# FACULTY OF ENGINEERING
## B.E. (Civil/EEE/EIE/CSE/CME) IV Semester (Backlog) Examination,
## March / April 2022
## Subject: Finance and Accounting

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

### (Missing data, if any, may be suitably assumed)
### PART – A

**Note: Answer all questions**                             **(10 x 2 = 20 Marks)**

1  Write short note on accounting cycle.
2  Write short note on Petty Cash Book.
3  Differentiate between capital and revenue expenditure.
4  Explain the treatment of the following items (given as adjustment) in final accounts.
   i) Interest on Capital    ii) Bad Debts written off.
5  Write short note about Key players in financial system.
6  What do you mean by money market?
7  Explain about Time value of money.
8  When a project is acceptable under NPV method?
9  Write short note on Financial Statement Analysis.
10 Explain the term Current asset and Current liability.

### PART – B

**Note: Answer any five questions**                          **(5 x 10 = 50 Marks)**

11 Journalize the following transactions in books of Mr.X.

    01/04/2020 Mr. X commenced a business with a capital of Rs,5,00,000/-
    02/05/20 Purchased machinery for Cash Rs. 2,20,000/-
    13/05/20 Loan taken from Hiralal Rs. 55,000/-
    20/06/20 Purchased goods for Rs. 1,00,000/-
    30/07/20 Purchased goods from Ms. Uma for Rs. 75,000/- on credit.
    15/08/20 Cash paid to Ms. Uma Rs.50000/-
    15/08/20 Goods sold to Gupta for Rs. 90,000/- on credit.
    25/09/20 Goods sold for cash Rs. 60,000/-
    30/10/20 Received commission Rs. 3,000/-
    31/10/20 Paid salaries Rs. 10,000/-.

12    From the following Trial balance of Mr. X, prepare final accounts for the year ending 31st March 2020

| Particulars | Amount (Rs) | Particulars | Amount (Rs) |
|---|---|---|---|
| Plant and | 1,00,000 | Sales | 3,50,000 |
| machinery | 50,000 | Purchase returns | 12,000 |
| Goodwill | 25,000 | Discount received | 8,000 |
| Patents | 2,50,000 | Commission Received | 12,000 |
| Purchases | 5,000 | Sundry creditors | 20,000 |
| Sales returns | 4,000 | Bank overdraft | 30,000 |
| Discount Allowed | 15,000 | Capital | 1,00,000 |
| Wages | 8,000 | Bills Payable | 20,000 |
| Insurance | 25,000 | | |
| Sundry debtors | 3,000 | | |
| Bad debts | 3,000 | | |
| Direct Expenses | 26,000 | | |
| Office salaries | 30,000 | | |
| Furnitures | 2,000 | | |
| Rent | 6,000 | | |
| Audit Fee | | | |
| Total | 5,52,000 | Total | 5,52,000 |

Adjustments:
(i) Closing stock on 31-12-2012 was Rs. 90,000/-
(ii) Depreciate plant and machinery @ 10% and furniture @ 15%.
(iii) Make a provision of 5% on sundry debtors for doubt full debts.

13  What are the various financial intermediaries in financial system and explain their role.

14  A project requires an investment of Rs.10,00,000/-. Scrap value of Rs.1,50,000/- at the end of its useful life of 5 years. The profits after tax are estimated to be as follows:

Year        Rs
1        1,00,000
2        2,50,000
3        3,50,000
4        3,00,000
5        2,60,000

Calculate Pay-Back Period and Accounting Rate of Return.

15    The following is the balance sheet of Mr.X Ltd as on 31st April 2020

| Liabilities | Rs | Assets | Rs |
|---|---|---|---|
| Share capital | 11,00,000 | Plant and machinery | 15,00,000 |
| Mortgage loans (Long Term) | 11,50,000 | Sundry Debtors | 6,00,000 |
| Sundry Creditors | 3,00,000 | Stock on hand | 2,00,000 |
| Outstanding expenses | 3,50,000 | Cash at bak | 6,00,000 |
| Total | 29,00,000 | Total | 29,00,000 |

Additional information: Net Sales 10,00,000/- Gross profit Rs. 3,00,000/-
Calculate – a) Current ratio  b) Quick ratio   c) Stock Turnover Ratio
d) Debtors Turnover Ratio   e) Gross Profit Ratio.

16  Ascertain the Cash Balance by preparing Bank Reconciliation Statement from the following particulars of Mr. X.

   a) Bank Balance as per Pass Book Rs.51,000.
   b) Cheques entered in Cash Book Rs.5,500 were not sent to bank for collection.
   c) Insurance premium paid by bank Rs.2,800 is not appearing in Cash Book.
   d) Cheque issued to Nagesh for Rs.2,500 was not presented to bank for payment.
   e) Interest credited by bank in Pass Book only Rs.800.

17 a)  Write short note on Benefit Cost Ratio in Capital budgeting.
   b)  Explain the uses of Ratio Analysis.

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# FACULTY OF ENGINEERING
## B.E. (MECH/PROD/AE) VI Semester (AICTE) (Backlog) Examination, March / April 2022
### Subject: Kinematics of Machinery

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

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions**                          **(10 x 2 = 20 Marks)**

1  Define Kinematics pair?
2  Define Degree of freedom?
3  Classify constrained motions?
4  What is centrode? Define body centrode?
5  What are the different types of instantaneous centres?
6  What is friction axis of link?
7  Classify different types of followers?
8  What is Cam profile?
9  Write the difference between Base circle and Pitch circle?
10 Define Interference? What are the methods to avoid interference?

## PART – B

**Note: Answer any five questions**                     **(5 x 10 = 50 Marks)**

11 a) Explain any two inversions of quadratic cycle chain?
   b) Explain Davis steering gear mechanism?

12 a) In a four bar chain ABCD, AD is fixed and is 150mm long. The crank AB is 40mm long and rotates at 120rpm clock wise, while the link CD=80mm oscillates about D.BC and AD are of equal lengths. Find the angular velocity of link CD when angle BAD = $60^0$.
   b) What is instantaneous centre of rotation? How do you know the number of instantaneous centres in a mechanism?

13 a) A conical pivot bearing 150mm diameter has cone angle $120^0$. The shaft supports axial load 20kn and coefficient of friction is 0.03. The speed of shaft is 200rpm. Find power lost in friction. Assume uniform pressure.
   b) A cone clutch of cone angle $30^0$ is used to transmit 10Kw at 800rpm. The intensity of pressure between contact surfaces is not to exceed 85 kn/$m^2$. The width of the conical surface is half of main radius. Tale coefficient of friction as 0.15. Find dimensions of contact surfaces. Assume uniform wear; also find the axial load required to hold the clutch in transmitting power. What is the width of friction surface?

