VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]

B.Sc. (Phy. / Chem.) Degree (Semester) Examinations, November 2016
Part – III : Allied Subject : Third Semester : Paper – I

MATHEMATICS – I
Under CBCS – Credit 5

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. $\cos hx =$ _____.

   a) $\frac{e^x + e^{-x}}{2}$ b) $\frac{e^x - e^{-x}}{2}$ c) $\frac{e^x - e^{-x}}{2i}$ d) $\frac{e^x + e^{-x}}{2i}$

2. Differentiation of $\log x$ is _____.

   a) 1 b) x c) $\frac{1}{x}$ d) $\log x$

3. $\int \sin x \, dx =$ _____.

   a) $\sin x$ b) $\cos x$ c) $\tan x$ d) $-\cos x$

4. *curl curl curl curl* $f =$ _____.

   a) ∇f b) $\nabla^2 f$ c) $\nabla^3 f$ d) $\nabla^4 f$

5. In R^3 vector valued function $f =$ _____.

   a) $f_1 i + f_2 j$ b) $f_2 j + f_3 k$ c) $f_1 i + f_2 j + f_3 k$ d) $f_3 k + f_1 i$

6. $(\cos hx + \sin hx)^n =$ _____.

7. $\frac{d}{dx}(e^x) =$ _____.

8. $\int x^2 \, dx =$ _____.

9. A vector f is called solenoidal *if* _____.

10. The line integral of f over C is denoted by _____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11. a) Prove that $2^5 \cos^6\theta = \cos 6\theta + 6\cos 4\theta + 15\cos 2\theta + 10.$

(OR)

b) Prove that $\dfrac{1+\tan hx}{1-\tan hx} = \cos h2x + \sin h2x.$

12. a) Differentiate $\sin^{-1}\left(\dfrac{2x}{1+x^2}\right).$

(OR)

b) Find y' *if* $y = x^{\sin x}.$

13. a) Show that $I = \int_0^{\frac{\pi}{2}} \dfrac{\sin x}{\sin x + \cos x}\, dx = \dfrac{\pi}{4}.$

(OR)

b) Evaluate $I = \int_0^1 \int_0^2 xy^2\, dy\, dx.$

14. a) *If* $r = a\cos\omega t + b\sin\omega t$ where a, b are constant vectors and ω is a constant prove that $r \times \dfrac{dr}{dt} = \omega(a \times b)$ *and* $\dfrac{d^2r}{dt^2} + \omega^2 r = 0.$

(OR)

b) Show that $div\left(\dfrac{r}{r}\right) = \dfrac{2}{r}.$

15. a) Evaluate $\int_C f.dr$ where $f = (x^2 + y^2)i + (x^2 - y^2)j$ *and* C is the curve $y = x^2$ joining $(0,0)$ *and* $(1,1).$

(OR)

b) Verify Gauss divergence theorem for the vector function $f = (x^2 - yz)i - 2x^2yj + 2k$ over the cube bounded by $x = 0,$ $y = 0,\ z = 0,\ x = a,\ y = a,\ z = a.$

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Expand $\sin 7\theta$ in powers of $\cos\theta$ *and* $\sin\theta.$

Hence prove that $\dfrac{\sin 7\theta}{\sin\theta} = 7 - 56\sin^2\theta + 112\sin^4\theta - 64\sin^6\theta.$

17. Find y' *if* $y = x^x + x^{1/x}.$

18. Evaluate $I = \int_0^a \int_0^x \int_0^y xyz\, dz\, dy\, dx.$

19. *If* r is the position vector of any point $P(x, y, z),$ then prove that grad $r^n = n r^{n-2} r.$

20. Evaluate $\iint_S f.n\, ds$ where $f = (x + y^2)i - 2xj + 2yzk$ *and* S is the surface of the plane $2x + y + 2z = 6$ in the first octant.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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B.Sc. Mathematics Degree (Semester) Examinations, November 2016
Part – III : Allied Subject : Third Semester : Paper – I

PROGRAMMING IN C
Under CBCS – Credit 3

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. A _____ is a data name that may be used to store a data value.
2. The assignment operators is of the form _____.
   a) vop = exp b) vop < exp c) vop > exp d) vop ≥ exp
3. Write the general form of the simple if statement.
4. The while statement is an _____ loop statement.
   a) exit – controlled b) entry – controlled
   c) direct – controlled d) indirect – controlled
5. Write the general form of array declaration.
6. The function which counts and returns the number of characters in a string is called _____ function.
   a) strlen() b) strcpy() c) strcmp() d) strncpy
7. What is the general form to declare a function?
8. Which one of the following is an user – defined function?
   a) printf b) scanf c) main d) sqrt
9. The length of the data type – character has _____ bytes.
   a) 2 b) 3 c) 1 d) 0
10. The general form to declare a pointer to a function is _____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11. a) Explain Character set in C.

(OR)

b) Explain Logical operators.

12. a) Draw the flowchart of else…if ladder.

(OR)

b) Write a C program for printing of a multiplication table using do…while loop.

13. a) Write short notes on Multi – dimensional arrays.

(OR)

b) Write short notes on strcpy() function.

14. a) Write an example for arrays within structure.

(OR)

b) Write an example for arrays of structures.

15. a) Write a C program to print the address of a variable along with its value.

(OR)

b) Write short notes on pointer increments and scale factor.

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Write a C program to test the "character" type.
17. Explain Switch statement with an example.
18. How to declare one – dimensional arrays.
19. Write an example for structure initialization.
20. Explain pointer expressions with an example.

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B.Sc. Mathematics Degree (Semester) Examinations, November 2016
Part – III : Core Subject : First Semester : Paper – I

ALGEBRA AND TRIGONOMETRY
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. *If* $x^n + p_1x^{n-1} + p_2x^{n-2} + \ldots\ldots + p_{n-1}x + p_n = 0$ then product of the roots = _____.

   a) p_1 b) p_2 c) $(-1)^n p_1$ d) $(-1)^n p_n$

2. If the coefficients of reciprocal equation have all like signs, then ___ is a root(s).

   a) -1 b) $+1$ c) $-i$ d) $+i$

3. The equation $x^{10} + 3x^4 - x^3 - 10 = 0$ cannot have more than _____ negative root(s).

   a) 1 b) 3 c) 2 d) 10

4. *If* $x = \cos\theta + i\sin\theta$ then $x^n - \frac{1}{x^n}$ is _____.

   a) $2\sin n\theta$ b) $2\cos n\theta$ c) $2i\sin n\theta$ d) $2i\cos n\theta$

5. The real part of $\log(1-i)$ is _____.

   a) 0 b) 1 c) $\frac{1}{2}\log 2$ d) $\frac{1}{4}\log 2$

6. *If* $\alpha + i\beta$ is an imaginary root of the equation $f(x) = 0,$ then _____ is also a root.

