

**(FOR THE CANDIDATES ADMITTED
DURING THE ACADEMIC YEARS
2015 & 2016 ONLY)**

**(NO.OF PAGES: 4)
16UMA3A3 / 15UMA3A3**

REG.NO

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER- 2017

B.SC.- MATHEMATICS (S.F)

MAXIMUM MARKS: 75

III SEMESTER

TIME: 3 HOURS

PART-III

FINANCIAL ACCOUNTING

SECTION – A (10 X 1 = 10 MARKS).

CHOOSE THE CORRECT ANSWER.

1. The amount which the proprietor has invested in the business is called
 - (a) Capital
 - (b) Investment
 - (c) Assets
 - (d) Cash
2. Trading account is prepared to find out
 - (a) Gross profit or loss
 - (b) Net profit or loss
 - (c) Financial position
 - (d) Capital
3. From which account we can get the information of credit sales?
 - (a) Sundry Creditors
 - (b) Sundry Debtors
 - (c) Bills payable
 - (d) Bills receivable
4. Branches not keeping full system of accounting are called
 - (a) Dependent branches
 - (b) Independent branches
 - (c) Simple branches
 - (d) Head office
5. Under which depreciation method the amount of depreciation expenses remains same throughout the useful life of a fixed asset
 - (a) Straight line method
 - (b) Diminishing balance method
 - (c) Depreciation fund method
 - (d) Insurance policy method
6. What is a Trial balance?
7. What do you mean by Current assets ?
8. What is Statement of Affairs?
9. What is Dependent branch?
10. What is Depreciation?

SECTION – B (5 X 4 = 20 MARKS)

ANSWER EITHER 'a' OR 'b' IN EACH OF THE FOLLOWING QUESTIONS.

11. a) Explain any five accounting concepts.

(OR)

- b) How are the accounts classified?

(CONTD.....2)

12. a) Prepare Trading Account for the year ending 31st March 2016 from the following information.

Opening stock Rs. 1,70,000	Purchases return Rs. 10,000
Sales Rs.2,50,000	Wages Rs. 50,000
Sales return Rs. 20,000	Purchases Rs. 1,00,000
Carriage inward Rs. 20,000	Closing stock Rs. 1,60,000

(OR)

- b) Prepare Profit and Loss Account, from the following balances of Mr.Kandan for the year ending 31.12.2016.

Office rent Rs. 30,000	Salaries Rs. 80,000
Printing expenses Rs. 2,000	Stationeries Rs. 3,000
Tax, Insurance Rs. 4,000	Discount allowed Rs. 6,000
Advertisement Rs. 36,000	Travelling expenses Rs. 26,000
Gross Profit Rs.2,50,000	Discount received Rs. 4,000

13. a) Find out profit from the following data:

	Rs.
Capital at the beginning	8,00,000
Drawings	1,80,000
Capital at the end	9,00,000
Capital introduced during the year	50,000

(OR)

- b) From the following information, calculate Total Purchases:

	Rs.
Cash purchases	17,000
Creditors on 1-1-2016	8,000
Cash paid to creditors	31,000
Purchase returns	1,000
Creditors on 31-12-2016	13,400

14. a) Mr. Ram of Cochin has opened a Branch at Madras which sells goods for cash only.

	Rs.
Opening Stock on 1-1-2015	2,00,000
Goods sent to Branch	5,00,000
Cash sent to branch for Rent	2,000
Cash sent to branch for other expenses	1,000
Cash received from Branch	6,00,000
Closing stock on 31-12-2015	1,50,000
Petty cash balance on 31-12-2015	100
Prepare Madras Branch Account.	

(OR)

- b) From the following particulars prepare a Branch account:

	Rs.
Opening stock	15,000
Goods sent to branch	45,000
Sales	60,000

Salaries 5,000

Other expenses 2,000

Closing stock could not be ascertained but it is known that the branch usually sells at cost plus 20%. The branch manager is entitled to a commission of 5% on the profit of the branch before charging such commission.

