. a) Choose the correct answer.

15x1=15

- i. If $n_{P_4} = 20 \times n_{P_2}$ then n is equal to
a) 7 b) 8 c) 2 d) 4
- ii. Modulus of $3 - 4i$ is
a) 6 b) 5 c) 4 d) 3
- iii. Slope of line $3x + y - 2 = 0$ is
a) 3 b) 2 c) -3 d) -2
- iv. Mid points internally of $(-a, b)$ and $(a, -b)$ is
a) $\frac{a+b}{2}$ b) $\frac{a-b}{2}$ c) $a + b$ d) $(0, 0)$
- v. The point $(-4, -5)$ lies in quadrant
a) 1st b) 2nd c) 3rd d) 4th

b) State True or False.

- vi. $\sin(A + B) = \sin A \cos B - \cos A \sin B$
- vii. Sum of first n natural numbers is $\frac{n(n+1)}{4}$.
- viii. If a, b, c are in A.P then $2b = 2a + c$.
- ix. Length of latus rectum of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is $\frac{2b^2}{a}$.
- x. The equation $3x + 4y + 5 = 0$ and $4x - 3y + 7 = 0$ represent perpendicular lines.

c) Fill in the blanks.

- xi. nth term of a G.P is _____
- xii. The eccentricity of parabola is _____
- xiii. The equation $x + 2y + 3 = 0$ to the slope form is _____
- xiv. Two lines are _____ if their slopes are equal.
- xv. Value of $\frac{\tan 70^\circ + \tan 65^\circ}{1 - \tan 70^\circ \tan 65^\circ} =$ _____

SECTION-B

Q2. Attempt any six questions.

6x5=30

- a. If $\cos A = \frac{5}{13}$ and A lies in the 4th quadrant, Show that $\frac{13 \sin A + 5 \sec A}{5 \tan A + 6 \csc A} = -\frac{2}{37}$.
- b. Given $\log 2 = .30103$, $\log 5 = 0.69897$ Solve the equations $2^x \cdot 5^y = 1$, $5^{x+1} \cdot 2^y = 2$.
- c. Find the term independent of x in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$.
- d. Resolve into partial fraction $\frac{2x+1}{x^2-3x+2}$.
- e. Express the Complex number $-3 + 3i$ in polar form.
- f. Find the co-ordinates of foot of perpendicular from the point $(2, 3)$ on the line $y = 3x + 4$.
- g. Prove that $\frac{1}{\sec A + \tan A} = \frac{1 - \sin A}{\cos A}$.
- h. Sum the series $0.9 + 0.09 + 0.009 + \dots$ to nth term.
- i. The sum of two angles is $\frac{2\pi}{5}$ and their difference is 18° . Find the angles in degrees and radians.

S.B. Roll No.....

SECTION-C

Q3. Attempt any three questions.

3x10=30

- i. Find the equation of circle which passes through the points (4, 1) and (6, 5) and has its centre lies on the line $4x + y = 16$.
- ii. If $\sin\theta + \sin\phi = a$ and $\cos\theta + \cos\phi = b$ then show that $\sin(\theta + \phi) = \frac{2ab}{a^2 + b^2}$.
- iii. If x is so small that its square and higher powers are neglected show that :

$$\frac{\sqrt[3]{1-2x} + \sqrt{(1+x)^5}}{\sqrt{9+x}} = \frac{2}{3} - \frac{11}{54}x.$$
- iv. Find the co-ordinates of focus, vertex, the equation of directrix and axis of parabola $y^2 - 4y - 2x - 8 = 0$.
- v. A boy observes the angle of elevation of a mountain top to be 60° and after walking directly away from it on level ground through 100 meters, the angle of elevation is 45° . Find the height of the mountain and the distance between the mountain and first position of the boy.