7. The remainder when $x^4-5x^3+7x^2-4x+5$ is divided by $(x-2)$ is _____.

8. *If* $f'(x)=0$ has real roots, then $f(x)=0$ cannot have more than _____ real roots.

9. The expansion of $\tan n\theta$ in powers of $\tan\theta$ is _____.

10. $\sin\alpha+\sin(\alpha+\beta)+.....+\sin(\alpha+\overline{n-1}\beta)=$ _____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11. a) Solve the equation $x^4-2x^3+4x^2+6x-21=0$ given that two of its roots are equal in magnitude and opposite in sign.

(OR)

b) Find $\frac{1}{\alpha^5}+\frac{1}{\beta^5}+\frac{1}{\gamma^5}$ where α,β,γ are the roots of the equation $x^3+2x^2-3x-1=0.$

12. a) Solve the equation $x^4+20x^3-143x^2+430x+462=0$ by removing its 2nd term.

(OR)

b) *If* α,β,γ are the roots of the equation $x^3+px^2+qx+r=0,$ find the value of $(\alpha^2+1)(\beta^2+1)(\gamma^2+1).$

13. a) Find the values of a for which $ax^3-9x^2+12x-5=0$ has equal roots using HCF.

(OR)

b) Discuss the reality of roots $x^4+4x^3-2x^2-12x+a=0$ for all real values of *a.*

14. a) Expand $\sin^3\theta\cos^5\theta$ in a series of sines multiples of θ.

(OR)

b) *If* $\cosh u=\sec\theta,$ show that $u=\log\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right).$

15. a) *If* $\log\sin(\theta+i\phi)=L+iB,$ prove that $2e^{2L}=\cosh 2\phi-\cos 2\theta.$

(OR)

b) Find the sum to n terms $\cos ec\theta\cos ec2\theta+\cos ec2\theta\cos ec3\theta+.....$

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. *If* α,β,γ are the roots of the equation $x^3+px^2+qx+r=0,$ form the equation whose roots are $\alpha+\beta-2\gamma,\ \beta+\gamma-2\alpha,\ \alpha+\gamma-2\beta.$

17. Solve $6x^5-x^4-43x^3+43x^2+x-6=0.$

18. Find the root between 1 *and* 2 of the equation $x^2-3x+1=0$ correct to 3 places of decimals using Horner's method.

19. Expand $\cos^6\theta$ *and* $\cos^5\theta$ in a series of cosines of multiples of θ.

20. Sum to infinity the series $\cos\alpha+\frac{1}{2}\cos(\alpha+\beta)+\frac{1.3}{2.4}\cos(\alpha+2\beta)+.....$

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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B.Sc.,Mathematics Degree (Semester) Examinations, November -2016
Part – III : Core Subject : First Semester : Paper – II

DIFFERENTIAL CALCULUS

Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. Differential coefficient of x^n is _____.
   a) nx^{n-1} b) nx^{n-2} c) x^{n-1} d) x^n

2. Differential coefficient of cosx is _____.
   a) sinx b) -sinx c) cosx d) -cosx

3. n^{th} differential coefficient of e^{ax} is_____.
   a) e^{ax} b) e^{nax} c) $a^n e^{ax}$ d) ne^{ax}

4. n^{th} differential coefficient of sinx is _____.
   a) cosx b) sinnx c) cosnx d) sin(x+nπ/2)

5. Polar subnormal = _____.
   a) $\frac{dr}{d\theta}$ b) $\frac{d\theta}{dr}$ c) $\frac{dx}{dy}$ d) $\frac{dy}{dx}$

6. Subnormal =_____.

7. Cartesian formula for the radius of curvature is _____.

8. X co-ordinate of centre of curvature is _____?

9. If u = sin(ax+by+cz), $\frac{\partial u}{\partial x}$= _____ .

10. If $u=x^2y+3x$, $\frac{\partial u}{\partial y}$=_____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11.a) Find the differential coefficient of $(x^2+1)(x+2)$

(OR)

b) Find the differential coefficient of $\frac{x^3}{3x-2}$

12.a Find y_n where $y=\frac{3}{(x+1)(2x-1)}$

(OR)

b) If x=sint,y=cospt,prove that $(1-x^2)y_2-xy_1+p^2y=0$

13.a) For the cycloid $x=a(1-\cos\theta), y=a(\theta+\sin\theta)$,find $\frac{ds}{dx}$.

(OR)

b) Find the angle at which the radius vector cuts the curve $\frac{l}{r}=1+e\cos\theta$

14.a) What is the radius of curvature of the curve $x^4+y^4=2$ at the point (1,1)

(OR)

b) Find the co-ordinates of the centre of curvature of the curve xy=2 at the point(2,1)

15. a) If $u=\frac{xy}{x+y}$,show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=u$

(OR)

b. Find $\frac{du}{dt}$ where$u=x^2+y^2+z^2, x=e^t, y=e^t\sin t, z=e^t\cos t$

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Find the differential coefficient of $\frac{(a-x)^2(b-x)^3}{(c-2x)^3}$

17. Find the n^{th} differential coefficient of cosx cos2x cos3x

18. Find the envelope of the family of a straight lines $y+tx=2at+at^3$,the parameter being t

19. Find the radius of curvature of the cardioid $r=a(1-\cos\theta)$

20. If $u=\tan^{-1}(\frac{x^3+y^3}{x-y})$,prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=\sin 2u$

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B.Sc. Mathematics Degree (Semester) Examinations, November 2016
Part – III : Core Subject : Third Semester : Paper – I

