Code No. 11129

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II – Semester (Suppl.) Examination, November / December 2018

Subject: Water Resources Engineering – I

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

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1 The total rainfall over a catchment is 8 cm in 6 hrs, the losses are 3 cm, what is the effective rainfall intensity? (2M)
2 What is radius of influence in case of a pumping well? (2M)
3 The duty of a crop is 1200 hec/cumec, the area of the crop is 5000 hectares, what is the discharge required in the canal, if time factor is 0.8. (3M)
4 What is meant by available moisture in soil? (3M)
5 What is afflux in case of constructing a weir across a river? (2M)
6 The length of a weir is 30m and flood discharge is 80 m^3/sec, if C =2.2 determine the head over the weir. (3M)
7 What is the necessity of a canal fall in regulation works? (2M)
8 What is the difference between flumed and unflumed fall? (2M)
9 Explain how to calculate afflux, when flow takes place through siphon barrels. (3M)
10 Explain the components of level crossing with a neat sketch. (3M)

PART – B (5x10 = 50 Marks)

11 a) Explain the factors effecting direct runoff. (4M)
b) The area of a catchment is 30 sq.km, the four hour DRO ordinates are given below, determine four hour unit hydrograph ordinates. (6M)

Time (Hrs)	0	4	8	12	16	20	24
DRO (m^3/sec)	0	80	60	30	15	5	0

12 a) Compute the storage capacity of a reservoir for following data.

Crop	Area (Hec)	Duty (Hec/ cumec)
Paddy	7000	1200
Sugarcane	5000	1000
Wheat	2000	400
Groundnut	6000	500

Assume 20% losses in canal and 15% due to seepage. (6M)

b) Design a lined irrigation channel for a discharge of 12 m^3/sec. Assume max. velocity as 2 m/sec with a side slopes of 1.5 H : 1 V, Manning's n = 0.018. (4M)

13 a) Determine the length of horizontal floor if allowable G_E = 1 in 10, Head = 6m, depth of downstream sheet pile is 8m; with the help of Khosla's method for a diversion head work. (6M)
b) Explain briefly hydraulic design of vertical drop weir. (4M)

14 Design a vertical drop fall for a discharge of 20 m^3/sec and a fall of 1.2m, the upstream canal bed level is 100m R.L, and full supply depth is 2m. Assume suitable side slopes. (10M)

15 a) Explain the design procedure of a siphon aqueduct. (6M)

b) With help of neat sketches explain different types of CDWs. (4M)

16. a) Derive Dupuit's equation for steady radial flow into a pumping well in a confines aquifer. (6M)

b) Find the hydraulic conductivity in case of an unconfined aquifer for the following pumping well data. Q = 2000 m^3/day, radii of observation wells are 10m and 18m with drawdowns of 5m and 1.0m respectively. The initial saturated thickness is 40m. (4M)

17 Answer any two of the following: (5x2=10M)

a) Ø - index
b) Bligh's creep theory
c) Canal escape.

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Code No. 11129/O

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II - Semester (Old) Examination, November / December 2018

Subject : Water Resources Engineering & Management - I

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

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (25 Marks)

1 List out various forms of precipitation. 2

2 Compute the slope of channel with a silt factor of 0.9 and discharge of 200 cumecs by Lacey's method. 2

3 Explain the difference between a weir and a barrage. 2

4 List out functions of outlets. 2

5 Define Warabandi's system of irrigation. 2

6 Define runoff and state the process of runoff. 3

7 What is meant by balancing depth in a channel? 3

8 Explain the difference between gravity weir and non-gravity weir. 3

9 Define a canal fall. List out suitable locations for the same. 3

10 Distinguish between single purpose and multi-purpose projects. 3

PART – B (50 Marks)

11 a) Explain different methods of estimating mean rainfall over a basin. 5

b) The observed flows from a storm of 4-hour duration on a stream of area 1200 km^2. Derive and plot 4-hour unit hydrograph assuming constant base flow of 70m^3/sec. 5

Time (days)	1	2	3	4	5	6	7
Flow (m^3/sec)	70	700	730	530	470	380	280
Time (days)	8	9	10	11	12	13	14
Flow (m^3/sec)	220	190	150	140	120	90	70

12 a) Derive the relation between duty and delta. 5

b) Design an irrigation channel in alluvial soil using Lacey's theory to carry a full discharge of 15 cumecs. Assume Lacey's silt factor as 0.9 and side slope as ½ H:1 V. 5

13 a) With the help of neat sketch explain components of diversion head works. 5
b) Explain the method of independent variable in the design of impervious floors. 5

14 a) Explain functions of
(i) A head regulator (ii) A cross regulator. 5
b) Discuss the various requirements of a good outlet. 5

15 a) Explain the requirements and uses of multi-purpose projects. 5
b) Write note on farmer's participation in water management. 5

16 a) Explain the design principles of Trapezoidal notch fall. 5
b) With the help of a neat sketch, explain various components of hydrological cycle. 5

17 Write notes on any **Two** of the following. 10
(a) Factors affecting runoff.
(b) Kennedy's theory of canal design.
(c) Canal falls.

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Code No: 11139

FACULTY OF ENGINEERING

BE 3/4 (EE/Inst.ECE) II-Semester (Suppl.) Examination, November / December 2018

Subject: Managerial Economics and Accountancy

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

Note: Answer all questions from Part-A, & Answer any FIVE Questions from Part-B.

PART- A (25 Marks)

1. Define Managerial Economics. [2]
2. Explain Macro and Micro Economics. [2]
3. What is Cross Elasticity of Demand? [2]
4. Out of Pocket Cost and Book Cost. [2]
5. What is Capital Budgeting? [2]
6. What is Money Measurement Concept? [3]
7. Define Monopoly [3]
8. What is Production Function? [3]
9. Write about Margin of Safety. [3]
10. Write Journal Entries for the following Transactions

    (a) Paid into Bank Rs 2,00,000 (b) Paid travelling charges Rs. 10, 000

    (c) Purchase goods from Narayan Rs.1, 00,000 [3]

PART- B (50 Marks)

11. Explain the basic fundamental principle of Managerial Economics.
12. What is Demand? Explain the factors influencing Demand.
13. Explain the Cost-Output Relationship with Example.
14. Write about Accounting Conventions.
15. Calculate the (a) P/V ratio (b) B.E.P in units and value (c) Margin of safety.