APPLIED MATHEMATICS - I

1st Exam /Common/2455/0251/5402/MAY '17

Duration : 3 Hrs

M. Marks : 75

SECTION A

Q. 1) Choose the correct answer

(5 × 1 = 5)

- (i) 5th term of series 3, 8, 13, 18 _____
a) 21 b) 22 c) 23 d) 24
- (ii) The total number of terms in $(x + a)^8$
a) 7 b) 8 c) 9 d) 10
- (iii) value of $\cos 90^\circ$
a) 0 b) 1 c) -1 d) none of these
- (iv) modulus of $1 + i\sqrt{3}$ is equal to
a) 2 b) 1 c) 10 d) -2
- (v) The radius of the circle $x^2 + y^2 - 4x + 6y - 25 = 0$
a) $\sqrt{37}$ b) $\sqrt{38}$ c) 38 d) 37

Q. 2) State true or false

(5 × 1 = 5)

- (i) The midpoint of A(-3,2) and B(5,4) is (1,-3)
- (ii) angle 1325° lies in Ist quadrant
- (iii) $\sec(90^\circ - \theta) = \operatorname{cosec} \theta$
- (iv) Two lines are parallel if their slopes are equal
- (v) a, b, c are in A.P. if $b = \frac{a+c}{2}$

Q. 3) Fill in the blanks

(5 × 1 = 5)

- (i) The value $\sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ$ is _____
- (ii) The area of triangle whose vertices are (4,4), (3,-16) and (3,-2) is _____
- (iii) If the end points of the diameter of circle are (2,3) and (6,5) then the centre of circle is _____
- (iv) value of $\cos \frac{\pi}{2} + i \sin \frac{\pi}{2} =$ _____
- (v) value of $\frac{8!}{6!}$ is _____

SECTION B

Q. 4) Attempt any 6 Questions

(6 × 5 = 30)

- (i) Which term of the series $3 + 7 + 11 + 15 + \dots$ is 47 ?
- (ii) Sum the series $3 + 33 + 333 + \dots$ to n terms.
- (iii) Find the 4th term in the expansion of $\left(\frac{x}{a} + \frac{a}{x}\right)^{10}$
- (iv) if $\sin(A + B) = 1$, $\cos(A - B) = \frac{\sqrt{3}}{2}$ then find A and B
- (v) Prove that $\frac{\cos 17^\circ + \sin 17^\circ}{\cos 17^\circ - \sin 17^\circ} = \tan 62^\circ$
- (vi) Find the co-ordinates of a point which divides the line joining the points (1,3) and (6,-3) Internally in the ratio 2 : 1
- (vii) Find the equation of the straight line passing through (2,5) and perpendicular to $5x + 2y + 8 = 0$
- (viii) Find the \perp distance of the point (3,4) from the line $12x - 5y + 7 = 0$
- (ix) Show $3\log \frac{3}{4} + 2\log \frac{4}{5} - 2\log \frac{3}{10} = \log 3$

SECTION C

Q. 5) Attempt any 3 Questions

(3 × 10 = 30)

- (i) Resolve $\frac{x^2}{(x-1)(x-2)(x-3)}$ into partial fraction
- (ii) if x be so small that its square and higher powers are neglected show that
$$\frac{(1+x)^{1/2} + (1-x)^{2/3}}{(1+x)^{2/3} + (1-x)^{1/2}} = 1 - \frac{1}{6}x$$
- (iii) (a) Find the equation of the circle whose centre is the point (2, 3) and which passes Through the point (5, 7)
- (b) Find the equation of the circle passing through the points (0, 0) , (1, 0) , (0, 1)
- (iv) (a) Prove that $\frac{\sqrt{3} \cos 23^\circ - \sin 23^\circ}{2} = \cos 53^\circ$
- (b) Prove that $\sin 150^\circ \cos 120^\circ + \cos 330^\circ \sin 660^\circ = -1$
- (v) (a) if the three vertices of a rectangle are the points (2, -2) , (8, 4) , (5, 7) find the Co-ordinate of the fourth vertex.
- (b) Find the equation of line joining two points (1, 2) and (2, 3)

APPLIED MATHEMATICS-I
1st Exam/common/2455/0251/5402/May'16

Duration : 3 Hrs.