14 a) A 600mm diameter of the pulley rotating at 1200rpm, the angle of contact of belt over pulley is $190^0$. The co-efficient of friction between pulley and belt is 0.3. The power transmitted is 9KN. Find tensions in the belt?
   b) Distinguish between brakes and dynamometers?

15 A cam is to be designed for a knife edge follower with the following data:
   1. Cam lift=400mm during $90^0$ of cam rotation with simple harmonic motion,
   2. Dwell for the next $30^0$, 3. During the next $60^0$ of cam rotation, the follower returns to its original position with simple harmonic motion and 4. Dwell during the remaining $180^0$ Draw profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. The radius of base circle of cam is 40mm.

16 a) the number of teeth each of the two equal spur gears in mesh are 40. The teeth have
      $20^0$ involute profile and the module is 6mm. If the arc of contact is 1.75 times the circular pitch. Find the addendum.
   b) State law of gearing.

17    In a reverted epi-cyclic gear train as shown in Fig.1, the arm A carries two gears B and C and a compound gear D-E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gear B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm. A makes 100rpm clockwise.
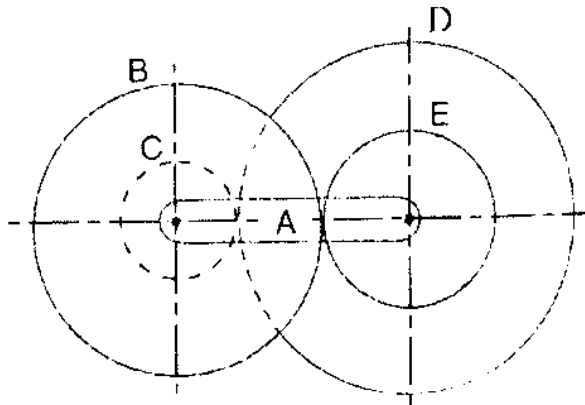


**Fig. 1**

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# FACULTY OF ENGINEERING
## B.E. (IT) IV - Semester (AICTE) (Backlog) Examination, March / April 2022

### Subject: OPERATIONS RESEARCH

Time: 3 Hours                                                                     Max. Marks: 70

(Missing data, if any, may be suitably assumed)

### PART – A

Note: Answer all questions.                                         (10 x 2 = 20 Marks)

1. What is the scope for OR?
2. What is meant by a feasible solution of an LPP?
3. State features of duality in LPP
4. State various steps involved in dual simplex algorithm.
5. What is sensitivity analysis?
6. Explain the method to solve an unbalanced transportation problem.
7. What is game theory? State its application.
8. Describe some important replacement situations.
9. Explain the rules to determine a saddle point.
10. What is no passing rule in sequencing algorithm.

### PART – B

Note: Answer any five questions.                                   (5 x 10 = 50 Marks)

11. (a) List the areas in which operations research techniques can be applied.
    (b) Solve by graphical method.

    Max $Z = 5X_1 + 7X_2$
    STC $X_1 + X_2 \leq 4$
    $3X_1 + 8X_2 \leq 24$
    $10X_1 + 7X_2 \leq 35$
    $X_1, X_2 \geq 0$

12. A company has 4 machines on which to do 3 jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following table.

|      |   | Machines |    |    |    |
|------|---|----|----|----|----|
|      |   | W  | X  | Y  | Z  |
| Jobs | A | 18 | 24 | 28 | 32 |
|      | B | 8  | 13 | 17 | 19 |
|      | C | 10 | 15 | 19 | 22 |

What are the job Assignments which will minimize the cost?

13. Obtain the optimum solution of the following transportation problem after getting a basic feasible solution by VAM.

|   | $D_1$ | $D_2$ | $D_3$ | $D_4$ | Supply |
|---|---|---|---|---|---|
| $S_1$ | 5 | 2 | 4 | 3 | 60 |
| $S_2$ | 6 | 4 | 9 | 5 | 60 |
| $S_3$ | 2 | 3 | 8 | 1 | 90 |
| Demand | 50 | 65 | 65 | 30 | |

14. Solve the Game whose Pay off Matrix to the player A is given in the table.

$$A \quad \begin{bmatrix} 1 & 7 & 2 \\ 6 & 2 & 7 \\ 5 & 2 & 6 \end{bmatrix} \quad \overset{B}{}$$

15. The cost per year of running a vehicle, whose purchase price is Rs.50,000. The Running Cost and Resale value are given below. At what age is the replacement due?

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Running Cost | 5000 | 6000 | 7000 | 9000 | 11500 | 16000 | 18000 |
| Resale Value | 30000 | 15000 | 7500 | 3750 | 2000 | 2000 | 2000 |

16. (a) Write notes on replacement.
    (b) Explain the assumptions made in sequencing problems.

17. Write notes on:
    (a) Genetic algorithm
    (b) Pure strategy and mixed strategy in game theory

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# FACULTY OF ENGINEERING
## BE (Civil) IV Semester (CBCS) (Backlog) Examination, March / April 2022

### Subject:  Strength of Materials - II

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

### (Missing data, if any may be suitably assumed)

### PART – A

**Note**: **Answer all questions**.                                    **(10 x 2 = 20 Marks)**

1. What is conjugate beam? Explain how the deflection of a beam is determined using conjugate beam

2. State Mohr's second theorem for moment area method.

3. Differentiate between proof resilience and modulus of resilience.

4. Define static indeterminacy

5. A circular shaft of 120mm diameter is subjected to a bending moment of 40kN-m and a twisting moment of 30kN. Calculate the principal stresses

6. Explain reciprocal theorem

7. A close coiled helical spring of mean diameter 150mm, diameter of coil 10mm is subjected to an axial load of 500 N. Determine the maximum deflection of the spring, if the number of turns are 10 in the spring

8. A fixed beam AB of 5m span carries a UDL of 4 kN/m over the entire span. Determine the fixed end moments.

9. Deduce an expression for stress due to impact loading

10. List any three assumptions in Euler's theory of columns

### PART - B

**Note: Answer any five questions**.                               **(5 x 10 = 50 Marks)**

11.     A cantilever beam 120mm wide and 240mm deep having a span of 2m is subjected to the loads as shown in fig. Find the deflection at the free end. Take Young's modulus as $2 \times 10^5$ N/mm$^2$. Also draw SFD and BMD
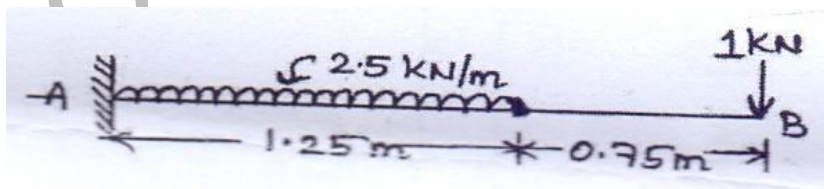


12. A continuous beam ABCD is simply supported at A, B, C & D is loaded as shown in fig. Find the moments over the beam and draw S.F and B.M. diagrams.
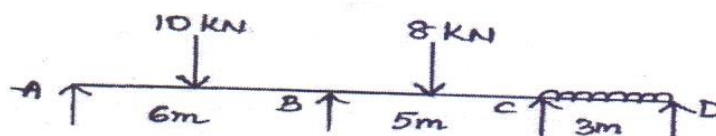


13.a) A cantilever beam of span 3m is provided with a prop at free end and is carrying a UDL of intensity 3KN/m over a length of 2m from the fixed end. Draw SFD & BMD.

b) A fixed beam of length 6m carries two point loads of 30kN each at a distance of 2m from both ends. Determine the fixed end moments and draw the BMD.