DIFFERENTIAL EQUATIONS
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. *If* $Mdx+Ndy=0$ is an exact differential equation then _____.
   a) $\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$ b) $\frac{\partial M}{\partial x}=\frac{\partial N}{\partial y}$ c) $\frac{\partial M}{\partial y}=\frac{\partial M}{\partial x}$ d) None
2. P.I. of $\left(D^2+5D+6\right)y=e^x$ is _____.
   a) $\frac{e^x}{10}$ b) $\frac{e^x}{6}$ c) $\frac{e^x}{12}$ d) $\frac{xe^x}{12}$
3. Solution of $\frac{dx}{x}=\frac{dy}{y}=\frac{dz}{z}$ is _____.
   a) $\phi\left(x-y,y+z\right)=0$ b) $\phi\left(x,y\right)=0$
   c) $\phi\left(x+y,y+z\right)=0$ d) $\phi\left(x-y,y-z\right)=0$
4. Value of $L\left(\cos at\right)$ is _____.
   a) $\frac{s}{s^2+a^2}$ b) $\frac{a}{s^2+a^2}$ c) $\frac{s}{s^2-a^2}$ d) $\frac{a}{s^2-a^2}$
5. Complete integral of $pq=k$ is
   a) $z=ax+b$ b) $z=ax+ky$ c) $z=ax-kb$ d) $z=ax+\left(\frac{k}{a}\right)y+c$
6. Bernoulli's equation is _____.
7. Complementary function of $\left(D^2+1\right)y=\cos x$ is _____.
8. Integrability condition of total differential equation is _____.
9. $L\left(t^n\right)=$ _____.
10. Eliminate a *and* b from $z=\left(x+a\right)\left(y+b\right)$ is _____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11. a) Solve : $\frac{dy}{dx} + y\cos x = \frac{\sin 2x}{2}$.

(OR)

b) Solve : $\left(x^2y - 2xy^2\right)dx - \left(x^3 - 3x^2y\right)dy = 0.$

12. a) Solve : $\left(D^2 + 16\right)y = x\cos x + e^{2x}$.

(OR)

b) Solve : $x^2y_2 + 4xy_1 + 2y = e^x$.

13. a) Solve : $\frac{dx}{-y^2 - z^2} = \frac{dy}{xy} = \frac{dz}{zx}$.

(OR)

b) Solve : $\left(yz + z^2 + y^2\right)dx + \left(zx + x^2 + z^2\right)dy + \left(xy + y^2 + x^2\right)dz = 0.$

14. a) Find : $L^{-1}\left[\log\left(\frac{s+1}{s-1}\right)\right]$.

(OR)

b) Find : $L\left(\frac{1-\cos t}{t}\right)$.

15. a) Solve : $p^2 + q^2 = npq.$

(OR)

b) Solve : $q = xp + p^2$.

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Solve : $\left(x^3 - 3xy^2\right)dx - \left(y^3 - 3x^2y\right)dy = 0.$

17. Solve : $x^2y_2 - xy_1 + y = \frac{\log x \sin\left(\log x\right) + 1}{x}$.

18. Solve : $\frac{d^2y}{dx^2} + n^2y = \sec nx$ by using method of variation of parameters.

19. Solve $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t$ given that $y = \frac{dy}{dt} = 0,$ when $t = 0.$

20. Solve $\left(y+z\right)p + \left(z+x\right)q = \left(x+y\right).$

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B.Sc. Mathematics Degree (Semester) Examinations, November 2016
Part – III : Core Subject : Third Semester : Paper – II

NUMERICAL METHODS
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. The order of convergence of NRM is
   a) 1 b) 2 c) 1.891 d) .096
2. Relation between the operators E *and* Δ is
   a) $E = 1 - \Delta$ b) $\Delta = E - 1$ c) $E = 1 + \Delta$ d) $E = \Delta - 1$
3. The maxima and minima of $f(x)$ can be obtained by equating the first derivative to _____.
   a) 0 b) 1 c) 2 d) ∞
4. The error in the Trapezoidal rule is of order _____.
   a) $\hbar$ b) $\hbar^2$ c) $\hbar^3$ d) $\hbar^4$
5. Modified Euler's method is the $R-K$ method of oerder _____.
   a) 2 b) 3 c) 4 d) None of these
6. Gauss elimination method involves the method of transforming the given system of simultaneous equation to an _____.
7. $\Delta(z^x) =$ _____.
8. Newton's interpdation formula is used only for _____ intervals.
9. The error in simpson's $\left(1/3\right)^{rd}$ rule is of order _____.
10. Euler's formula is _____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11. a) Solve the following equations by Gauss elimination method :

$x+y+z=9;\quad 2x-3y+4z=13;\quad 3x+4y+5z=40.$

(OR)

b) Use Regular falsimethod, to find the root of the equation $3x-\cos x-1=0,$ correct to four decimal places.

12. a) Prove that i) $E=e^{hD}$ ii) $E\nabla=\nabla E=\Delta$

(OR)

b) Find a cubic polynomial for the following data :

x	0	1	2	3
$f(x)$	1	2	1	10

13. a) Find $y'(x),$ given

x	0	1	2	3	4
$y(x)$	1	1	15	40	85

Hence find $y'(x)$ at $x=0.5.$

(OR)

b) Given the values

x	5	7	11	13	17
y	150	392	1452	2366	5202

Find y_9 using Lagrange's interpolation formula.

14. a) Evaluate $\int_0^{\frac{\pi}{2}}\sin x\,dx$ by using simpson's $\left(\frac{1}{3}\right)$ rule *if* $\hbar=\frac{\pi}{12}.$

(OR)

b) Dividing the range into 10 equal parts, find the approximate value of $\int_0^{\pi}\sin x\,dx$ by Trapezoidal rule and simpson's rule.

15. a) Use Euler's method, solve $y'=xy+1$ with $y(0)=2$ find $y(0.1),\ y(0.2)$ *and* $y(0.3).$

(OR)

b) Given $\frac{dy}{dx}=y-x$ with $y(0)=2$ find $y(0.1)$ *and* $y(0.2)$ by using second order Runge – Kutta method.

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Solve the following system of equations.

$27x+6y-z=85;\quad 6x+15y+2z=72;\quad x+y+54z=110$

by Gauss – seidel method.