    Sales Rs. 4,00,000, Fixed cost Rs. 60,000, Variable Expenses Rs.2,40,000.

16. From the following particulars, Calculate Net Present Value Cost of Investment

    In Rs. 4, 00,000, Rate of Return 10%. Cash inflow is as follows.

Cash Inflow	Year 1	Year 2	Year 3	Year 4	Year 5
Rs	1,20,000	2,00,000	2,40,000	3,20,000	2,40,000

17. Differentiate Capital Expenditure and Revenue Expenditure.

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Code No. 11149

FACULTY OF ENGINEERING

B.E. 3/4 (M/P) II – Semester (supply) Examination, November / December 2018

Subject: Refrigeration and Air Conditioning

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

Note: Answer all Questions from Part-A, & any Five Questions from Part-B.

PART – A (25 Marks)

1. Define Ton of refrigeration? (2)
2. Distinguish between closed and open air refrigeration system (3)
3. What are advantages of vapour compression refrigeration system? (3)
4. What is the function of flash intercooler? (2)
5. Write the principle of stem jet refrigerator (2)
6. List the merits and demerits of thermo-electric refrigeration system. (3)
7. Explain the term DBT, WBT and RH (3)
8. Define the term by – pass factor (2)
9. Discuss different heat sources to design air conditioning system (3)
10. What factors are considered for selection of air filters (2)

PART-B (50 Marks)

11 In an open cycle air refrigeration machine, air is drawn from a cold chamber at -2OC and 1 bar and compressed to 11 bar. It is then cooled, at this pressure, to the cooler temperature of 20OC and then expanded in expansion cylinder and return to the cold room. The compression and expansion are isentropic and follows the law PV 1.4 = constant. Sketch the p-v & T-s diagrams of the cycle and for refrigerant of 15 tonnes, find: 1 theoretical C.O.P 2.Rate of circulation of air in kg/min. 3. Piston displacement per minute in the compressor and expander; and 4. Theoretical power per tonne of refrigeration. (10)

12 A Vapour compression refrigeration uses R – 22 as refrigerant and liquid evaporates in the evaporator at $-15^{O}C$. The temperature of this refrigerant at the delivery from the compressor is $15^{O}C$ when the vapour is condensed at $10^{O}C$. Determine the C.O.P, if 1. There is no under cooling; and 2. The liquid is cooled by $5^{o}c$ before expansion by throttling.
Take specific heat at constant pressure for the superheated vapour as 0.64 kj/kg – K and that for liquid as 0.94 kj/kg – K.
Take the other properties from refrigeration tables. (10)

13 a) Explain with sketch the working principle pulse tube refrigeration system (5)
b) Explain with neat sketch the working of Electrolux vapour absorption refrigeration system and list the major field applications of this system. (5)

14 Atmospheri air at 35OC and 60% RH is conditioned to 22OCDBT and 55% RH. This is done First is $60m^3$/minute find the following
(i) Mass of water drained, (ii) Capacity of cooling coil and (iii) capacity of heating coil. Take atmospheric pressure = 1.033 bar. (10)

..2

15 The following data refer to a space to be air conditioned:

Inside conditions	=	25^{O}C DBT and 50% RH
Out-door conditions	=	22^{O}C DBT and 70% RH
Room sensible heat gain	=	20kW
Room latent heat gain	=	5kW
By- pass factor for the cooling coil	=	0.1

The return air from the space is mixed with the outside air before entering the cooling coil in the ratio of 4:1 by mass. Determine (a) apparatus dew point temperature: (b) condition of air entering and leaving the coil: (c) dehumidified air quantity: (d) fresh air mass flow and volume flow and volume flow rate: and (e) total refrigeration load on the air conditioning plant. (10)

16 a) Draw and explain cascade refrigeration cycle on T-s and P-h diagrams (5)

b) Explain the importance of Joule- Thomson coefficient and inversion temperature when operating a system for liquefaction of gases (5)

17 a) How the summer air conditioning system is different from winter air conditioning system. Explain wit neat diagram. (5)

b) Discuss about the importance of refrigerants in terms of Ozone depletion and Global warming issues (5)

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Code No: 11156/O

FACULTY OF ENGINEERING

B.E. 3/4 (A.E.) II – Semester (Old) Examination, Nov/Dec 2018

Subject: Finite Element Analysis

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

Note: Answer all questions from Part A and any five questions from Part B

PART – A (10x2.5 = 25Marks)

1. Differentiate elimination approach from penalty- approach.
2. Write the differential Operator for Axial, Trust, beam and in-plane elements.
3. Sketch the Hermite shape functions.
4. Sketch the quadratic shape functions.
5. Sketch the shape functions of 3-noded axisymmetric triangular element.
6. Sketch the shape functions of 4-noded quadrilateral elements.
7. Find the equivalent load vector of triangular element subjected to heat flux on edge jk as shown in fig. 1, take plate thickness = 1, q = 4000w/m^2.

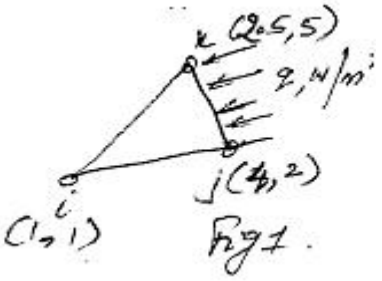

Fig 1.

8. Derive the consistent Mass Matrix for axial element.
9. Find the Capacitance matrix of rod subjected to transient heat loads.
10. What are global, local and natural coordinates?

PART – B (5x10=50 Marks)

11. a) Determine the strain displacement matrix for axial and quadratic element.
    b) Define (i) Potential Energy and
    (ii) Virtual work basis FE formulation.