14. a) Find the maximum torque that can be safely applied to a shaft of 80mm diameter. The permissible angle of twist is 1.5 degree in length of 5m & shear stress is not to exceed 42MPa. Take Shear modulus = 84 GPa.

b) A closely coiled helical spring made of 10mm diameter steel wire has 15 coils of 100mm mean diameter. The spring is subjected to an axial load of 100N. Calculate the maximum shear stress induced and the deflection of the spring.

15. A hollow C.I. column whose outside diameter is 200mm has a thickness of 20 mm, it is 4.5 meters long and is fixed at both ends. Calculate the safe load by Rankine's formula using a factor of safety of 4. Calculate the slenderness ratio and the ratio of Euler's and Rankine's critical loads. for cast iron take FC = 500 N/mm$^2$ and α = 1/1600 E = 8 x 10$^4$ N/mm$^2$.

16. a) Define the terms static indeterminacy and kinematic indeterminacy by taking suitable examples.

b) Calculate the strain energy in a bar 3m long & 40mm in diameter when it is subjected to a tensile load of 100kN, if the load is applied (i) Gradually (ii) Suddenly.

17. a) Derive the Euler's Equation for the buckling load of slender column whose both ends are fixed.

b) Determine Euler's crippling load for column shown in figure. Length is 5m and both ends are fixed. Take young modulus as 2.1x10$^5$ N/mm$^2$.



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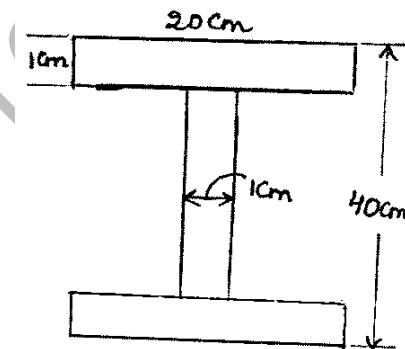
# FACULTY OF ENGINEERING
### B.E. (EEE/EIE) IV - Semester (CBCS) (Backlog) Examination, March / April 2022

### SUBJECT: Power Electronics

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

### (Missing data, if any may be suitably assumed)

## PART – A

**Note**: **Answer all questions**.                          **(10 x 2 = 20 Marks)**

1. Define depletion layer

2. Compare power BJT with power MOSFET

3. Draw the Symbol and structure of UJT.

4. Derive average load voltage and average load current of single-phase full wave rectifier with R load.

5. Draw output voltage and current waveforms of a single-phase half wave-controlled rectifier with RL load.

6. Define phase angle control.

7. Differentiate between Linear voltage regulator and switched mode regulators.

8. Write the complete classification of convertors.

9. What are the two gating schemes in a 3-phase inverter?

10. What is the advantage of multilevel inverter over normal inverter?

## PART - B

**Note: Answer any five questions**.                          **(5 x 10 = 50 Marks)**

11 Derive the relation between forward current gain and current gain of BJT and explain how it operates like a switch

12. a) Explain the working of UJT firing circuit with neat diagram
    b) Explain resistance firing of SCR.

13. With neat waveforms and circuit diagram explain the operation of full wave-controlled rectifier with freewheeling diode.

14. a) Derive the output voltage of Buck-Boost Chopper. Draw the circuit diagram.
    b) A step-down DC chopper has resistive load of R = 15Ω and input voltage $V_{DC}$ = 200 volts. The ON state voltage drop of the chopper is 2.5 Volts, chopping frequency is 1 KHz. If duty cycle is 50% find  (i) Average output voltage  (ii) RMS output voltage  (iii) Chopper efficiency.

15. Explain the 120 degrees mode operation of 3 phase bridge inverter with neat diagrams.

16. A 3 phase fully controlled bridge rectifier is supplied at 230 volts per phase and at a frequency of 50 Hz. The source inductance Ls = 5 mH and the load current on the dc side is constant at 12 amps. If the load consists of dc source voltage of 230 Volts having an internal resistance of 2Ω. Find (i) Firing angle 'α'  (ii) Overlap angle 'β'.

17. Write a short note on the following (i) Multilevel inverters   (ii) Class E Chopper.

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# FACULTY OF ENGINEERING
### B.E. (ECE) IV - Semester (CBCS) (Backlog) Examination, March / April 2022

**Subject: Analog Electronic Circuits**

Time: 3 Hours                                                          Max. Marks: 70

**(Missing data, if any, may be suitably assumed)**

**PART – A**

Note: Answer all questions.                                    (10 x 2 = 20 Marks)

1   Draw the high frequency $\pi$ model of BJT, indicate typical values of components.
2   Voltage gain of a single stage amplifier is 20, and it has a bandwidth of 10 KHz. Three such stages are cascaded. Find the overall voltage gain and bandwidth.
3   The open loop voltage gain of an amplifier is 1000, it has lower cutoff frequency of 100Hz and upper cut off frequency of 100KHz, if the feedback factor is 0.2, calculate the closed loop voltage gain, lower and upper cutoff frequencies with feedback.
4   Discuss the effect of negative feedback upon frequency distortion.
5   Why LC oscillators cannot be used at low frequencies.
6   For a Hartley oscillator, calculate the frequency of oscillation if
    $L_1 = 100 \mu$ H, $L_2 = 200 \mu$ H, C = 1 K pf.
7   What is Cross Over distortion, explain how it can be eliminated?
8   Define Harmonic distortion.
9   Explain Uni-laterization technique used in tuned amplifiers.
10  State and explain briefly Barkhausen's criterion for oscillations.

**PART – B**

Note: Answer any five questions.                              (5 x 10 = 50 Marks)

11  Draw the circuit diagram of a single stage of RC coupled BJT amplifier, Derive the equations for its voltage gain in the mid frequency region, low frequency region and high frequency region, also obtain its frequency response.