M. Marks 75

SECTION - A

Q1.A. Choose the correct one:

1x5=5

- i. Conjugate of $3 - i$ is
 (a) $-3 - i$ (b) $-3 + i$ (c) $3 + i$ (d) $3i$
- ii. 10th term of A.P Series $5+7+9+11+ \dots$
 (a) 23 (b) 24 (c) 25 (d) 21
- iii. Middle term of $(x^2+1/x)^2$ is
 (a) $2x$ (b) 2 (c) $3x$ (d) $4x$
- iv. $\sin\theta = 1/3$ and $\cot\theta = -\sqrt{8}$ then θ lies in
 (a) First quadrant (b) Second quadrant (c) Third quadrant (d) Fourth quadrant
- v. The centroid of a triangle whose vertices are (2,-8); (14,3); and (-10,8) is
 (a) (1,1) (b) (2,2) (c) (-2,1) (d) (2,1)

B. State whether the following statements are true or false.

1x5=5

- i. Area of triangle is zero then three angular points are collinear.
- ii. When equation of parabola is $y^2 = 4ax$ then Focus is $(-a,0)$.
- iii. Factorial of zero is zero.
- iv. $\tan(45^\circ + \theta) = \frac{1 + \tan \theta}{2 + \tan \theta}$
- v. If a,b,c are in G.P then $b^2 = ac$

C. Fill in the blanks.

1x5=5

- i. $P(7,3) = \underline{\hspace{2cm}}$
- ii. $\sin 18^\circ = \underline{\hspace{2cm}}$
- iii. Logarithms to the base 10 are called
- iv. The fixed straight line in parabola is called
- v. In which quadrant, the angle 750° lies

SECTION – B

Q2. Attempt any six questions.

5X6=30

- a. How many terms of the series $3+8+13+18+\dots$ Must be taken so that their sum is 1010
- b. Sum the series $5+55+555+\dots$ n terms
- c. If $a^2+b^2 = 7ab$ prove that
 $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}[\log a + \log b]$
- d. Find the absolute term in the expansion of $(3x^2 - 1/x^3)^{10}$
- e. If $\sin(A+B) = \sqrt{3}/2$ and $\cos(A-B) = \sqrt{3}/2$ then find A and B.
- f. Prove that $\tan 65^\circ = \tan 25^\circ + 2\tan 40^\circ$
- g. Obtain the equation of straight line passing through the point of intersection of $2x+3y+1=0$; $3x-4y=5$ and the point (2,3)
- h. Find the perpendicular distance of the origin from the line joining (1,3) and (-3,7)

i Resolve into partial fraction $\frac{2x+3}{(x-2)(x+3)}$

SECTION – C

Attempt Any Three Questions.

10x3=30

Q3. Prove $\frac{\sin 11A \sin A + \sin 7A \sin 3A}{\cos 11A \sin A + \cos 7A \sin 3A} = \tan 8A$

Q4. Find the equation of circle passing through points (0,0); (a,0), and (0,b)

Q5. Find the equation of a circle where centre is the point (4, 5) and which passes through the centre of the circle $x^2 + y^2 + 4x - 6y = 12$

Q6. From the top of cliff 120 meter high the angle of depression of top and bottom of a tower are observed to be 30° and 60° . Find the height of tower.

Q7. Resolve into Partial Fraction $\frac{1}{x^3+1}$

Q8. Reduce the equation $\sqrt{3}x + y + 6 = 0$ to the form of $x \cos \alpha + y \sin \alpha = p$ Also finds the value of p and α .