12.a) For the 2D truss shown in Fig. 2 determine the strain –displacement matrix.

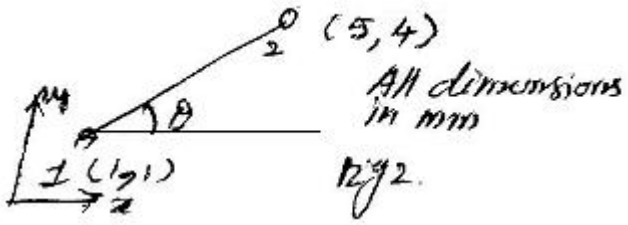

Fig 2.

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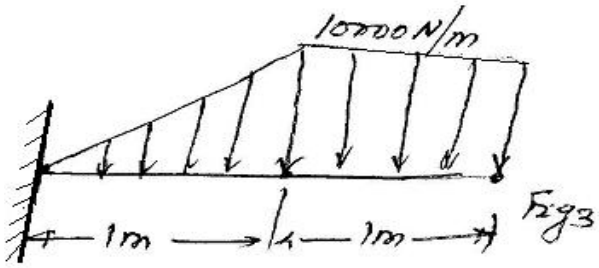
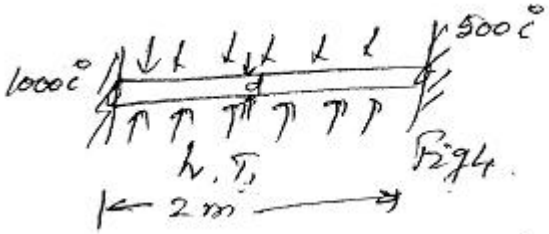
b) Find the equivalent load vector of beam element as shown in fig. 3.



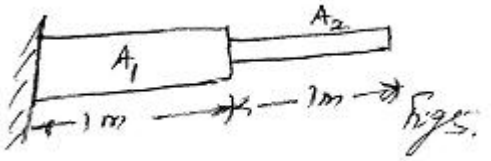
13. a) Derive strain displacement matrix for 3-noded traingular element.
    b) Find the stiffness Matrix of frame element (A line element with 2-nodes, each 3 dof per node)

14. a) Integrate numerically $\int_{-1}^{1}\left(3z^2-6z+10\right)dz$ and compare with Gaussian Quadrature. For n = 1, z = 0.0, $w_1 = 2$ for n = 2, $z_1 = z_2 = \mp 0.577$, $w_1 = w_2 = 1.0$
    b) What are convergence requirement? Explain.

15. Determine the temperature distribution in the fin as shown in fig.4 with two elements if as shown in fig4 with two elements if d = 0,02m, k = 50 w/m^{o}c. h = 200 N/m^{2}co, T~ $= 400^o\ C$



16. For the stepped bar as shown in fing. 5, determine the natural frequencies and modes if E = 200GPa, ρ = 8000 kg/m^3, $A_1 = 10^{-10}$ m^2, $A_2 = 10^{-10}$ m^2



17. a) Galerkin's Approach
    b) 'B' matrix for 2D heat conduction plate elements.
    c) Introduction to 3D problem in stress analysis with FE formulation.

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Code No. 11156

FACULTY OF ENGINEERING

B.E. 3/4 (A.E.) II – Semester (Suppl.) Examination, November / December 2018

Subject : Finite Element Methods

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

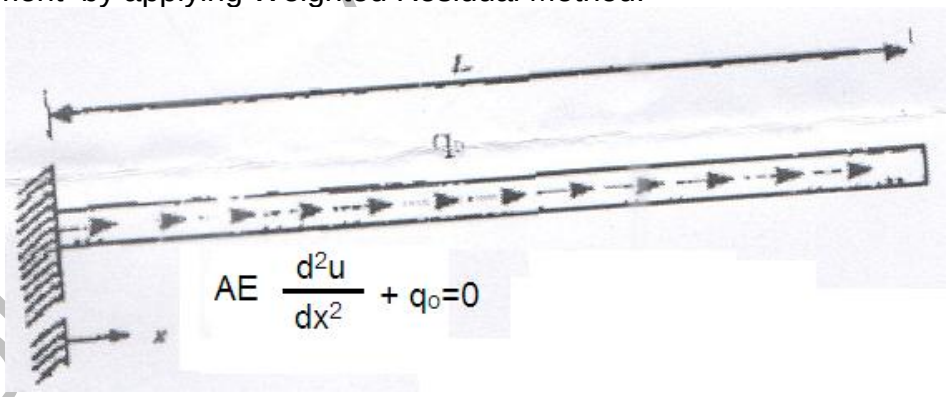
Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Ina plane strain problem σ_{xx}=20MPa, σ_{yy} = 10MPa, E = 80GPa, and ν = 0.3 determine the value of σ_{zz}?
2 Define equilibrium and compatibility conditions.
3 Derive quadratic shape functions for I-D element in global coordinates.
4 Define (a) Virtual displacement (b) potential energy
5 Write the equivalent load vector of a beam subjected to triangular load.
6 What is convergence? Explain.
7 State the governing differential equation for 3-dimensional heat transfer problem with boundary conditions.
8 Express the element stiffness matrix of a truss element.
9 Derive capacitance matrix for rod.
10 List finite element technique software and general steps that followed in software.

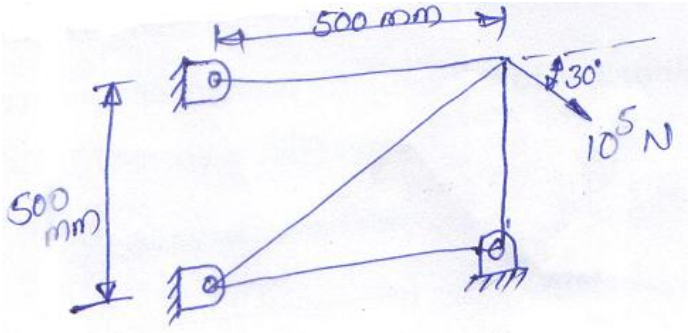
PART – B (50 Marks)

11 A uniform rod subjected to a uniform axial load is illustrated in figure, the deformation of the bar is governed by the differential equation given below. Determine the displacement by applying Weighted Residual Method.



with the boundary conditions $u(0) = 0, \frac{du}{dx}_{x=1} - 0$

12 For the plane truss shown in figure 2. Determine the nodal displacement element stresses and reaction forces if A = 1x 10^{-4} m^2, E= 200GPa.