12  (a) Draw the block diagram of a Voltage Series negative feedback amplifier, determine
        the effect of negative feedback upon amplifier's input and output resistance.
    (b) Prove that Negative feedback reduces the gain of the amplifier.

13  Draw the circuit diagram of R-C phase shift oscillator using BJT, briefly explain the principle of operation and derive the equation for the frequency of oscillation and condition of oscillation, obtain minimum value of $h_{fe}$.

14  Draw the circuit diagram of Class – B Push pull power amplifier, explain its operation with wave forms, show that 2$^{nd}$ harmonic distortion gets cancelled, also prove that

    (a) Maximum efficiency, $\eta = \dfrac{\pi}{4} = 78.5\%$ .

    (b) Power Dissipation, $P_{DMAX} = \dfrac{4}{\pi^2} P_{ACMAX}$ .

15  Draw the circuit diagram of a single tuned direct coupled amplifier, derive the expression for its gain at resonance and bandwidth.

16 (a) Draw the circuit diagram of colpitts oscillator using BJT, briefly explain the principle of operation and derive the equation for the frequency of oscillation and condition of oscillation.

(b) Draw single stage current series feedback amplifier if $R_S$ = 100KΩ, RC = 5KΩ, RE = 1 KΩ, $h_{ie}$ = 1.1 KΩ, $h_{fe}$ = 50, calculate A, $A_F$, $R_I$, $R_{IF}$, $R_O$, $R_{OF}$, $R'_O, R'_{OF}$.

17 Explain the following:
   (a) Neutralization in Rf Amplifier
   (b) Transistorized Shunt Voltage regulator
   (c) Complementary symmetry power amplifier.

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# FACULTY OF ENGINEERING
**B.E. (MECH/PROD) IV - Semester (CBCS) (Backlog) Examination,**
**March / April 2022**
**Subject: Electrical Circuits and Machines**

**Time: 3 Hours**                                                          **Max. Marks: 70**
**(Missing data, if any, may be suitably assumed)**
**PART – A**

**Note: Answer all questions.**                                    **(10 x 2 = 20 Marks)**

1  Define Kirchhoff's laws.
2  Define RMS value of current.
3  Derive EMF equation of transformer.
4  Write the expression of reactive and active power.
5  Classify different types of DC generators.
6  Draw the speed torque characteristic of DC series motor.
7  A 3 phase, 60 Hz induction motor has 2 poles. If the slip is 3% at a certain load, determine synchronous speed and speed of rotor.
8  Compare 3 phase squirrel cage and slip ring induction motor.
9  Define voltage regulation in Alternator.
10 Why single phase induction motor is not self starting?

**PART – B**

**Note: Answer any five questions.**                              **(5 x 10 = 50 Marks)**

11 (a) A voltage of 125V at 60 Hz is applied across a non – inductive resistor connected in series    with a capacitor. The current is 2.2A. If the capacitive reactive power is 256.5 VAR, calculate the resistance, capacitance, power factor and the power delivered to the circuit. Neglect the losses in the capacitor.
   (b) State and explain Norton's Theorem.

12 (a) Explain OC and SC test of single phase transformer.
   (b) A balanced 3 phase star connected load of 100 KW, line voltage and line current are 11KV and 100A respectively. Find the circuit constants per phase for lagging pf load.

13 (a) Explain 3 point starter of DC motor with neat schematic diagram.
   (b) A 200V, 4 Pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is $0.5\,\Omega$ and that of the shunt field winding is $200\,\Omega$. The motor takes 21A and flux/pole is 30mWb. Find speed and gross torque developed in the motor.

14 (a) With a neat diagram explain the principle of operation of star-delta starter for a 3phase induction motor.
   (b) Explain the working principle of a 3phase induction motor.

15 (a) Derive the emf equation of Synchronous Generator.
   (b) Explain principal of operation of capacitor start motor.

16 (a) Obtain the relationship between line and phase voltage and currents in three phase balanced delta connected system.
   (b) Derive the condition for which the efficiency of a transformer is maximum.

17 (a) Derive the torque equation of DC motor with usual notations.
   (b) Derive the expression for energy stored in inductor.

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# FACULTY OF ENGINEEERING
## B.E. (AE) IV - Semester (CBCS) (Backlog) Examination, March / April 2022

### Subject: Automotive Petrol Engines

Time: 3 Hours                                                            Max. Marks: 70

**(Missing data, if any, may be suitably assumed)**

### PART – A

**Note: Answer all questions**                                    **(10 x 2 = 20 Marks)**

1) Define the following:
   a) Compression ratio        b) Octane number.
2) Why petrol engine volumetric efficiency is less compare to Diesel Engine?
3) Why choke is applied in cold conditions?
4) Differentiate between constant choke and constant Vacuum Carburetors.
5) Draw MPFI and list out the parts.
6) Differentiate between Cold Spark plug and Hot spark plug
7) How Knocking occurs in petrol engine?
8) Why cooling system is required in petrol engine?
9) What are the factors controlling the combustion chamber design?
10) What are the important qualities of lubricating oil?

### PART – B

**Note: Answer any five questions**                              **(5 x 10 = 50 Marks)**

11) a) Derive an expression for the efficiency of Otto cycle and comment on the effect of compression ratio on the efficiency with respect to ratio of specific heats by means of suitable graph.
    b) What is the use of air-standard cycle analysis?

12 a) A gas engine working on the Otto cycle has a cylinder of diameter 200mm and stroke 250mm.the clearance volume is 1570cc.find the air-standard efficiency. Assume $c_p$=1.004 kj/kg k and $c_v$=0.717 kj/kg k for air.
   b) Mention various assumptions made in air-standard cycle analysis.

13) a) With a suitable sketch explain the starting circuit of a Solex carburetor.
    b) Explain why a rich mixture is required for the following:
        (i) idling         (ii) Maximum power         (iii) sudden acceleration.

14) a) Explain centrifugal advance system with a neat sketch.
    b) Briefly discuss the various factors which effect the ignition timing.

15) a) Explain briefly the various types combustion chambers used in SI engines.
    b) What is meant by abnormal combustion and its effect on combustion process?

16)   Explain the following with neat sketch:
      (i) MPFI System      (ii) EFI System      (iii) Electronically controlled injection system

17) a) Explain the following :
        (i) Thermo syphon cooling system   (ii) Forced circulation cooling system.
    b) What are the limitations of air cooling system?