15. a) On 1 Jan 2011, Company A purchased a vehicle costing Rs.20,000. The company expects the vehicle to be operational for 4 years at the end of which it can be sold for Rs.5,000. Prepare Vehicle account for the year ended 31 Dec 2011, 2012, 2013 and 2014.

(OR)

- b) On 1-1-2013, machinery was purchased for Rs.3,00,000. Depreciation at the rate of 10% has to be written off. Write up the machinery account for three years under Diminishing Balance Method.

SECTION – C (3 X 15 = 45 MARKS)

ANSWER ANY THREE OF THE FOLLOWING QUESTIONS.

16. The following balances were extracted from the ledger of Rahulon 31st March, 2013. You are required to prepare a Trial Balance as on that date in the proper form.

Rs.	Rs.
Salaries 36,320	Purchases 1,44,670
Sales 1,73,500	Sundry Debtors 1,430
Plant & Machinery 34,300	Travelling Expenses 2,630
Commission Paid 1,880	Carriage Inward 240
Stock on 1.4.2012 11,100	Sundry Creditors 14,260
Repairs 1,670	Capital, 1.4.2012 62,500
Sundry Expenses 460	Drawings 3,500
Returns Inward 1,000	Cash at Bank 1,090
Discount Allowed 1,150	Returns Outward 400
Rent and Rates 3,220	Investments 6,000

17. The following information was extracted from the books of M/s. Sudha Ltd. Prepare final accounts on 31.3.2012.

Particulars	Debit Rs.	Particulars	Credit Rs.
Opening stock	12,500	Sales	1,89,000
Depreciation	7,000	Commission	2,000
Carriage inwards	700	Capital	1,71,300
Furniture	8,000	Creditors	17,500
Carriage outwards	500	Bills payable	5,000
Plant & machinery	2,00,000	Return outwards	13,800

Cash	8,900		
Salaries	7,500		
Debtors	19,000		
Discount	1,500		
Bills receivable	17,000		
Wages		16,000	
Sales returns	14,000		
Purchase	86,000		
Total	<u>3,98,600</u>	Total	<u>3,98,600</u>

Closing stock Rs.45,000.

18. Sanjay started a firm on 1st April 2015 with a capital of Rs.10,000. On 1st July 2015 he borrowed from his wife a sum of Rs.4000 at 9% per annum (Interest not yet paid) for business and introduces a further capital of his own amounts to Rs.1500. On 31st March 2016 his position was:
Cash Rs.600, Stock Rs.9400, Debtors Rs.7000, Creditors Rs.6000. Ascertain his profit or loss taking in to account Rs.2000 for his drawings during the year.
19. On January 1, 2015 the goods invoiced by Calcutta Head Office of a trader to its Madras Branch were Rs.48,000 at selling price, being 33 1/3 percent above cost price. For six months ended June 30, 2015, the branch return showed that the sales were Rs.29,000. The goods invoiced at Rs.2,000 were returned by the Branch to the head office. The closing stock at Madras Branch on June 30, 2015 was Rs.16,800 at selling price.
Prepare necessary ledger accounts under Stock and Debtors system.
20. Write short notes on i) Straight line method and ii) Diminishing Balance method.

A6/-

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REG.NO

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PART - III

NUMERICAL METHODS

SECTION – A (10 X 1 =10 MARKS)

ANSWER ALL OF THE FOLLOWING QUESTIONS.

1. The order of convergence in Newton Raphson method is .
a)1 b)2 c)3 d) none of these
2. The first two terms of the interpolation formula will give the
a) linear interpolation b) parabolic interpolation c) elliptic interpolation d) none of these
3. Process of calculating the derivatives of a given function is called numerical
a) difference b) differentiation c) integration d) none of these
4. The process is called mechanical quadrature in numerical integration when we apply to function of
a) three variables b) two variables c) single variable d) none of these
5. . The error in one-step of the modified Euler method is
a) $o(h^3)$ b) $o(h^2)$ c) $o(h)$ d) none of these
6. State any two methods of solving algebraic and transcendental equations.
7. Define the term extrapolation.
8. When can numerical differentiation be used?
9. Why is Simpson's one third rule called a closed formula?
10. Write the formula to find K_2, K_4 in Runge-Kutta method of fourth order.