17. For the following data, find y_{70} by using Newton's interpolation formula :

x :	40	60	80	100	120
y :	250	370	470	540	590

18. Using stirling's formula, find $\left(\frac{dy}{dx}\right)$ at $x=900,$

x :	0	300	600	900	1200	1500	1800
y :	135	149	157	183	201	205	193

19. Evaluate : $\int_0^1\frac{dx}{1+x}$ using i) Trapezoidal rule

ii) Simpson's $\left(\frac{3}{8}\right)^{rd}$ rule iii) Weddle's rule

Take $\hbar=\frac{1}{6}$ for all cases.

20. Using R – K method of order 4, find $y(0.1),\ y(0.2),$ given that $\frac{dy}{dx}=1+xy;\ \ y(0)=2;\ \ \hbar=0.1..$

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20. Ten Competitors in a beauty contest are ranked by three judges in the following order.

I Judge	:	1	2	4	3	7	6	5	8
II Judge	:	3	2	1	5	4	7	6	8
III Judge	:	1	2	3	4	5	7	8	6

Use rank correlation coefficient to discuss which pair of judges have the nearest approach to common tastes in beauty.

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B.Sc.Mathematics Degree (Semester) Examinations,November-2016
Part – III : Core Subject : Fifth Semester : Paper - I

STATISTICS

Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. If F(x) is a distribution function of the random variable X and if a< b then P(a < X ≤ b) = _____.
2. The area under the normal curve is _____.
3 The standard deviation of a sampling distribution of a statistics is known as _____
4. Test of significance for equality of _____ is done by using Snedecor's F – distribution.
5. Spearman's formula for the rank correlation coefficient is_____.
6. E(XY) = _____if X and Y are independent random variable.
   a) E(X) + E(Y) b) E(X) - E(Y)
   c) E(X) . E(Y) d) E(X)
7. If the mean and variance of a binomial distribution is 4 and 8/3, then the mode is _____
   a) 4 b) 3 c) 2 d) 1
8. The moment generating function of chi-square distribution is _____.
   a) $(1-t)^{-8/2}$ b) $(1-2t)^{-8/2}$
   c) $(1-3t)^{-8/2}$ d) None of these
9. The t- test is tested at any level of significance with _____degrees of freedom
   a) n b) n-1 c) n+1 d) n/2
10. If γ = _____the variables are uncorrelated.
    a) 1 b) -1 c) 0 d) None of these

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11.a) Let S be a sample space. Let A $\subseteq$ S then prove that
i) P(A) = 1 - P($\bar{A}$) where $\bar{A}$ is the complement of A
ii) P(ϕ) = 0

(OR)

b) Let X be a random variable with the probability distribution.

x	:	-3	6	9
p(x)	:	1/6	1/2	1/3

Find i) E(X) ii) $E(X^2)$ iii) $E[(2X+1)^2]$

12.a) Derive the recurrence relation of moments of the binomial distribution.

(OR)

b) Obtain the Moment generating function about the origin of the Normal distribution.

13.a) A coin is tossed 144 times and a person gets 80 heads. Can we say that the coin is unbiased one?

(OR)

b) A normal population has a mean of 6.48 and S.D. of 1.5. In a sample of 400 members, mean is 6.75. Is the difference significant?

14.a) Write down the applications of t – distribution.

(OR)

b) A random sample of 10 boys has the following I.Q. 70,120, 110, 101, 88, 83, 95,98,107,100. Do these data support the assumption of a population mean I.Q of 100?

15.a) Calculate the coefficient of correlation for the following data.

X	:	65	66	67	67	68	69	70	72
Y	:	67	68	65	68	72	72	69	71

(OR)

b) The two regression equations are 3x + 2y - 26 = 0 and 6x + y -31 = 0 Find the mean values of x and y and also the correlation coefficient between x and y.

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Find the constant k such that the function.
i) $f(x) = kx^2$, if $0 < x < 3$ & f(x) = 0, elsewhere. is the probability function. Compute $P(1 < X < 2)$
ii) If A and B are independent events then prove that $\bar{A}$ and $\bar{B}$ are also independent events

17. Fit a Poisson distribution to the following data.

X	:	0	1	2	3	4	Total
F	:	123	59	14	3	1	200

18. The following table gives the number of train accidents in a country that occurred during the various days of the week. Find whether the accidents are uniformly distributed over the week.

Days :	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
No. of accidents :	20	18	13	23	26	11	15

19.Two random samples have the following results.

Sample deviation of mean	Size	Sample mean	Sum of equals of
1	10	15	90
2	12	14	108

Test whether the samples come from the same normal population at 5% level of Significance for F- test .
[$F_{0.05}(9,11) = 2.90$ $F_{0.05}(11,9) = 3.10$]

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B.Sc. Mathematics Degree (Semester) Examinations, November 2016
Part – III : Core Subject : Fifth Semester : Paper – II

MODERN ALGEBRA
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. *Let A and B* be two nonempty sets. A relation from A *to* B is a subset of _____.
   a) $A \cup B$ b) $A \cap B$ c) $A - B$ d) $A \times B$
2. The group S_n has _____ elements.
   a) n b) $n!$ c) $\frac{n!}{2}$ d) n_{c_2}
3. In the group $(C^*, .)$ order of i is _____.
   a) 1 b) 2 c) 3 d) 4
4. In the quotient group $\frac{G}{N}$, N is _____.
   a) any proper subgroup of G b) a cyclic subgroup of G
   c) a normal subgroup of G d) a proper abelian subgroup of G
5. Any ordered integral domain is of characteristic _____.
   a) 1 b) 0 c) infinite d) prime
6. The number of binary relations on a set with n elements is _____.
7. In an abelian group $(ab)^2$ = _____.
8. Every group of prime order is _____.
9. The kernel of a homomorphism $f : G \to G'$ is _____.
10. In a ring with identity the identity element is _____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11. a) Show that the union of two equivalence relations need not be an equivalence relation.

(OR)

b) *If* $: A \to B,\ g : B \to C,\ h : C \to D$ are functions then prove that $h \circ (g \circ f) = (h \circ g) \circ f$.

12. a) *If* H *and* K are subgroups of a group G then prove that $H \cap K$ is also a subgroup of G.