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# FACULTY OF ENGINEERING
### B.E. (CSE) IV-Semester (CBCS) (Backlog) Examination, March/April 2022

**Subject: Signals and System Analysis**

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

### (Missing data, if any, may be suitably assumed)

## PART – A

**Note: Answer all questions.**                             **(10x2 = 20 Marks)**

1    Determine the power and rms value of the signal x(t) = u(t).

2    Show the signals $x(t) = \{-1, \text{ for } 0 < t < 2, \; y(t) = \{1, \text{ for } 1 < t < 3$

                 $\{1, \text{ for } 2 < t < 4$            $\{-1, \text{ for } 3 < t < 4$

     are orthogonal over an interval [0, 4].

3    State and prove the following properties of Fourier Transform.
     (i) Duality Property      (ii) Modulation Property.

4    Find Fourier transform of single sided exponential signal.

5    Define signal bandwidth and system bandwidth.

6    What is an LTI System? Derive an expression for the transfer function of an LTI system.

7    Obtain the relation between convolution and correlation.

8    Write the properties of convolution.

9    Obtain the Z-transform and its associated ROC for the sequence X(n) = $a^{-n}$ u(-n).

10    Find the Z-transform of unit impulse.

## PART – B

**Note: Answer any five questions.**                 **(5 x 10 = 50 Marks)**

11    A rectangular function defined by

$$f(t) = 1 \,;\, 0 < t < \pi$$
$$= -1 \,;\, \pi < t < 2\pi$$

     Approximate the above function by a single sinusoid sin t, evaluate mean square error in this approximation. Also show what happens when more number of sinusoids are used for approximation.

12    (a) Derive Fourier Transform from Fourier series.

         (b)     Find Fourier Transform of x(t) shown in figure below
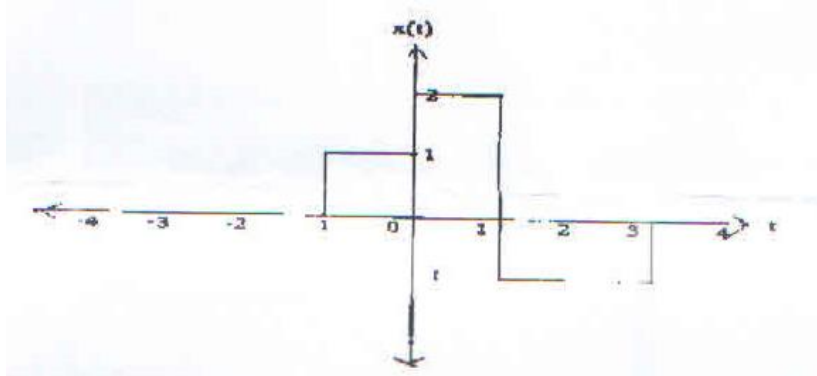
13 (a) Find the exponential fourier series of the periodic pulse train shown in figure
below.
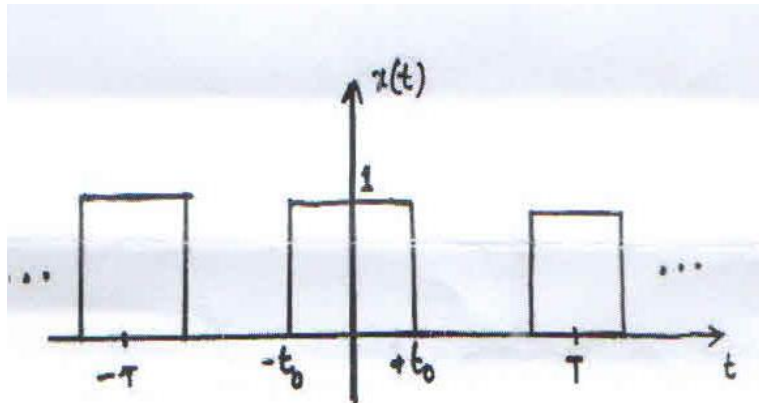


(b)    Show that system y(t) = x(t) + x(t-2) is linear time invariant system.

14 (a) State and prove time convolution theorem and frequency convolution theorem.
(b) Find the convolution of x1(t) = $e^{-at}$ u(t), x2(t)=$e^{-bt}$u(t) using Fourier transform.

15 (a) State and prove any three properties of Hilbert transform.
(b) Compare between Laplace, Fourier and Z-transform.

16 (a) Explain about orthogonality in complex functions.
(b) Find the Fourier Transform of rectangular pulse using time differentiation
property.

17 Write notes on:
(a) Detection of periodic signals in the pressure of noise by autocorrelation.
(b) Causality, physical realizability of a system and Paley-Wiener criterion.

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# FACULTY OF ENGINEERING
## B.E. (IT) IV - Semester (CBCS) (Backlog) Examination, March / April 2022

### Subject: Computer Organization and Microprocessor

Time: 3 Hours          Max. Marks: 70

**(Missing data, if any, may be suitably assumed)**

### PART – A

**Note: Answer all questions.**      (10 x 2 = 20 Marks)

1. Define multiprocessor and multicomputer.
2. Define memory mapped I/O.
3. What is average memory access time?
4. What is the difference between SRAM & DRAM?
5. Distinguish between direct addressing mode and indirect addressing mode.
6. List the major components of 8251A programmable communication interface.
7. Write the functions of DMA controller.
8. Write the control word format in the BSR mode.
9. Write the usage of stacks.
10. Write in brief the memory performance considerations.

### PART – B

**Note: Answer any five questions.**      (5 x 10 = 50 Marks)

11. Explain in detail with example the data transfer and logical instructions of 8085 instruction set.

12. (a) Describe the DMA Controller.
    (b) What is Bus Arbitration and explain its types?

13. Write in detail about 8255 in I/O mode.

14. (a) Write short notes on Buses of a Computer System.
    (b) Write short notes on secondary storage.

15. (a) Explain the functional units of computer system.
    (b) What are the advantages and disadvantages of RS-232 series protocols?

16. Discuss internal Architecture of 8085 with neat diagram.

17. Write in detail about 8279 display controller.

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# FACULTY OF ENGINEERING

**B.E. II / IV (Civil) II Semester (NON-CBCS) (Backlog) Examination, March / April 2022**

### Subject: Strength of Materials – II

Time: 3 hours                                                                          Max. Marks: 75

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions.**                                                      **(25 Marks)**

1  List the various methods for computing deflection beams.
2  State and explain Mohr's theorem under moment area method.
3  What is a propped cantilever beam?
4  A fixed beam 6m long is carrying a point load of 50KN at its center. Determine the fixed end moments. Take $I = 90 \times 10^6 mm^4$ and E = 200 GPa.
5  Define PROOF RESILIENC.
6  Distinguish between a statically determinate and a statically indeterminate structure with a suitable example.
7  What are the limitations of Euler's theories?
8  A leaf spring is made of 9 steel plates, 40mm wide and 5mm thick. If the bending stress is limited to $90 N/mm^2$. Find the length of the spring.
9  What is Tension coefficient?
10 A tensile load of 50kN is suddenly applied to a circular bar of 30mm diameter and 6m long. Determine the strain energy absorbed by the rod. E = 200GPa.