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13 Consider the bar shown in figure axial force P =- 30KN is applied as shown in figure 3. Determine the nodal displacement, stresses in each element and reaction forces.

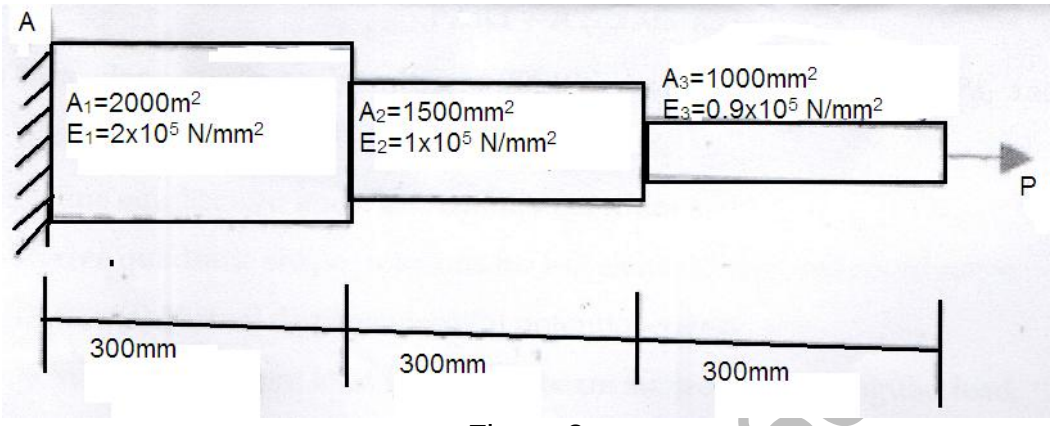


Figure 3

14 13) Derive strain-displacement matrix for
(a) Aix symmetric Triangular element
(b) Constant strain Triangle

15 Derive Jacobean and strain displacement matrix, and load vector for 3-node triangular element shown in figure 4 E = 80 GPa, υ= 0.28, P = 15 KN/m.

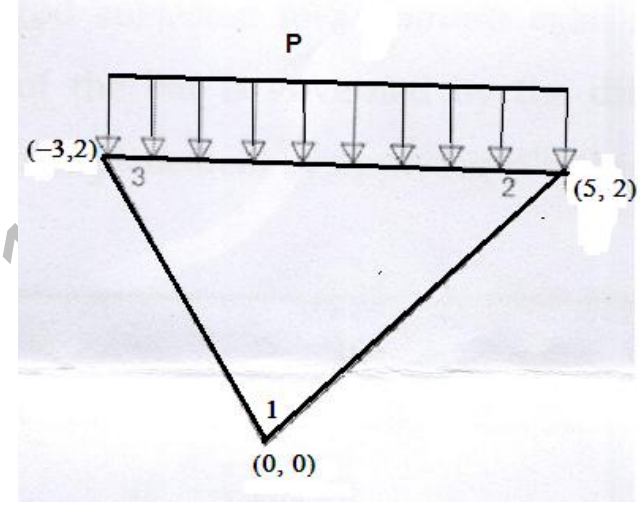
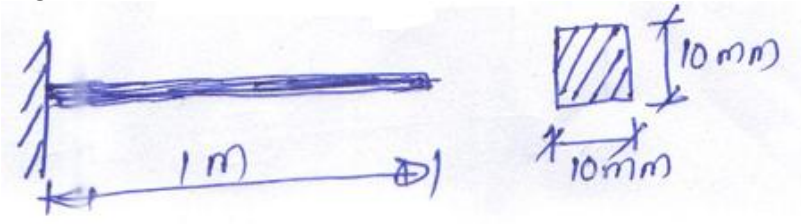


Figure 4

16 For the rod shown in figure 4 subjected to convection and head flux, determine the temperature distribution if thermal conductivity is 50w/cm^{o}c. Determine the Eigen values of and natural frequencies of a system whose stiffness and mass matrices are given below.

17 Determine the natural frequencies of a cantilever beam as shown in figure E = 200GPa, Density = 7800kg/m^3.



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Code No. 11157

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) II – Semester (Suppl.) Examination, Nov. / Dec. 2018

Subject: Web Programming and Services

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

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (25 Marks)

1	What is URI? Give its format.	3
2	List out the different HTTP request methods.	3
3	What is frame? Divide a window into 3 frames with an example.	3
4	What is a web container?	2
5	Write about taglib directive.	2
6	Differentiate between JSP include directive and include action tag.	3
7	What is CLR?	2
8	What is connection pooling? What is its purpose?	2
9	Illustrate deployment descript, with an example.	2
10	What is the purpose of JSP tag extensions?	3

PART – B (5x10 = 50 Marks)

11	a)	How validation and verification is done in java script? Illustrate with suitable example.	6
	b)	Explain DOM events and event handlers.	4
12	a)	What are the major features of servlets? Explain in detail about session management with an example.	5
	b)	Write in detail the steps required to deploy a J2EE application.	5
13	a)	Create a dynamic web page with JSP which illustrates the usage at actions and scripting.	5
	b)	Explain the mechanisms to secure a web application with examples.	5
14	a)	Write short notes on Java Mail API.	5
	b)	Explain in detail different IDBC drivers.	5
15	a)	Briefly discuss about J2EE platform architecture.	4
	b)	Explain in detail about XSLT with an example.	6
16	a)	Explain in detail about ·NET framework.	5
	b)	What is code behind file? Explain different controls in ASP ·Net with examples.	5
17	a)	Explain about Java script data types and control structure. Write a simple program for java script which illustrates control structures.	6
	b)	What is XML? Explain about XSLT style sheets.	4