(OR)

b) Prove that any cyclic group is abelian.

13. a) *Let* G be a group and a be an element of order n in G. Then prove that $a^m = e$ *iff* n divides m.

(OR)

b) State and prove Lagrange's theorem.

14. a) Prove that any infinite cyclic group G is isomorphic to $(Z, +)$.

(OR)

b) State and prove fundamental theorem of homomorphism.

15. a) *Let* R be a ring with identity. Prove that the set of all units in R is a group under multiplication.

(OR)

b) *Let* R be a commutative ring with identity. Then prove that R is a field *iff* R has no proper ideals.

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Show that $f : R \to (0,1)$ defined by $f(x) = \frac{1}{2}\left[1 + \frac{x}{1+|x|}\right]$ is a bijection.

17. Prove that any permutation can be expressed as a product of disjoint cycles.

18. Prove that a group G has no proper subgroups if it is a cyclic group of prime order.

19. State and prove Cayley's theorem.

20. Prove that Z_n is an integral domain *iff* n is prime.

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B.Sc.,Mathematics Degree (Semester) Examinations, November -2016
Part – III : Core Subject : Fifth Semester : Paper – III

REAL ANALYSIS

Under CBCS – Credit 5

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. A set A is said to be_____ if it is finite or countably infinite.
   a) Countable b) Uncountable c) First d) Second
2. Q^+ is _____.
   a) Countable b) Uncountable
   c) First set d) Second set
3. Int([0,1])= _____.
   a) [0,1] b) (0,1) c) [0,1) d) (0,1]
4. In R with usual metric,any closed interval[a,b] is a _____ set.
   a) Open b) Closed c) Not open d) Not closed
5. R with usual metric is _____.
   a) Open b) Cauchy c) Complete d) Incomplete
6. If a function f is discontinuous at a ,then a is called a point of _____.
7. Any continuous image of a connected set is _____.
8. A subspace of R is connected iff it is an _____?
9. Any compact subset A of a metric space M is_____.
10. Any closed interval [a,b] is a _____ subset of R.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11.a) Prove that in any metric space (M,d) each open ball is an open set.

(OR)

b) Prove that a subset of a countable set is countable

12.a Prove that in any metric space, every closed ball is a closed set.

(OR)

b) Let (M,d) ba a metric space.Let A be a subset of M.Then prove that x is a limit point of A iff each open ball with centre x contains an infinite number of points of A.

13.a) Let (M,d) be a metric space. Then prove that any convergent sequence in M is a Cauchy sequence

(OR)

b) Let (M_1,d_1) and (M_2,d_2) be two metric spaces. Let $a \varepsilon M_1$.Prove that a function $f:M_1 \to M_2$ is continuous at a iff $(x_n) \to a$ implies $f((x_n)) \to f(a)$.

14.a) State and prove intermediate value theorem.

(OR)

b) If A and B are connected subsets of a metric space M and if $A \cap B \neq \varphi$,prove that $A \cup B$ is connected.

15.a) Prove that any compact subset A of a metric space M is bounded.

(OR)

b) Prove that a closed subspace of a compact metric space is compact.

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. State and prove Holder's Inequality.
17. Let M be a metric space and M_1 a subspace of M.Let A_1 be a subset of M_1.Then prove that A_1 is open in M_1 iff there exists an open set A in M such that $A_1 = A \cap M_1$.
18. State and prove Baire's category theorem.
19. Prove that a metric space M is connected iff there does not exist a continuous function f from M onto the discrete metric space {0,1}.
20. State and prove Heine Borel Theorem.

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B.Sc. Mathematics Degree (Semester) Examinations,
November -2016
Part – III : Core Subject : Fifth Semester : Paper - V

STATICS

Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. Newton's third law of motion states that action and reaction are _____ and _____. ?
2. If three parallel forces are in _____ each is proportional to the distance between the other two?
3. If three forces acting on a rigid body are in equilibrium, they must be _____.
4. The coefficient of friction is equal to the _____ of the angle of friction
5. _____ is called the intrinsic equation of the catenary ?
   a) Profit Curve b) Demand Curve
   c) Average Cost Curve d) Marginal Revenue Curve
6. When the bodies tend to approach each other, the force is _____?
   a) Tension b) Attraction
   c) Repulsion d) Opposite
7. When a couple is positive and its moment is _____and produce rotation in the_____.
   a) Positive, Clockwise b) Positive, Anticlockwise
   c) Negative, Clockwise d) Negative, Anticlockwise
8. When G = 0 and R ≠ 0 the given system reduces to _____.
   a) Single force b) Couple
   c) Equilibrium d) Constant

9. The coefficient of friction is μ = _____.

a) F/R b) R/F c) F d) R

10. The relation between x and ψ is _____.

a) y = cosh(x/c) b) x = c log(sec ψ + tan ψ)

c) s = c sinh(x/c) d) x = c log sec ψ

SECTION – B

Answer ALL Questions : (5 × 7 = 35)

11.a) State and prove triangle law of forces.

(OR)

b) State and prove Lami's theorem.

12.a) Find the resultant of two like parallel forces acting on a rigid body.

(OR)

b) State and prove the theorem of resultant of coplanar couples.

13.a) Obtain the equation to the line of action of the resultant?

(OR)

b) A uniform rod, of length a, hangs against a smooth vertical wall being supported by means of a string, of length l, tied to one end of the rod, the other end of the strin being attached to a point in the wall: Show that the rod can rest inclined to the wall at an angle θ given by $\cos^2\theta = \frac{l^2-a^2}{3a^2}$.

14.a) State laws of friction.

(OR)

b) A particle of weight 30 kgs. resting on a rough horizontal plane is just on the point of motion when acted on by horizontal forces of 6 kg weight and 8 kg weight at right angles to each other. Find the coefficient of friction between the particle and the plane and the direction in which the friction acts.

15.a) Derive the Cartesian equation to the catenary.

(OR)

b) The span of a suspension bridge is 100 metres and the sag at the middle of the chain is 10 metres. If the total load on each chain is 750 quintals, find the greatest tension in each chain and tension at the lowest point.