## PART – B

**Note: Answer any five questions.**                                                 **(5 x 10 = 50 Marks)**

11 An overhanging beam ABC is shown in figure1. Determine the deflection at free end 'C' and maximum deflection between A and B in terms of EI. Use Macaulay's method.
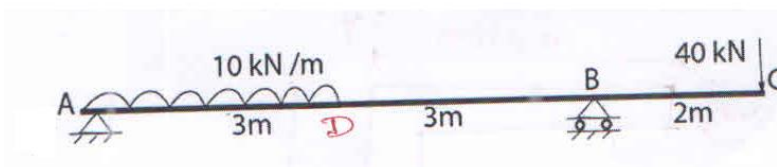


Figure 1

12 A fixed beam of span 6m carries a UDL of 20kN/m for the left half of the span and a point load of 50kN at 1m from the right end. Sketch the shear force and bending moment diagrams showing the salient points.

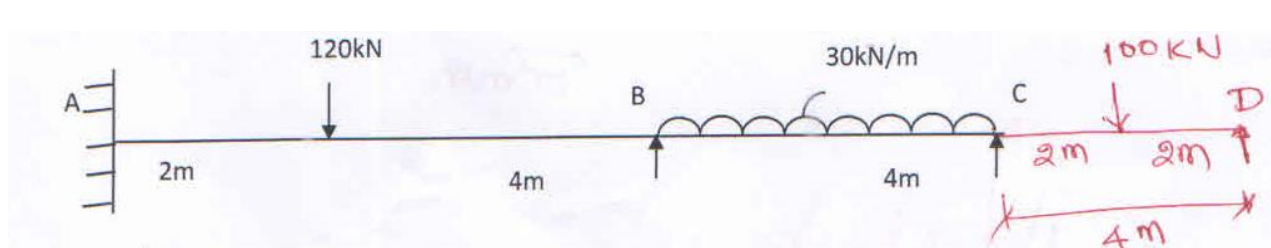13 Draw the SFD and BMD for the continuous beam shown in the figure 2 given below.



Figure 2

14 For the angle section shown in figure 3 below determine.
   (a)     Product of inertia with respect to the indicated z axis and y axis.
   (b)     Product of Inertia with respect to centroidal axis parallel to indicated z axis and y axis.
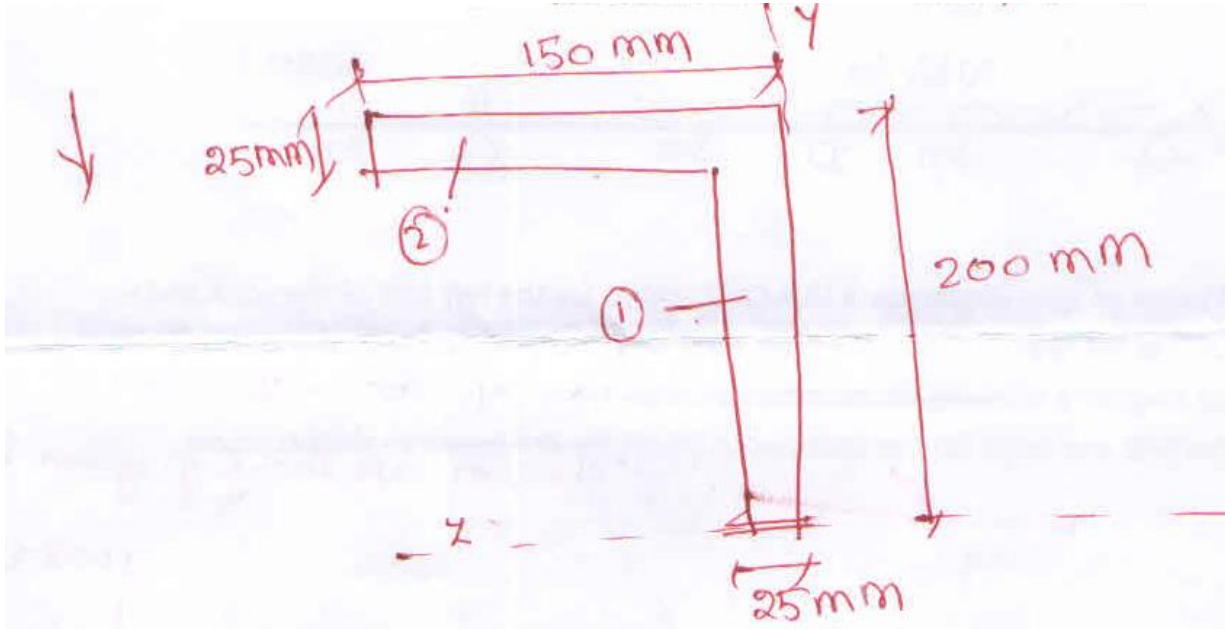


Figure 3

15 An unknown weight falls through a height of 10mm on a collar rigidly attached to the lower end of a vertical bar 500cm long and 600mm$^2$ in section. If the maximum extension of the rod is to be 2mm, what is the corresponding stress and magnitude of the unknown weight? Take E = 200GPa.

16 A long column of length 4m is build up at both the ends. The cross section of the column is of an I section with 300mm x 20mm flanges and 12mm x 320mm web. Determine the Euler's critical load for the column. Take E = 200 GPa. Compare this with Rankine's formula. Take fc = 550MPa and Rankine's constant as 1/1600.

17 (a) Deduce the expression for calculating the deflection of a leaf spring under axial load?
   (b) An open coiled helical spring made out of 6mm diameter steel rod, has 9 complete turns at a mean diameter of 100mm. The angle of helix being 15°. Compute deflection under the load, maximum intensities of direct and shear stresses induced in the section of the wire.