APPLIED MATHEMATICS-I
1st Exam/Common/2455/0251/5402/ Nov'15

Duration 3 hrs:

M.Marks: 75

Section A

Q 1 (15 marks)

A. Choose the correct one:

- I. Number of terms in expansion of $(1-2x)^{-9}$ are
a. 9 b. infinite c. -10 d. 11
 - II. The value of $\sin A = \frac{1}{2}$ then $\sin 3A =$
a. 0 b. 1 c. -1 d. 2
 - III. The modulus of $\sqrt{3} + i$
a. 2 b. 1 c. -2 d. 0
 - IV. Latus rectum of parabola $y^2 - 8y - x + 19 = 0$
a. $4a = 1$ b. $4a = 2$ c. $4a = 3$ d. $a = 1$
 - V. 310 is a term of AP 3, 8, 13, 18,
a. 14^{th} b. not a term c. 7^{th} d. 8^{th}
- B. State whether the following statements are true or false:**
- I. The radius of circle $X^2 + Y^2 - 8X - 16Y + 78 = 0$ is $\sqrt{2}$.
 - II. The number ways of selecting 6 players out of 7 is 7P_6 .
 - III. The value of x -radian in degrees is $\frac{180X}{\pi}$
 - IV. If $K, K+1, K+3$ are in GP then $K=2$.
 - V. The co-ordinates of middle point of the line joining (3,4) and (-5,6) are (-1,-1).
- C. Fill in the blanks:**
- I. The value of $\cos 53^\circ \cos 37^\circ - \sin 53^\circ \sin 37^\circ$ is equal to -----
 - II. The value of $\frac{5!}{4!} =$ -----
 - III. Natural logarithmus are known -----.
 - IV. The conic is ellipse if -----.
 - V. Value of $\cos \frac{\pi}{2} + i \sin \frac{\pi}{2} =$ -----.

Section B

Q2. Attempt any six questions (5x6)

- I. Prove that $\tan 28^\circ = \frac{\cos 17^\circ - \sin 17^\circ}{\cos 17^\circ + \sin 17^\circ}$
- II. Prove that $7 \log \frac{10}{9} - 2 \log \frac{25}{24} + 3 \log \frac{81}{80} = \log 2$
- III. Find absolute term in expansion of $\left(x + \frac{1}{x}\right)^{10}$.
- IV. Sum the series $31 + 29 + 27 + \dots + 3$
- V. The sum of first three terms of a GP is 21 while the sum of next three terms is 168. Find first term and common ratio.
- VI. Show that $\tan 65^\circ = \tan 25^\circ + 2 \tan 40^\circ$
- VII. Two vertices of triangle are (4,-6) and (2,-2) and its centroid is (8/3,-1). Find third vertex.
- VIII. Find equation of the straight line parallel to $2x+3y+11=0$ and which is such that sum of its intercepts on the axis is 15.

IX. Find the ratio in which the line joining (3, -6) and (-6, 8) is cut by x-axis.

Section C

Note: Attempt any three questions

(10x3)

3. If x is so small that its square and higher powers are neglected.

Show that
$$\frac{\sqrt{9+7x} - (16+3x)^{1/4}}{(4+5x)} = \frac{1}{4} - \frac{17x}{384}$$

4. Find equation of the straight line passing through the intersection of $x+2y+3=0$ and $3x+4y+7=0$ and perpendicular to line $y-x=9$.

5. Resolve into partial fraction
$$\frac{3x+7}{(x+3)(x^2+1)}$$

6. Prove that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

7. A ladder 20 m long reaches to a distance 20 m from the top of flag staff. At the foot of ladder the elevation of the top is 60° . determine the height of flag staff.