SECTION – C

Answer any THREE Questions : (3 × 10 = 30)

16. ABC is a given triangle. Forces P, Q, R acting along the lines OA, OB, OC are in equilibrium. Prove that

i) P: Q: R = cos(A/2) : cos(B/2) : cos(C/2) if O is the incentre of the triangle.

ii) P: Q: R = a:b:c if O is the ortho centre of the triangle.

17. State and prove the theorem of equilibrium of two couples.

18. If D is any point on the base BC of a triangle ABC such that $\frac{BD}{DC} = \frac{m}{n}$ and ∠ADC = θ, ∠BAD = α, ∠DAC = β then

i) (m + n) cot θ = m cot α – n cot β and

ii) (m + n) cot θ = n cot B – m cot C

19. Discuss the equilibrium of the body on a rough inclined plane under a force parallel to the plane.

20. A uniform chain of length l is to be suspended from two points in the same horizontal line so that either terminal tension is n times that at the lowest point. Show that the span must be. $\frac{1}{\sqrt{n^2-1}}\log(n+\sqrt{n^2-1})$.

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B.Sc. Maths Degree (Semester) Examinations, November 2016
Part – III : Elective Subject : Fifth Semester : Paper – I

LINEAR PROGRAMMING
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. All the constraints in standard form of LPP are expressed in the form of _____, except for the non-negative restrictions.
   a) equations b) "≤" type c) "≥" type d) inequalities
2. In a simplex method, *If* there is one $z_j - c_j < 0$ and all the elements of the corresponding column x_j are less than or equal to zero, then the solution is
   a) optimal b) feasible c) unbounded d) basic
3. For every primal constraint, there is a _____ variable.
   a) primal b) dual c) non negative d) basic
4. In a transportation problem with size $m \times n$, *if* the number of occupied cells _____ $m+n-1$ then there exists degeneracy.
   a) = b) < c) > d) ≥
5. An assignment problem with size $m \times n$ is unbalanced, *if*
   a) $m = n$ b) $m \neq n$ c) $m \leq n$ d) $m \geq n$
6. The common region obtained in graphical methods is called _____.
7. The cost of artificial variable in Big-M Method will be designated by _____ for maximization problem.
8. If the primal or the dual problem has an unbounded objective function value, then the other problem has _____ solution.
9. A necessary and sufficient condition for the existence of feasible solution to the general transportation problem is that _____.
10. For the game with payoff matrix $\begin{pmatrix} 1 & -2 \\ 0 & 2 \end{pmatrix}$, the value of the game is _____.

SECTION – B

Answer ALL Questions : **(5 × 7 = 35)**

11. a) A firm manufactures 3 products *A, B and C*. The profits are Rs.3, Rs.2 and Rs.4 respectively. The firm has 2 machine and below is given the required processing time in minutes for each machine on each product.

Machine	Products A	B	C
G	4	3	5
H	2	2	4

Machines *G and H* have 2,000 and 2,500 machine – minutes respectively. The firm must manufacture 100 A's, 200 B's and 50 C's but not more than 150 A's. Set-up an L.P. problem to maximize profit. Do not solve it.

(OR)

b) Solve by graphical method:

$$Max\ z = 5x_1 + 3x_2$$

subject to constraints $3x_1 + 5x_2 \le 15$

$5x_1 + 2x_2 \le 10$ and

$x_1, x_2 \ge 0.$

12. a) Solve by simplex method :

$$Max\ z = 10x_1 + x_2 + 2x_3$$

subject to constraints $x_1 + x_2 - 2x_3 \le 10$

$4x_1 + x_2 + x_3 \le 20$ and

$x_1, x_2, x_3 \ge 0.$

(OR)

b) Use penalty method to

$$Maximize\ z = 2x_1 + 3x_2$$

subject to constraints $x_1 + 2x_2 \le 4$

$x_1 + x_2 = 3$

$x_1 \ge 0$ *and* $x_2 \ge 0.$

13. a) Use duality to solve the L.P.P.:

$$Maximize\ z = 8x_1 + 6x_2$$

subject to constraints $x_1 - x_2 \le \frac{3}{5}$

$x_1 - x_2 \ge 2$

$x_1 \ge 0$ *and* $x_2 \ge 0.$

(OR)

b) Verify dual of dual primal for the following LPP :

$$Maximize\ f(x) = 2x_1 + 5x_2 + 6x_3$$

subject to constraints $5x_1 + 6x_2 - x_3 \le 3$

$-2x_1 + x_2 + 4x_3 \le 4$

$x_1 - 5x_2 + 3x_3 \le 1$

$-3x_1 - 3x_2 + 7x_3 \le 6$

$x_1, x_2, x_3 \ge 0.$

14. a) Determine initial basic feasible solution to the following TP using North West Corner Method.

		D_1	D_2	D_3	D_4	Supply
Source	S_1	3	7	6	4	5
	S_2	2	4	3	2	2
	S_3	4	3	8	5	3
Demand		3	3	2	2	

(OR)

b) Obtain an initial basic feasible solution to the following TP using Least – Cost method.

		Destination				
		D_1	D_2	D_3	D_4	Capacity
Origin	O_1	3	7	6	4	5
	O_2	2	4	3	2	2
	O_3	4	3	8	5	3
Demand		3	3	2	2	

15. a) Solve the following assignment problem.

		Job			
		I	II	III	IV
Person	A	2	10	9	7
	B	15	4	14	8
	C	13	14	16	11
	D	4	15	13	9

(OR)

b) Solve the following game after reducing it to 2×2 game :

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} B \\ \begin{pmatrix} 1 & 7 & 2 \\ 6 & 2 & 7 \\ 5 & 1 & 6 \end{pmatrix} \end{array}$$

SECTION – C

Answer any THREE Questions : **(3 × 10 = 30)**

16. Solve the following LPP graphically :

$$Min\ z = 20x_1 + 10x_2$$

subject to constraints $x_1 + x_2 \le 40$

$3x_1 + x_2 \ge 30$

$4x_1 + 3x_2 \ge 60$

$x_1, x_2 \ge 0.$

17. Use Two – Phase Simplex Method to

$$Minimize\ z = x_1 + x_2$$

subject to constraints $2x_1 + x_2 \le 4$

$x_1 + 7x_2 \ge 7$

$x_1, x_2 \ge 0.$

18. Apply the principle of duality to solve the following LPP :

$$Min\ z = 2x_1 + 2x_2$$

subject to constraints $2x_1 + 4x_2 \ge 1$

$x_1 + 2x_2 \ge 1$

$2x_1 + x_2 \ge 1$

$x_1, x_2 \ge 0.$

19. Solve the following Transportation Problem

		Ware House				
		W_1	W_2	W_3	W_4	Capacity
Factory	F_1	19	30	50	10	7
	F_2	70	30	40	60	9
	F_3	40	8	70	20	18
Required		5	8	7	14	