SECTION – B (5 X 5 =25 MARKS)

ANSWER EITHER (A) OR (B) IN EACH OF THE FOLLOWING QUESTIONS

11. (a) Use the iteration method to find a root of the equation $x = \frac{1}{2} + \sin x$.

(OR)

- (b) Find a real root of the equation $x^3 - 2x - 5 = 0$ by bisection method.

12. (a) The following table gives the corresponding values of x and y. Prepare a forward difference table and express y as a function of x. Also obtain y when x = 2.5.

x	0	1	2	3	4
y	7	10	13	22	43

(OR)

(CONTD.....2)

(b) Find the missing y_x values from the first difference provided.

y_x	0	-	-	-	-	-
Δy_x	0	1	2	4	7	11

13. (a) From the following table, obtain the value of $\frac{d^2 y}{dx^2}$ at the point $x = 0.96$.

x	0.96	0.98	1.00	1.02	1.04
y	0.7825	0.7739	0.7651	0.7563	0.7473

(OR)

(b) The elevation above a datum line of seven points of a road are given below. Find the gradient of the road at the middle point.

X	0	300	600	900	1200	1500	1800
Y	135	149	157	183	201	205	193

14. (a) Using Trapezoidal rule evaluate $\int_0^2 y dx$ from the following table.

X	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
Y	1.23	1.58	2.03	4.32	6.25	8.36	10.23	12.45

(OR)

(b) A river is 80 feet wide. The depth 'd' in feet at a distance 'x' from one bank is given by the following table. Find approximately the area of cross section of the river using Simpson's rule.

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

15. (a) Given $\frac{dy}{dx} + y - x^2 = 0$, $y(0) = 1$, $y(0.1) = 0.9052$, $y(0.2) = 0.8213$ find correct to four decimal places $y(0.3)$ using modified Euler's method .

(OR)

(b) Using improved Euler's method find y at $x = 0.1$ and $x = 0.2$, given

$$\frac{dy}{dx} = y - \frac{2x}{y}, \quad y(0) = 1.$$

SECTION – C (5 X 8 =40 MARKS)

ANSWER EITHER (A) OR (B) IN EACH OF THE FOLLOWING QUESTIONS.

16. (a) Find a root of $xe^x = 3$ using Newton's method and Regula falsi method correct to three decimal places. Compare the results.

(OR)

(b) Evaluate $\sqrt{12}$ to four decimal places by Newton's method.

17. (a) The following table gives the population of a town during the last six census. Estimate the increase in the population during the period 1946 to 1948 using Newton's interpolation formula.

Year	1911	1921	1931	1941	1951	1961
Population (in thousands)	12	13	20	27	39	52

(OR)

- (b) The population of a certain town is shown in the following table. Estimate the population in the year 1936 and 1963.

Year	1921	1931	1941	1951	1961
Population	19.96	39.65	58.81	77.23	94.61

18. (a) A rod is rotating in a plane. The following table gives the angle θ (radians) through which the rod has turned for various values of the time t seconds. Calculate the angular velocity and the angular acceleration of the rod when $t = 0.6$ seconds.

t	0	0.2	0.4	0.6	0.8	1.0
θ	0	0.12	0.49	1.12	2.02	3.20

(OR)

- (b) Find the first and second derivatives of the function $y = f(x)$ tabulated below at the point $x = 1.1$.

x	1.0	1.2	1.4	1.6	1.8	2.0
$f(x)$	0.00	0.1280	0.5440	1.2960	2.4320	4.00

19. (a) When a train is moving at 30 metres per second steam is shut off and breaks are applied. The speed of the train (v) in metres per second after t seconds is given by the following table. Using the Simpson's rule determine the distance moved by the train in 40 seconds.