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# FACULTY OF ENGINEERING

**B.E. II / IV (EEE) II – Semester (NON-CBCS) (Backlog) Examination, March / April 2022**

**Subject: Electrical Circuits - II**

Time: 3 Hours                                                                            Max. Marks: 75

**(Missing data, if any, may be suitably assumed)**

**PART – A**

Note: Answer all questions.                                                     **(25 Marks)**

1. What is the Transient Current response of RC series circuit with impulse input voltage? Assume circuit is initially relaxed.
2. An exponential voltage V(t) = $16e^{-4t}$ volts is applied to series RC circuit with R = 1Ω and C=0.4F. Find the response i(t) assuming initial charge to be zero.
3. Determine the Laplace transform of $t^2\sin5t\ u(t)$.
4. Write the properties of Laplace Transform.
5. When a network is said to be symmetrical and reciprocal with respect to transmission parameters?
6. If $Z_{11}$ = 2 ohms , $Z_{12}$ = 1ohms, $Z_{21}$ = 1 ohms and $Z_{22}$ = 3 ohms. Determine admittance matrix.
7. Write expression of Fourier transform of a periodic signal.
8. Explain bandwidth concept.
9. What is network synthesis?
10. Verify whether the given polynomial is Hurwitz or not.
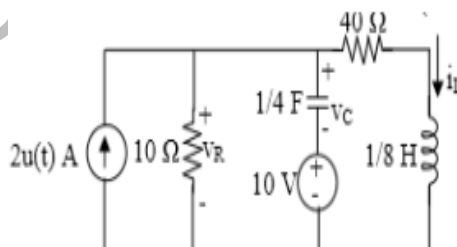    $F(s) = s^6 + 3s^5 + 8s^4 + 18s^3 + 37s^2 + 75s + 50$

**PART – B**

Note: Answer any five questions.                                          **(5 x 10 = 50 Marks)**

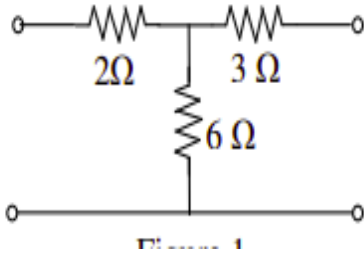11. For the circuit shown below, calculate (i) $i_L(0^+), V_c(0^+), V_R(0^+)$

    (ii) $i_L(\infty), V_c(\infty), V_R(\infty)$.
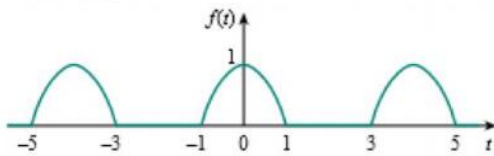


12. Test whether F(S)=(S+8)(S+2)/(S+4)(S+6) is positive real function.

..2

13. Find the hybrid parameters of the network shown below



14. Determine the Fourier series of half wave rectified cosine function shown below.



15. (a) Determine the inverse laplace transform of $\dfrac{2s+1}{(s+1)(s^2+2s+2)}$

   (b) Explain the concept of pole and zero in transfer function.

16. Synthesize the network function $F(s) = s\,(s^2+4)\,/\,2(s^2+1)(s^2+3)$ using Foster forms.

17. (a) Find the Fourier transform of the function represented in below figure
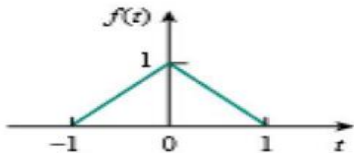


   (b) Explain the concepts of parallel and cascade connection of two port networks.

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# FACULTY OF ENGINEERING
### B.E.II / IV (EIE) II – Semester (NON-CBCS) (Backlog) Examination, March / April 2022

### Subject: Transducer Engineering

Time: 3 hours                                                           Max. Marks: 75

### (Missing data, if any, may be suitably assumed)
### PART – A

**Note: Answer all questions.**                                        **(25 Marks)**

1. Identify the difference between Accuracy & Precision.
2. Give the governing equation for the dynamic response of a measurement system.
3. What do you mean by active & passive transducer? Explain.
4. What is meant by hygrometer? State its principle with respect to capacitive pickup?
5. Explain the operation of RTD?
6. List out the various pressure transducers with their advantages and disadvantages.
7. Mention atleast four applications of strain gauges.
8. What are the standards adopted for the calibration of temperature?
9. Compare flat & corrugated diaphragms.
10. What is the operating principle of inductive transducer?

### PART – B

**Note: Answer any five questions.**                                   **(5 x 10 = 50 Marks)**

11. a) Draw the block diagram of measurement system and explain in detail each block?
    b) Obtain the response of a zero order system to a unit ramp input with relevant figures.

12. a) Describe the constructional details of potentiometer and derive the expression for error during the loading effect.
    b) List out the applications of potentiometer.

13. Explain the construction & operating principle of LVDT with relevant sketches and also discuss the advantages and disadvantages.

14. a) Explain thermocouple laws.
    b) Explain how a thermocouple can be used for the measurement of temperature.

15. a) List out the various elasticity elements for pressure measurement.
    b) Explain a strain gauge pressure transducer with the associated measurement circuit.

16. a) Explain the various static characteristics of measuring system?
    b) Discuss the special features and applications of semi-conductor strain gauge.

17. Write short notes on;
    a) Pyrometers
    b) Dead weight gauges
    c) Capacitive proximity

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# FACULTY OF ENGINEERING
## B.E. II / IV (ECE) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022

### Subject: Probability Theory and Stochastic Process

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

### (Missing data, if any, may be suitably assumed)
### PART – A

**Note: Answer all questions.**                                                 **(25 Marks)**

1. State the fundamental Axioms of probability.
2. If the probability density function is defined as $f(x) = Ax^4$ in $0 < x < 2$, 0 elsewhere Find the value of A.
3. What is exponential random variable?
4. When 2 dice are rolled simultaneously, find the probability for the sum on the two faces will be 3 or 12.
5. Define moment generating function of a random variable.
6. The pdf of continuous random variable X is given as $f(x) = 8/x^2$ find its mean.
7. What do you mean by an ergodic process?
8. A pair of dice is rolled .find the probability of an event A is defined as
   A ={ sum of two dice =12}.
9. Define Autocorrelation function of a random process and state its properties.
10. State the central limit theorem.

### PART – B

**Note: Answer any five questions.**                                   **(5 x 10 = 50 Marks)**

11 (a) In a factory machines X, Y and Z manufacture 10%, 40%, 50% of the total their output 5%, 3% and 2% are defective. A bolt is draw at random and found to be defective. What is the probability that it is manufacture by machines X,Y and Z?
  (b) State and prove total probability Theorem.

12 (a) State probability distribution function and its properties.
  (b) Determine the real constant 'a' for arbitrary real constants m and b > 0, such that
   $f(x) = a\,e^{-|x-m|/b}$ is a valid density function.

13 (a) Define random variable. Write any three different random variable with the density and distribution function.
  (b) If X is a Gaussian random variable with zero mean and variance $\sigma^2$. Find the pdf of Y= I x I.

14 (a) The joint pdf of x and y is given by $f(x,y) = 8xy$ where $0 \le x \le 1$, $0 \le y \le 1$
   (i) Marginal function of X and Y     (ii) Is x and y are independent?
  (b) State conditional distribution probability.

15 let x and y be random variable having joint density function $f(x,y) = 2-x-y$ where $0 \le x \le 1$, $0 \le y \le 1$. Find var(x), var(y), cov(x,y) and coefficient of correlation.