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Code No. 11165

FACULTY OF ENGINEERING

B.E. 3/4(IT) II-Semester (Suppl.) Examination, November / December 2018

Subject : Artificial Intelligence

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

Note : Answer all questions from Part-A and any Five Questions from part-B

PART – A (25 Marks)

1. State on example to show how an AI technique is effective? (3)

2. Match the following: (2)

a) Donald Hebb	1) Back propagation Learning
b) Alan Turin	2) Update Rule
c) Mc Carthy	3) Chess Program
d) Bryson	4) Named the field as Artificial Intelligence

3. How do you represent the solution to a problem in state-space? Give an example. (3)

4. Define Proof (Deduction) in terms of wffs. (2)

5. Explain how chaining is a special case of Resolution. (3)

6. Explain briefly the following properties of a Logical Reasoning system: a) Soundness b) Completeness c) Tractability (3)

7. How is knowledge base updated in an expert system? (2)

8. What is Clustering? What is the basis for assigning a data point to a cluster? (3)

9. Match the following: (2)

a) Morphological Analysis	1. Extracts Root Word
b) Semantic Analysis	2. Establishes meaning in different contexts
c) Pragmatic Analysis	3. Uses Parse structure to represent meaning
d) Syntactic Analysis	4. Builds Structural Description

10. Give one similarity between Semantic Grammar and Context Free Grammar. (2)

PART – B (50 Marks)

11. a) Heuristic Function estimates the merit of each node and a cost function estimates the cost of moving from initial node to current node. Explain this aspect in A* algorithm. (5)
    b) Analyze the Exhaustive Search in Binary Tree. (5)

12. a) Explain the following statements:
    (a) Inference is the process of deriving new sentences from old ones.
    (b) Sound inference algorithms derive only sentences that are entailed.
    (c) Complete algorithms derive all sentences that are entailed. (5)
    b) What is a Horn Clause? Explain how it is implemented in Prolog. (5)

..2

13. a) Explain the working of an expert system with the help of a detailed block diagram. (5)
    b) How is knowledge extracted and represented in an expert system? Explain. (5)

14. a) What is a Decision Tree? What is the input required to develop a Decision Tree? What is 'Attribute Selection Measure'? (5)
    b) Explain the development of a Decision Tree. (5)

15. a) Explain the evolution of Transition Network (TN), Recursive Transition Network (RTN) , and Augmented Transition Network (ATN). (5)
    b) Sketch an Augmented Transition Network to parse a sentence with a noun phase and present its corresponding parent structure. (5)

16. a) Write applications of AI citing AI techniques used. (5)
    b) Explain one search application based on AI. (5)

17. Present comparative notes on: (3+3+4)
    a) Propositioned Logic and Predicate Logic
    b) Sigmoid Function and Radial Basis Function
    c) Extensible Markup Language (XML) and Web Ontology Language (OWL).

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Code No. 11427/CBCS/S

FACULTY OF ENGINEERING

B.E. (Civil) IV - Semester (CBCS) (Suppl.) Examination, November/December 2018

Subject : Numerical Methods

Time : 3 Hours **Max. Marks: 70**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (20 Marks)

1 Write iterative formula for $\sqrt{N}$ using Newton-Raphson method.

2 Solve by Jacobi's method the following system of equation up to two iteration.
10x + 2y + z = 9, 2x + 20y - 2z = - 44, - 2x +3y + 10z = 22.

3 Write rotation matrix for xy-plane.

4 Construct Newton's divided difference table for following data

X	0	1	2	4	5
f(x)	1	14	15	5	6

5 Evaluate $\int_0^{\pi/2} \sqrt{\cos\theta}\, d\theta$ by trapezoidal rule using four subintervals.

6 Compute $\int_{-1}^{1} \frac{1}{1+x^2}\, dx$ by Gaussian two point formula.

7 Using Picard's approximation method, obtain a solution for y (0.1) up to second approximation of the equation $\frac{dy}{dx} = x + y$ such that y=1 when x=0.

8 Apply Euler's method, solve for y at x=0.4 from $\frac{dy}{dx} = xy^2$, y (0) =0, taking step size 0.1.

9 Solve the equation $y'' = x + y$ with the boundary conditions y(0) = y(1) = 0 using finite difference method.

10 Write finite difference approximation of Laplace equation.

PART- B (50 Marks)

11 a) Find a root of equation x^3-x-11=0 lies between 2 and 3 using bisection method upto six iteration (5)

b) Apply LU decomposition method to solve the system of equations (5)
2x + 3y + z = 9
x + 2y + 3z = 6
3x + y + 2z = 8.

12 a) Find eigen values and eigen vectors of the following symmetric matrix by using Jacobi's method.

$$\begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$$ (5)

b) Calculate value of f (1.85) from given table using Newton's interpolation formula (5)

x	1.7	1.8	1.9	2.0	2.1	2.2	2.3
f(x)	5.474	6.050	6.686	7.389	8.166	9.025	9.974

..2

13 a) From the following table of values of x and y, obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x=1.0. (5)

x	1.0	1.2	1.4	1.6	1.8	2.0
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891

b) A reservoir discharging through sluices at a depth h below the water surface has a surface area A for various values of h as given below.

h in ft	10	11	12	13	14
A in sq. ft	950	1070	1200	1350	1530

If t denotes the time in minutes, the rate of fall of the surface area is given by

$$\frac{dh}{dt} = -\frac{48}{A}\sqrt{A}$$

Estimate the time taken for the water level to fall from 14 ft to 10 ft above the sluices. (5)

14 a) Apply Taylor's method, solve for y at x=0.1 correct upto four decimals from $\frac{dy}{dx} = xy^2$, y (0)=0 (5)

b) Given $\frac{dy}{dx} = x^2(1+y)$ $y(1)=1, y(1.1)=1.233, y(1.2)=1.548, y(1.3)=1.979$, evaluate y(1.4) by Adams-bashforth method. (5)