T	0	5	10	15	20	25	30	35	40
v	30	24	19.5	16	13.6	11.7	10.0	8.5	7.0

(OR)

- (b) Evaluate $\int_{\frac{1}{2}}^1 \frac{1}{x} dx$ by Simpson's one third rule with five ordinates and from the result find $\log 2$ correct to three decimal places.

20. (a) By applying the fourth order Runge-Kutta method find $y(0.2)$ from

$$\frac{dy}{dx} = y - x; y(0) = 2 \text{ taking } h = 0.1.$$

(OR)

- (b) Given $\frac{dy}{dx} = x^3 + \frac{y}{2}$, $y(1) = 2$. Find $y(1.1)$ and $y(1.2)$ using Runge-Kutta method of fourth order.

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PART-III

MATHEMATICAL STATISTICS-I

SECTION-A(10 X 1 = 10 MARKS)

ANSWER ALL QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. If $\text{Var}(X)=1$, then $\text{Var}(2X+3)$ is
a). 5 b). 13 c). 4 d). 0
2. If $t=0$, then $M_X(t) = \underline{\hspace{2cm}}$
a). 0 b). 1 c). -1 d). 2
3. Moment Generating function of the Poisson distribution is
a). $e^{\lambda(e^t-1)}$ b). $e^{\lambda(e^t+1)}$ c). e^λ d). $e^{(e^t-1)}$
4. Mean of the rectangular distribution is
a). $\frac{b-a}{2}$ b). $\frac{b+a}{2}$ c). $b-a$ d). $b+a$
5. The p.d.f. of exponential distribution is $f(x, \theta) = \underline{\hspace{2cm}}, x \geq 0$.
a). $\theta e^{-\theta x}$ b). $\theta e^{\theta x}$ c). $e^{-\theta x}$ d). $e^{\theta x}$

SHORT ANSWERS.

6. Define Covariance.
7. Define moment generating function of a random variable.
8. Define Binomial distribution.
9. Define Normal distribution.
10. Write the M.G.F. of Gamma distribution.

SECTION-B (5 X 5 = 25 MARKS)

ANSWER EITHER 'a' OR 'b' IN EACH OF THE FOLLOWING QUESTIONS.

11. a). State and prove Addition theorem of Expectation.
(OR)
b). Find the expectation of the number on a die when thrown.

(CONTD.....2)

12. a). Find the mean and variance of the cumulants.

(OR)

b). Find the moment generating function of the random variable whose moments are:

$$\mu'_r = (r + 1)! 2^r.$$

13. a). Ten coins are thrown simultaneously. Find the probability of getting at least seven heads.

(OR)

b). If X is a Poisson Variate such that $P(X = 2) = 9P(X = 4) + 90P(X=6)$, then find λ .

14. a). X is a normal variate with mean 30 and S.D. 5. Find the probability that $26 \leq X \leq 40$.

(Given $P(0 \leq Z \leq 0.8) = 0.288$ and $P(0 \leq Z \leq 2) = 0.4772$).

(OR)

b). Find the M.G.F. of Rectangular Distribution.

15. a). Find the mean of Exponential Distribution.

(OR)

b). Define Beta distributions of first and second kind.

SECTION-C (4 X 10=40 MARKS)

ANSWER ANY FOUR QUESTIONS.

(16TH QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM QN. NO: 17 TO 21)

16. Let X be a random variable with the following probability distribution:

x	-3	6	9
P(X = x)	1/6	1/2	1/3

Find $E(X)$ and $E(X^2)$ and using the laws of expectation, evaluate $E(2X + 1)^2$.

17. State and prove Chebychev's inequality.

18. Let the r. v. X assume the value 'r' with the probability law: $P(X = r) = q^{r-1}p$; $r = 1, 2, 3, \dots$

Find the m.g.f. of X and hence its mean and variance.