8. Find equation of circle passing through points (4, 2) and (-6, -2) and has its centre on x-axis.

APPLIED MATHEMATICS-I

1st Exam/Common/2455/0251/5402 May 2015

Duration 3 hrs

M.Marks: 75

Section A

Q 1

(15 marks)

A. Choose the correct one:

- I. The modulus of $\sqrt{3} + i$
 - a. 2
 - b. 1
 - c. -2
 - d. 0
- II. The end point of diameter of circle are (2,3) and (6,5). The centre of the circle is
 - a. (4,-4)
 - b. (-4,4)
 - c. (4,4)
 - d. (4,0)
- III. The value of $\sin 75^\circ$ is
 - a. $\frac{\sqrt{3}+1}{2}$
 - b. $\frac{\sqrt{3}+1}{\sqrt{2}}$
 - c. $\frac{\sqrt{3}+1}{2\sqrt{2}}$
 - d. $\frac{\sqrt{2}+1}{3}$
- IV. Number of terms in expansion of $(1+3x)^{-3}$ are
 - a. 4
 - b. 5
 - c. 6
 - d. 2
- V. 7th term of the series $\frac{1}{2} + \frac{1}{3} + \frac{2}{9} + \dots$
 - a. $\frac{125}{729}$
 - b. $\frac{32}{729}$
 - c. $\frac{32}{625}$
 - d. $\frac{25}{729}$

B. State whether the following statements are true or false:

- I. The mid point of A(-3,2) and (5,4) is (1,-3).
- II. The angle -1837 lies in IV quadrant.
- III. Factorial of negative integers is defined.
- IV. The radius of circle $X^2+Y^2-8X-16Y+78=0$ is $\sqrt{2}$.
- V. If K, K+1, K+3 are in GP then K=2.

C. Fill in the blanks:

- I. The value of $\cos 48^\circ \sin 18^\circ - \sin 48^\circ \cos 18^\circ$ is equal to _____.
- II. The value of $\frac{8!}{4!} =$ _____.
- III. Log of 1 to any base a(a \neq 0) is always _____.
- IV. The conic is ellipse if _____.
- V. Value of $\cos \bar{\lambda} + i \sin \bar{\lambda} =$ _____.

Section B

Q2. Attempt any six questions

(5x6)

- a. Find the value of K if (K,1), (5,5) and (10,7) are collinear.
- b. Sum the series $\frac{4}{3} + 1 + \frac{3}{4} + \dots - \infty$
- c. Find absolute term in expansion of $\left(3x^2 - \frac{1}{x^3}\right)^{10}$.
- d. Find equation of straight line through (4,5) and parallel to $2x-3y-5=0$.
- e. Prove that $\tan 28^\circ = \frac{\cos 17^\circ - \sin 17^\circ}{\cos 17^\circ + \sin 17^\circ}$
- f. Show that $\sin 51^\circ + \cos 81^\circ = \cos 21^\circ$
- g. Sum the series upto n terms $8+88+888+\dots$
- h. Two vertices of triangle are (2,3) and (-3,4). Its centroid is (1,3). Find third vertex.
- i. Prove that $7 \log \frac{10}{9} - 2 \log \frac{25}{24} + 3 \log \frac{81}{80} = \log 2$

contd....

Section C

Note: Attempt any three questions

(10x3)

3. Resolve into partial fraction $\frac{x+4}{(x-4)(x^2-3x+2)}$
4. Prove that $4 \sin A \sin(60^\circ - A) \sin(60^\circ + A) = \sin 3A$
5. Find equation of circle passing through (5,7), (6,6) and (2,-2).
6. A boy observes the angle of elevation of a mountain top to be 60° and after walking directly away from it on level ground through 100 m, the angle of elevation is 45° . Find height of mountain and the distance between mountain and first position of the boy.
7. If x is so small that its square and higher powers are neglected.

Show that $\frac{\sqrt{9+7x} - (16+3x)^{1/4}}{(4+5x)} = \frac{1}{4} - \frac{17x}{384}$

8. Find equation of the straight line passing through the intersection of $x+2y+3=0$ and $3x+4y+7=0$ and perpendicular to line $y-x=9$.