15 Solve the boundary value problem $y^{iv} + 81y = 729x^2, y(0) = y'(0) = y''(1) = y'''(1) = 0$ use n=3 using finite difference approximation. (10)

16 a) Solve the following system of equation by Gauss elimination method. (5)

2x+y+z=10
3x+2y+3z=18
x+4y+9z=16

b) Using Lagrange's interpolation formula find polynomial. (5)

X	-2	1	0	2
F(x)	3	-3	1	-1

17 a) Evaluate $\int_3^7 x^2 \log x dx$ by taking 8 strips using Simpson's 1/3 rule. (5)

b) Use Milne's predictor-corrector method to obtain the solution of the equation $\frac{dy}{dx} = x - y^2$ at x = 0.8, given that y(0) = 0.0000, y(0.2) = 0.0200, y(0.4) = 0.0795, y(0.6) = 0.1762. (5)

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Code No. 11434 / CBCS / S

FACULTY OF ENGINEERING

B.E. (EE/Inst/M/P/AE) IV – Semester (CBCS) (Suppl.) Examination, Nov / Dec. 2018

Subject: Engineering Mathematics – IV

Time: 3 Hours **Max.Marks: 70**

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (10x2 = 20 Marks)

1 If f(x) = $\begin{cases} x, & 0 < x < 1 \\ 2-x, & 1 < x < 2 \\ 0, & x > 2 \end{cases}$, then find the Fourier cosine transform of f(x)

2 If F{F(x)} = f(s) then evaluate F{F(x) cos ax}.

3 Evaluate $Z\{n^2a^n\}$.

4 Find f_o, f_1 if $Z\{f_n\} = F(z) = \frac{z^2}{z^2+1}$.

5 Find a root of $x^3 + 4x - 9 = 0$ using bisection method.

6 Evaluate $\Delta^2(x^2 + 3x + 4)$ (take h = 1).

7 Using method of least squares find a straight line of the form y = a+bx which fits the following data.

x	-3	-2	1	2	4
y	11	9	3	1	-3

8 If 5x – y – 22 = 0 and 64x – 45y – 24 = 0 are the regression lines of x on y and y on x respectively then find the correlation coefficient.

9 Define uniform distribution and find its mean.

10 Find k such that the function f(x) = $\begin{cases} k(1-x^2), & 0 < x < 1 \\ 0, & otherwise \end{cases}$ is a probability density function of a continuous random variable.

PART – B (5x10 = 50 Marks)

11 a) Find the Fourier transform of $F(x) = e^{-x^2/2}$. 5

b) If $\tilde{f}_s(s) = \frac{s}{1+s^2}$ then find the inverse Fourier sine transform of $\tilde{f}_s(s)$. 5

12 State and prove convolution theorem for Z-transform. Verify the above theorem for $f_n = 2^n$ and $g_n = 3^n$. 10

13 a) Solve the following system of equations using Gauss elimination method
$x_1 + x_2 – x_3 = 2$
$2x_1 + 3x_2 – 5x_3 = 1$
$4x_1 – 5x_2 – 7x_3 = 5$ 5

b) Using divided differences, show that the data 5

x	-3	-2	-1	1	3
f(x)	-40	-15	-6	-12	-10

represents a third degree polynomial. Hence, determine the interpolating polynomial.

14 a) Using the method of least squares, fit a curve $y = a + bx + cx^2$ to the following data 5

x	-2	-1	1	2	4
y	39	20	6	11	45

b) Evaluate Karl Pearson's coefficient of correlation for the following data: 5

x	20	35	42	37	13	39	24
y	32	37	50	30	25	24	40

15 a) An intelligence test conducted on 1000 students. Assume that the marks obtained by the students follows a normal distribution with mean 42 and the standard deviation 24. Then find
i) the number of students exceeding a score of 50
ii) the number of students getting a score between 30 and 54.
($P(0 \le z \le 0.333) = 0.1293$, $P(0 \le z \le 0.5) = 0.1915$). 5

b) The heights of 8 persons participating in an athletic championship are found to be 175 cm, 168 cm, 165 cm, 170 cm, 167 cm, 160 cm, 173 cm and 168 cm. Can we conclude that the average height is greater than 165 cm? Test at 5% level of significance.
(Take t_7 (0.1) = 1.895). 5

16 a) In a bolt factory machines A, B and C manufacture 25%, 35% and 60% of the total output. Of their output, respectively 5%, 4% and 2% are known to be defective. A bolt is drawn at random and found to be defective. Find the probability that it is produced by machine B. 5

b) Evaluate $\left(\frac{dy}{dx}\right)$ at x = 3/2 from the following data: 5

x	1	2	3	4	5
y	-1	4	15	12	55

17 a) Using Z-transform solve the difference equation
$y_{n+2} + 5y_{n+1}+4y_n = 2^n$, $y_o = 1$, $y_1 = -4$. 5

b) If $y' = x(y-x)$, $y(2) = 3$ then evaluate y(2.2) by using Runge-Kutta fourth order method (take h = 0.2). 5

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Code No. 11443 / CBCS

FACULTY OF ENGINEERING

B.E. (ECE) IV - Semester (CBCS) (Suppl.) Examination,
November / December 2018

Subject : Applied Mathematics

Time : 3 Hours **Max. Marks: 70**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (20 Marks)

1 Find 'K' such that the set of vectors. (2)
{(1, 2, 3), (3, 2, 4), (5, 4, K)} is linearly dependent.

2 Is W = {(x, y, z) | (x = y + 1} a subspace of $\mathbf{R}^3(\mathbf{R})$? (2)

3 Evaluate $\Delta(\sin 2x \cos 6x)$. (2)

4 Find an approximate root of the equation $x^5 - 4x + 2 = 0$ using bisection method. (2)

5 If $y' = x^2 - y$, $y(0) = 1$ then find $y(0.3)$ by using Euler's method. (2)

6 Find $\frac{dy}{dx}$ at x = 1 from the following data : (2)

x	0	1	2	3	4
y	2	10	24	44	70

7 Write normal equations to fit a straight line y = a + b x to the data (x_i, y_i) for all $1 \le i \le r$. (2)

8 For two random variables x and y with the same mean, the two regression lines are y = ax + b and x = αy + β then show that $\frac{b}{} = \frac{1-a}{1-\sim}$. (2)