19. Show that for rectangular distribution: $f(x) = \frac{1}{2a}$, $-a < x < a$, m.g.f. about origin is $\frac{1}{at}(\text{Sinhat})$

20. Find the moment generating function of the Poisson Distribution.

21. X and Y are independent with a common p.d.f. (exponential):

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

Find a p.d.f. for X-Y.

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PART-III

CLASSICAL ALGEBRA

SECTION-A (10 X 1 = 10 MARKS)

ANSWER ALL QUESTIONS:

CHOOSE THE CORRECT ANSWER:

- The value of $\frac{e - e^{-1}}{2} =$
a). $1 + \frac{1}{2!} + \frac{1}{4!} + \dots \infty$ b). $1 - \frac{1}{2!} + \frac{1}{4!} - \dots \infty$
c). $\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + \dots \infty$ d). None
- If the roots of the equation $4x^3 - 24x^2 + 23x + 18 = 0$ are a-d, a, a+d then the value of a is
a). 2 b). 4 c). -2 d). 6
- To remove the fractional coefficients from $x^3 - \frac{1}{4}x^2 + \frac{1}{3}x - 1 = 0$ multiply the roots by
a). 4 b). 3 c). -3 d). 12
- Maximum Number of positive real roots of $x^4 + 3x - 1 = 0$ is
a). 0 b). 1 c). 2 d). 4
- A diagonal matrix in which all the diagonal elements are equal is called a _____
a). Unit matrix b). Symmetric matrix c). Scalar matrix d). Null matrix

SHORT ANSWERS.

- Define logarithmic series.
- If α, β, γ are the roots of the equation $x^3 + px^2 + qx + r = 0$ express the value of $\sum \alpha^2 \beta$ in terms of the coefficients.
- Define Reciprocal equation.
- Write the Descarte's Rule of signs for positive roots.
- Define characteristic roots.

(CONTD.....2)

SECTION-B (5 X 5 = 25 MARKS)

ANSWER EITHER 'a' OR 'b' IN EACH OF THE FOLLOWING QUESTIONS:

11. a). Find the sum to infinity of the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \dots$

(OR)

b). Sum the series $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + \dots$ to ∞ .

12. a). Solve the equation $27x^3 + 42x^2 - 28x - 8 = 0$ whose roots are in geometric progression.

(OR)

b). If $\alpha, \beta, \gamma, \delta$ be the roots of the equation $x^4 + px^3 + qx^2 + rx + s = 0$, then find $\sum \alpha^2$.

13. a). Remove the fractional coefficients from the equation $x^3 + \frac{1}{4}x^2 - \frac{1}{16}x + \frac{1}{72} = 0$.

(OR)

b). Solve the following equation $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$.

14. a). Diminish the roots of $x^4 - 5x^3 + 7x^2 - 4x + 5 = 0$ by 2.

(OR)

b). Increase by 7 the roots of the equation $3x^4 + 7x^3 - 15x^2 + x - 2 = 0$.

15. a). Determine the characteristic roots of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ 2 & -1 & 0 \end{bmatrix}$.

(OR)

b). Determine the characteristic roots of the matrix $\begin{bmatrix} a & h & g \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$.

SECTION-C(4 X 10 = 40 MARKS)

ANSWER ANY FOUR QUESTIONS.

(16TH QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM QN. NO: 17 TO 21)

16. Show that $\log \sqrt{12} = 1 + \left(\frac{1}{2} + \frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4} + \frac{1}{5}\right)\frac{1}{4^2} + \dots$

17. Sum the series $\sum_{n=1}^{\infty} \frac{n^2+3}{n+2} \cdot \frac{x^n}{n!}$

18. Solve the equation $81x^3 - 18x^2 - 36x + 8 = 0$ whose roots are in harmonic progression.

19. Solve the equation $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

20. Determine completely the nature of the roots of the equation $x^5 - 6x^2 - 4x + 5 = 0$.

21. Obtain the characteristic roots and the associate characteristic vectors of the matrix

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

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PART-III

CALCULUS

SECTION-A

(10 X 1 =10 MARKS)