20. Solve the following game graphically :

	Player B			
Player A	*B*1	*B*2	*B*3	*B*4
*A*1	1	3	–3	7
*A*2	2	5	4	–6

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B.A. / B.Sc. Degree (Semester) Examinations, November 2016
Part – IV : Non Major Elective Subject : First Semester : Paper – I

FUNDAMENTALS OF MATHEMATICS

Under CBCS – Credit 2

Time: **2** Hours Maximum Marks: **75**

SECTION – A

Answer ALL Questions: **(10 × 1 = 10)**

1. Write the equivalent ratio for $\frac{32}{96}$

   a) $1/2$ b) $1/3$ c) $1/4$ d) $1/5$

2. The slope of the straight line joining the points (x_1, y_1) *and* (x_2, y_2) is

   a) $\frac{y_2 - y_1}{x_2 - x_1}$ b) $\frac{x_2 - x_1}{y_2 - y_1}$ c) $\frac{x_2 - y_2}{x_1 - y_1}$ d) $\frac{x}{y}$

3. Find the diagonal matrix

   a) $\begin{bmatrix} 1 & 2 & -2 \\ 3 & 4 & -1 \\ 5 & 1 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 0 \\ 3 & 2 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$

4. Find the identity matrix

   a) $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

5. In the ratio $3:2 = a:8$ value of a is

   a) 10 b) 8 c) 14 d) 12

6. If the equation of a line is $2x + 4y + 7 = 0,$ the x intercept is

   a) $2/7$ b) $7/20$ c) $4/2$ d) $7/2$

7. 64^x as a power of 2 is _____.

8. The fifth term in the G.P. 3, 6, 12, …… is

   a) 28 b) 25 c) 82 d) 48

9. The 10^{th} term of the A.P. 3, 5, 7, 9 …….. is _____.

10. For the quadratic equation $ax^2 + bx + c = 0.$ the product of the roots is _____.

SECTION – B

Answer ALL Questions: **(4 × 10 = 40)**

11.a) The daily income of A *and* B are in the ratio $2:3$ If the income of each of them increases by Rs.50 per day, the income ratio became $10:17$. Calculate the income of A *and* B.

(OR)

b) Simplify $\sqrt{a\sqrt{a\sqrt{a\sqrt{a}}}}$ for $a = 3^{\frac{16}{15}}$.

12.a) If $A=\begin{bmatrix}1 & 0 & 1\\ 2 & 0 & 1\\ 1 & 2 & 1\end{bmatrix}$, $B=\begin{bmatrix}1 & 0 & 1\\ 0 & -1 & 0\\ 2 & 0 & -1\end{bmatrix}$, $C=\begin{bmatrix}1 & 0 & -1\\ -2 & 0 & 1\\ 1 & 2 & -1\end{bmatrix}$ verify $(AB)C = A(BC)$.

(OR)

b) If $A=\begin{bmatrix}2 & 4\\ 3 & 6\end{bmatrix}$, $B=\begin{bmatrix}2 & -3\\ 1 & 0\end{bmatrix}$ Prove that $(2A+5B)^T = 2A^T + 5B^T$.

13.a) Find the equation of the line passing through the points $(2,-5)$ *and* $(4,6)$.

(OR)

b) If $A(3,7)$ $B(-2,x)$ *and* $C(5,2)$ are co-ordinates of three points and $AB = AC$ find the values of x.

14.a) Find the sum of the series $2+7+12+17+.....+152$.

(OR)

b) Find the 15^{th} term and the sum of the first 10 terms for the sequence $2,10,50,.....$

SECTION – C

Answer Any TWO Questions: **(2 × 12½ = 25)**

15.Three vessels contain mixtures of milk and water in the proportions $3:1$, $4:1$ *and* $5:1$. The contents of the three vessels are mixed in the proportion $x:y:1$. If the resulting mixture contains milk and water in the proportion $7:1$, find y in terms of x.

16. *If* $A=\begin{bmatrix}1 & 5 & 2\\ 3 & -2 & 4\\ 6 & 2 & 1\end{bmatrix}$, find A^{-1}.

17.Show that the points $(8,-10)$, $(7,-3)$ *and* $(0,-4)$ are the vertices of a right angled triangle.

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B.Sc. Mathematics Degree (Semester) Examinations, November 2016
Part – IV : Skill Based Subject : Third Semester : Paper – I

MATHEMATICAL LOGIC

Under CBCS – Credit 2

Time: **2** Hours Maximum Marks: **75**

SECTION – A

Answer ALL Questions: **(10 × 1 = 10)**

1. Write a negation statement for Jens and Lincen's do not like fruits.
2. "7 is an even number" this is a statement. (True / False)
3. Change to symbolic form Ramu and Ramesh go to college.
4. $p \vee (p \wedge q) \Leftrightarrow$ _____.
   a) q b) p c) $7q$ d) $7p$
5. p : I will buy a computer
   q : I will a car write a statement $p \vee q$.
6. Write the truth table for conditional operator.
7. Write the truth table for biconditional operator.
8. Define a tautology.
9. Write the Distributive law.
10. Write the Demorgan's law.

SECTION – B

Answer ALL Questions: **(4 × 10 = 40)**

11. a) Give truth table for $(p \wedge q) \wedge r$. **(OR)**
    b) Give truth table for $(p \to q) \to (7p \vee q)$.
12. a) Check for tautology $p \to (p \vee q)$ **(OR)**
    b) Check for tautology $q \vee (p \wedge 7q) \vee (7p \wedge 7q)$.
13. a) Prove that $(p \to q) \Rightarrow (7q \to 7p)$. **(OR)**
    b) Prove that $(p \to (q \to p)) \Leftrightarrow ((7p) \to (p \to q))$.
14. a) Give truth table for $(p \vee q) \Leftrightarrow 7(7p \wedge 7q)$. **(OR)**
    b) Prove $(p \to q) \Leftrightarrow (7p \wedge q)$.