9 Convert the following linear programming problem into standard form (2)

Minimize $Z = -4x_1 - 3x_2 + 7x_3$

Subject to $-5x_1 + 2x_2 \le 3$

$2x_1 + 3x_2 + x_3 \ge -7$

$x_1 \ge 0,\ x_2 \ge 0,\ x_3 \ge 0$ (2)

10 Define slack variable and give an example. (2)

PART – B (50 Marks)

11 (a) Show that the set S = {(1, 0, 0), (1, 1, 0), (1, 1, 1)} is a basis of the vector space $\mathbf{R}^3(\mathbf{R})$. Also express the vector α = (2, 3, 5) as a linear combination of the above basis vectors. (5)

(b) If the linear transformation T : $\mathbf{R}^2 \to \mathbf{R}^3$ is defined by (5)
T (1, 2) = (3, -1, 5), T(0, 1) = (2, 1, -1) then find T(a, b).

12 (a) Solve the following system of equations by using Gauss-Seidel method (perform 3 iterations) (5)

$3x_1 + x_2 + x_3 = 21$

$x_1 + 3x_2 + x_3 = 13$

$x_1 + 3x_2 + x_3 = 11$

$x_1 \ge 0,\ x_2 \ge 0,\ x_3 \ge 0$

(b) Construct the backward difference table and hence the corresponding interpolating polynomial for the data: (5)

x	–3	– 2	–1	0	1
F(x)	17	20	27	32	36

..2

13 If $y' = x^2 + y^2$, $y(0) = 1$ then evaluate $y(0.8)$ by using Milne's predictor – corrector method. (Evaluate $y(0.2)$. $y(0.4)$, $y(0.6)$ by using Taylor series method). (10)

14 (a) Find the rank correlation coefficient for the following data which represents the marks of 10 students in two subjects. (5)

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

(b) Find the equation of regression line of y on x for the following data: (5)

x	3	5	6	4	2
y	2	5	3	8	7

15 Solve the following linear programming problem by using simplex method. (10)

Maximize $Z = 21x_1 + 15x_2$

Subject to $x_1 + 2x_2 \leq 6$

$x_1 + 3x_2 \leq 12$

$x_1 \geq 0,\ x_2 \geq 0$

16 (a) If the linear transformation $T : \mathbf{R}^3 \rightarrow \mathbf{R}^3$ is defined as $T(x, y, z) = (x + y, x - y, z)$ then find the Rank and Nullity of T. (5)

(b) Construct the divided difference table for the following data: (5)

x	– 3	–1	0	2	3
f(x)	– 9	5	3	11	33

Also find the Newton divided difference interpolating polynomials.

17 (a) Using the method of least squares fit a curve of the form $y = a + bx + cx^2$ to the following data (5)

x	– 1	0	1	2	3
y	96	100	122	162	220

(b) Find the correlation coefficient for the following data: (5)

X	18	33	40	52	57
Y	24	27	55	34	67

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Code No. 11457

FACULTY OF ENGINEERING

BE IV-Semester (CSE) (CBCS) (Suppl.) Examination, November / December 2018

Subject : Mathematics & Statistics

Time : 3 Hours **Max. Marks : 70**

Note : Answer all questions from part-A & Any five questions from Part-B

PART- A (10x2 = 20 Marks)

1. Use bisection method to find a root of the equation $x^2 - 5x - 1 = 0$ 2
2. Apply Gauss elimination method to solve
   $x - y + 5z = 5,\ 2x - 3y + z = 0,\ x + 2y + 7z = 11.$ 2
3. Find the Fourier sine transform of $f(t) = \begin{cases} t, & 0 \le t < l \\ 0, & t > l \end{cases}$. 2
4. State convolution theorem for Fourier transforms. 2
5. Find the G.C.D of 2210, 493. 2
6. State Wilson theorem 2
7. A continuous random variable X has pdf $f(x) = \frac{3}{4}(x^2 + 1), 0 \le x \le 1$ then find a such that $P(X \le a) = P(X \ge a)$. 2
8. The continuous random variable X is uniformly distributed with mean and variance 3 then find $P(x < 0)$ 2
9. Derive the normal equations by the method of least squares to fit a straight line of the form y = a+bx . 2
10. If the two regression lines are $8x - 10y + 66 = 0$ and $40x - 18y = 214$ then find the Mean values of x and y. 2

PART- B (5x10 = 50Marks)

11. a) Use Newton's divided difference interpolation formula to find a polynomial for the following data.

X:	-3	-2	-1	1	2	3	5
f(X):	18	12	8	6	8	12	26

Hence evaluate f(0). 5

b) Apply Runge- Kutta's fourth order method to find an approximate value of y for x = 0.2 given that $\frac{dy}{dx} = x + y^2, \quad y(0) = 1$ .. 5

12. a) Find the Fourier transform of $e^{-at^2}, \quad a > 0$. 5

b) Express the function $f(x) = \begin{cases} 1 & for\ |x| \le 1 \\ 0 & for\ |x| > 1 \end{cases}$ as a Fourier integral. Hence

Evaluate $\int_0^\infty \frac{\sin ax \cos ax}{a} dx$. 5

13. a) State and prove Chinese remainder theorem. 5
    b) State and prove Fermat's theorem. 5
14. a) There are three bags: first bag containing 1 white , 2 red, 3 green balls; second bag containing 2 white, 3 red, 1 green balls and third bag containing 3 white, 1 red, 2 green balls. Two balls are drawn from a bag at random and they are found to be one white and one red. Find the probability that the balls so drawn came from the second bag. 5

...2

(b) The nine items of a sample have the values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from assumed mean of 47.5 ? [Table value of $t_{0.05} = 2.31$] 5

15. a) Calculate the co-efficient of correlation and obtain the regression line y on x for the following data. 5