ANSWER THE FOLLOWING QUESTION

MULTIPLE CHOICE QUESTIONS

- Find the complementary function of $(D^2 + 5D + 6)y = e^x$
(a) $Y = Ae^{-2x} + Be^{-3x}$ (b) $y = Ae^{-4x} + Be^{4x}$
(c) $y = (AX+B)e^{-2x}$ (d) $y = A\cos 2x + B\sin 2x$
- Eliminate a and b from $z = (x+a)(y+b)$
(a) $z^2 = p^2q^2$ (b) $z = \frac{p}{q}$
(c) $z = p-q$ (d) $z = pq$
- $\iint_R f(r, \theta) r dr d\theta$ is
(a) $\int_{\alpha}^{\beta} \int_{r=f_1(\theta)}^{r=f_2(\theta)} f(r, \theta) dr d\theta$ (b) $\int_{\alpha}^{\beta} \int_{r=f_1(\theta)}^{r=f_2(\theta)} r dr d\theta$
(c) $\int_{\alpha}^{\beta} \int_{r=f_1(\theta)}^{r=f_2(\theta)} f(r, \theta) r dr d\theta$ (d) $\int_{\alpha}^{\beta} \int_{r=f_1(\theta)}^{r=f_2(\theta)} dr d\theta$
- What is the value of $\int_1^{\infty} \frac{dx}{x^2}$
(a) 1 (b) 0 (c) 2 (d) -2
- Find $L[\cos 4t]$
(a) $\frac{4}{s^2+16}$ (b) $\frac{4}{s^2-16}$ (c) $\frac{s}{s^2+16}$ (d) $\frac{s}{s^2-16}$

SHORT ANSWERS

- Define Linear differential equations with constant coefficients.
- Define elimination of arbitrary constants .
- Define Triple integrals.
- Define Jacobian.
- Define Laplace transforms.

SECTION- B

(5X5=25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

11. (a) Solve $(D^2 - 3D + 2)y = \sin 3x$.

(OR)

- (b) Solve $(D^2 - 4D + 3)y = e^{-x} \sin x$.

(CONTD....2)

12. (a) Obtain a PDE by eliminating a & b from

$$(x - a)^2 + (y - b)^2 + z^2 = a^2 + b^2$$

(OR)

- (b) Solve $q = xp + p^2$

13. (a) Evaluate $\iint xy \, dx \, dy$ taken over the positive quadrant of the circle

$$x^2 + y^2 = a^2$$

(OR)

- (b) Evaluate $\iint (x^2 + y^2) \, dx \, dy$ over the region for which x, y are each ≥ 0 and $x+y \leq 1$.

14. (a) Given that $x+y = u$, $y = uv$, change the variables to u & v in the integral

$$\iint [xy(1 - x - y)]^{1/2} \, dx \, dy$$

taken over the area of the triangle with sides $x=0, y=0, x+y=1$ and evaluate it.

(OR)

- (b) Evaluate $\int_{-\infty}^{\infty} \frac{dx}{4+x^2}$ is convergent.

15. (a) Find $L(\sin^2 2t)$.

(OR)

- (b) Prove that $L(\cos at) = \frac{s}{s^2 + a^2}$.

SECTION-C

(4X10=40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS

(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No:17 to 21)

16. Solve the equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t$ given that $y = \frac{dy}{dt} = 0$, When $t=0$.

17. Solve $3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x$

18. Find the general solution of $(y+z)^p = (z+x)^p = x+y$.

19. Evaluate $\iiint xyz \, dx \, dy \, dz$ taken through the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$.

20. Derive Relation between Beta and Gamma functions.

21. Solve $L^{-1} \left[\frac{s+2}{(s^2+4s+5)^2} \right]$