SECTION – C

Answer Any TWO Questions: **(2 × 12½ = 25)**

15. Prove that i) $7(p \wedge q) \to (7p \vee (7p \vee q)) \Leftrightarrow (7p \vee q)$ ii) $(p \vee q) \wedge (7p \wedge (7p \wedge q)) \Leftrightarrow (7p \wedge q)$
16. Give truth table for $(p \vee q) \vee (r \vee s)$.
17. Draw a logical networks for a) $(a+b).c$ b) $(a.\bar{b})+(\bar{a}.b)$ c) $(a+b)(\bar{a}+\bar{b})$

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B.Sc. Mathematics Degree (Semester) Examinations, November 2016
Part – IV : Skill Based Subject : Fifth Semester : Paper – I

QUANTITATIVE APTITUDE

Under CBCS – Credit 2

Time: **2** Hours Maximum Marks: **75**

SECTION – A

Answer ALL Questions: **(10 × 1 = 10)**

1. A can do a certain job in 12 days B is 60% more efficient than A. How many days does B alone take to do the same job?
   a) $7\frac{1}{2}$ *days* b) $13\frac{1}{3}$ *days* c) $1\frac{3}{4}$ *days* d) $10\frac{1}{4}$ *days*
2. A man can do a piece of work in 5 days but with the help of his son he can do it in 3 days, In what time can the son do it alone?
   a) $6\frac{1}{2}$ *days* b) 7 *days* c) $7\frac{1}{2}$ *days* d) 8 *days*
3. At what rate percent per annum will a sum of money double in 16 years?
   a) 5% *p.a.* b) $6\frac{1}{4}\%$ *p.a.* c) $7\frac{1}{2}\%$ *p.a.* d) 6% *p.a.*
4. If Rs.64 amounts to Rs.83.20 in 2 years, what will Rs.86 amount to in 4 years at the same rate percent per annum?
   a) Rs.114.80 b Rs.124.70 c) Rs.127.40 d) Rs.137.60
5. An athlete runs 200 meter race in 24 seconds. His speed is
   a) $20\,km/hr$ b) $24\,km/hr$ c) $28.5\,km/hr$ d) $30\,km/hr$
6. A train 360 m long is running at a speed of $45\,km/hr$. In what time will it pass a bridge 140 m long?
   a) 40 sec b) 42 sec c) 45 sec d) 48 sec
7. Sachin is younger than Rahul by 4 years. If their ages are in the respective ratio of $7:9$. How old is Sachin?
   a) 16 Years b) 18 Years c) 20 Years d) None of these
8. January 1, 2007 was Monday. What day of the week lies on Jan 1, 2008?
   a) Monday b) Tuesday c) Wednesday d) Sunday
9. At what angle the hands of a clock are inclined at 15 minutes past 5?
   a) $58\frac{1}{2}^{o}$ b) 64^{o} c) $67\frac{1}{2}^{o}$ d) $72\frac{1}{2}^{o}$
10. A 9% stock fields 8%. The market value of the stock is,
    a) Rs.72 b) Rs.92 c) 112.50 d) Rs.116.50

SECTION – B

Answer ALL Questions: **(4 × 10 = 40)**

11. a) i) A and B together can complete a piece of work in 4 days, if A alone can complete the same work in 12 days, in how many days can B alone complete that work?

ii) A can do a certain job in 12 days. B is 60% more efficient than A. How many days does B alone take to do the same job? **(OR)**

b) i) How many minutes does Adithya take to cover a distance of 400m, if he runs at a speed of $20\,^{km}/_{hr}$?

ii) A car is running at a speed of 108 kmph. What distance will it cover in 15 seconds?

12. a) i) A cyclist covers a distance of 750 m in 2 min 30 sec. What is the speed in $^{km}/_{hr}$ of the cyclist?

ii) I walk a certain distance and ride back taking a total time of 37 minutes. I could walk both ways in 55 minutes. How long would it take me to ride both ways?

(OR)

b) i) A train travels at an average of 50 miles per hour for $2\,^{1}/_{2}$ hours and then travels at a speed of 70 miles per hour for $1\,^{1}/_{2}$ hours. How far did the train travel in the entire 4 hours?

ii) A motor car starts with the speed of $70\,^{km}/_{hr}$ with its speed increasing every two hours by 10 kmph In how many hours will it cover 345 kms?

13. a) i) A certain amount earns simple interest of Rs.1750 after 7 years. Had the interest been 2% more, how much more interest would it have earned?

ii) In how many years, Rs.150 will produce the same interest @ 8% as Rs.800 produce in 3 years @ $4\,^{1}/_{2}\%$? **(OR)**

b) i) What annual payment will discharge a debt of Rs.1025 due in 2 years at the rate of 5% compound interest?

ii) What is the difference between the compound interest on Rs.5000 for $1\,^{1}/_{2}$ years at 4% per annum compounded yearly and half – yearly?

14. a) i) The product of the ages of Mohan and Gowtham is 240. If twice the age of Gowtham is more than Mohan's age by 4 years, what is Gowtham's age?

ii) On 8th Feb, 2005 it was Tuesday. What was the day of the week on 8th Feb, 2004?

(OR)

b) i) An accurate clock shows 8 o'clock in the morning Through how many degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

ii) A man buys Rs.25 shares in a company which pays 9% dividend. The money invested is such that it gives 10% on investment. At what price did he buy the shares?

SECTION – C

Answer Any TWO Questions: **(2 × 12½ = 25)**

15. A and B can do a piece of work in 18 days. B and C can do it in 24 days. A and C can do it in 36 days. In how many days will A, B and C finish it, working together and separately?
16. Divide Rs.2379 into 3 parts so that their amounts after 2, 3 and 4 years respectively may be equal, the rate of interest being 5% per annum at simple interest.
17. A man sells Rs.5000, 12% stock at 156 and invests the proceeds partly in 8% stock at 90 and 9% stock at 108. He there by increases his income by Rs.70. How much of the proceeds were invested in each stock?

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