X:	1	2	3	4	5	6	7	8	9
Y:	9	8	10	12	11	13	14	16	15

Also find the value of y when x = 6.2 .

b) Fit a parabola of second degree to the following data. 5

X:	0	1	2	3	4
Y:	1	1.8	1.3	2.5	6.3

16. a) Apply Newton's forward interpolating formula to find .6) 5

X:	1	1.4	1.8	2.2
F(x):	3.49	4.82	5.96	6.5

b) Find the Fourier cosine transform of $f(x) = \begin{cases} x, & for \quad 0 < x < 1 \\ 2 - x & for \quad 1 < x < 2 \\ 0, & for \quad x > 2 \end{cases}$ 5

17. a) In a normal distribution , 31% of the items are under 45 and 8% are over 64. Find the Mean and Standard deviation of the distribution.
[P(0 < z < 0.5) = 0.19, P(0 < z < 1.4) = 0.42]

5

b) The ranking of 10 students in two subjects A and B as follows

A :	3	5	8	4	7	10	2	1	6	9
B :	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient. 5

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Code No. 11463/CBCS

FACULTY OF ENGINEERING

B.E. IV (CBCS) (I.T.) (Suppl.) Examination, November / December 2018

Subject : Signals and Systems

Time : 3 Hours **Max. Marks: 70**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (20 Marks)

1 Define unit impulse, & compute $\int_0^5 \cos(\pi t) . \delta(t-2)\, dt$. 2

2 Find the even & odd components of u(t). 2

3 Explain the effect of Symmetry on coefficients of Fourier series. 2

4 Write the condition for two signals to be orthogonal to each other. 2

5 Find the Fourier Transform of u(t). 2

6 Explain the significance of Region of Convergence of Laplace Transform. 2

7 Sketch the following 2

(a) u(n)

(b) u(n+2) - u(n-3)

8 Define aliasing. 2

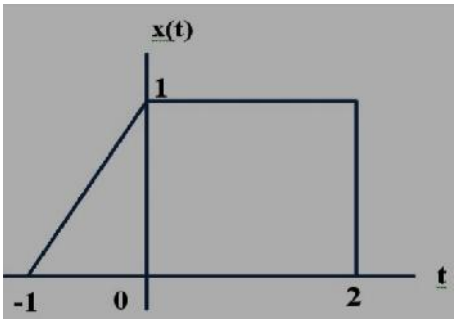
9 Find Z-Transform of n. u(n). 2

10 Give the relationship between Laplace Transform & Z-Transform. 2

PART-B (50 Marks)

11 (a) For the signal x(t) shown in figure. Sketch the following 6

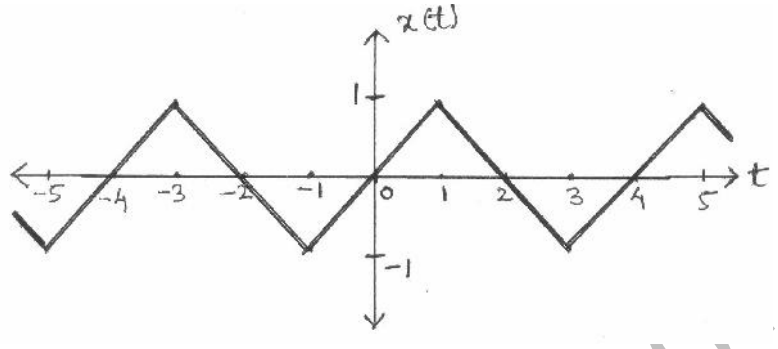
(i) x(t+3)
(ii) x(t/2)
(iii) x(2 – t)
(iv) x(2t-2)



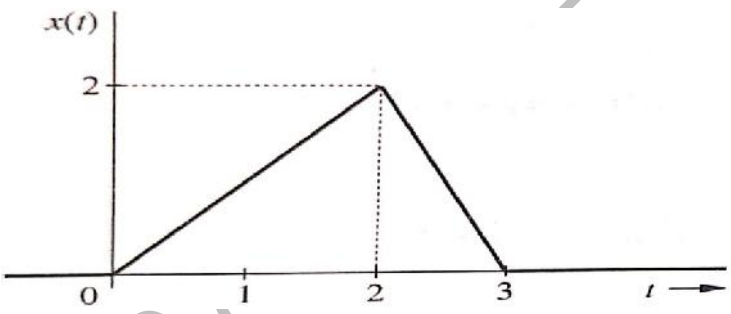
(b) Show that the system given by differential equation

$\frac{d}{dt} y(t) + 2ty(t) = \frac{d}{dt} x(t) - x(t)$ is a Linear & Time varying system. 4

12 Find the Exponential Fourier Series for the periodic signal **x(t)** shown in figure, & sketch its Magnitude & Phase spectra. 10



13 (a) For the signal **x(t)** shown in figure, Find Fourier Transform using time differentiation property. 5



(b) Find the Inverse Laplace Transform of $X(S) = \dfrac{(3S+4)}{(S+1)(S+2)^2}$. 5

14 (a) Determine whether the following discrete time signals are energy signals or power signals. 5

(i) x(n) =n. u(n)

(ii) $x(n) = 3^{-n}$. u(n)

(b) Find the DTFS of $x(n) = \sin\left(\frac{®}{4}n\right)$ 5

15 (a) If Z[x(n)] = X(Z), Prove that $Z[a^n . x(n)] = X(z/a)$. 5

(b) Find the Inverse Z- Transform of $X(Z) = \dfrac{1}{(z-1)(4z-1)}$. 5

16 (a) Show that the product of two even or of two odd signals is an even signal, and the product of an even & odd signal is an odd signal. 5

(b) Show that over an interval ($-\pi < t < \pi$) the best approximation of the signal x(t) = t, in terms of sin(t) is 2 sin(t). Verify that the error signal is orthogonal to sin(t) over the same interval. 5

17 Write Short notes on

(a) Ideal & Practical filters. 4

(b) Nyquist rate of sampling. 3

(c) Properties of DTFT. 3

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