16 (a) Consider a random process x(t) =A sin(wt+φ ) where A and φ are statistical independent
and φ is uniform in the interval of (0,2π). Is the process WSS or not?
(b) What is stationary random process?

17 Write short notes on any two:
(a) Characteristic function and its properties
(b) Cross correlation and its properties.
(c) Markov process.

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# FACULTY OF ENGINEERING
## B.E. II / IV (MECH/PROD/AE/CSE) II Semester (NON-CBCS) (Backlog) Examination, March / April 2022
### Subject: Mathematics - IV

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

**(Missing data, if any, may be suitably assumed)**
### PART – A

**Note: Answer all questions.**          **(25 Marks)**

1. Show that the function $f(z) = \bar{z}$ is not analytic at any point.

2. Evaluate $\oint_c e^z \, dz$, where C is $|z| = 1$.

3. Find the zeros and singularities of $f(z) = \dfrac{z^2-1}{(z+2)(Z-4)}$.

4. Obtain the fixed points of the transformation $w = \dfrac{z-1}{z+1}$

5. Find $z\left\{\dfrac{1}{n!}\right\}$

6. Let $Z\{f_n\} = \dfrac{3z^3+5z^2-7z+1}{(z-1)(z+2)^2}$ Then find $\lim\limits_{n\to\infty} f_n$.

7. Find the Fourier sine transform of $f(x) = e^{-x}$.

8. If $F\{f(x)\} = F(s)$, Prove that $F\{f(ax)\} = \dfrac{1}{a}F\left(\dfrac{s}{a}\right), a \neq 0$.

9. Derive Newton-Raphson iterative formula to find $N^{1/2}$ $N > 0$.

10. State Newton's forward and backward interpolation formulae.

### PART – B
**Note: Answer any five questions.**          **(5 x 10 = 50 Marks)**

11. (a) Construct the analytic function $f(z) = u(x,y) + i\,v(x,y)$ if $u(x,y) = e^x \cos y$.

    (b) State and prove Cauchy's integral theorem.

12. (a) Find the Laurent series of $f(z) = \dfrac{\sin z}{(z-\pi)^3}$ about $z = \pi$ and hence find the

    residue of the function $f(z)$ at $z = \pi$.

    (b) Find the bilinear transformation which maps the points

$$z = 0, 1, \infty \text{ onto the points } w = -i, 1, i.$$

13. (a) Find the Z transform of the sequence $\{\cosh n\theta\}$.

    (b) Use convolution theorem, find $Z^{-1}\left\{\dfrac{Z^2}{(z-1)(z-2)}\right\}$

..2

14. Find the fourier transform of $f(x) = \begin{cases} 1 - x^2, & |x| \leq 1 \\ 0 & |x| > 1 \end{cases}$.

Hence evaluate $\int\limits_0^\infty \dfrac{x\cos x - \sin x}{3}\cos\left(\dfrac{x}{2}\right)dx$.

15. From the following table, find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ at $x = 0.96$

| $x$: | 0.96 | 0.98 | 1.00 | 1.02 | 1.04 |
|------|------|------|------|------|------|
| $y$: | 0.7825 | 0.7739 | 0.7651 | 0.7563 | 0.7473 |

16. (a) Apply Cauchy's integral formula to evaluate.

$\int\limits_c \dfrac{2z-1}{(z-1)(z-2)}dz$, Where $C$ is $|z| = \dfrac{5}{2}$

(b) Evaluate $\int\limits_0^\infty \dfrac{dx}{x^2 + 1}$ using residue theorem.

17. (a) Solve $y_{n+2} - 3y_{n+1} + 2y_n = 0, y_0 = 0, y_1 = 1$ using Z transforms.

(b) Using Euler's method, find y (0.2) for the initial value problem

$y' = x + y + xy, y(0) = 1$ with $h = 0.1$.

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# FACULTY OF ENGINEERING

### B.E. II / IV (IT) II Semester (NON-CBCS) (Backlog) Examination, March / April 2022

## Subject: Probability and Random Process

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

### (Missing data, if any, may be suitably assumed)
## PART – A

**Note: Answer all questions.**                                          **(25 Marks)**

1   If two events A and B are independent, prove that their complementary events are also independent.
2   Define conditional probability
3   Write the properties of cumulative distribution function.
4   Define $n^{th}$ order moment, central moment and generalized moment of a random variable X.
5   Determine the density of Z=X+Y
6   Write the expressions for f(x/y) and f(y/x)
7   Write the conditions for a random process to be WSS.
8   If the ACF of a WSS random process is given by $R(t) = 25 + \dfrac{4}{1+\tau^2}$. Determine the mean and variance of the random process.
9   State the properties of Gaussian process.
10  Draw the low pass and band limited representation of White noise.

## PART – B

**Note: Answer any five questions.**                                  **(5 x 10 = 50 Marks)**

11 a)  State and prove Baye's Theorem
   b)  Three switches operate independently of each other are connected in parallel. each switch remains closed with a probability p. determine the probability of i) Receiving an i/p signal at the output. ii) the switch $S_1$ is open given an i/p signal is received at the output.

12 a)  The probability function if a RV 'X' is given in the following table.

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| P(X=X) | K | 2K | 3K | 4K | K | 2K | 3K |

   i)   Determine the value of 'K'
   ii)  Determine P(X=2)
   iii) Determine P(2<X<4)

   b)  An order of 3000 parts is received. The probability that a part is defective is 0.001. Determine the probability P(K>5) that there will be more than five defective parts.

13 a) Given X and Y are independent exponentially distributed random variables with common parameter $\lambda$. Define U=X+Y and V=X-Y. Determine the Joint pdf of U and V

   b) State the properties of joint distribution function

14 a) The ACF of a WSS process is given by R($\tau$) = Ae$^{-\alpha\tau}$. Determine the second order moment of the random variable X(8)-X(5)

   b) State and prove the properties of auto correlation function.

15 a) Define Poisson process. Derive the mean variance and auto correlation function of a Poisson process

   b) If X(t) is a Gaussion process with u(t) = 10, c(t$_1$,t$_2$) = 16 e$^{-(t_1-t_2)}$. Determine the probability that i) X(10)$\leq$8 ii) 1 X (10) – X (6) $\leq$ 4

16 a) State and prove addition theorem of probability of n events.

   b) Determine the mean and variance of binomial distribution from its characteristic function.

17 a) Determine the variance of a random variable Z = ax-by

   b) The power spectral density of a WSS process $S(w)=\dfrac{b}{a}(a-|\omega|)\,|\omega|\leq a$

   $S(w)=0, |\omega| > a$.

   Determine the ACF of the random process

   c) Define White noise

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