

FACULTY OF ENGINEERING**B.E 3/4 (Civil) I – Semester (Backlog) Examination, May/June 2019****Subject: Transportation Engineering****Time: 3 Hours****Max. Marks: 75****Note: Answer all the questions from Part A & any five questions from Part B.****PART – A (25 Marks)**

1. Define the term alignment and what are requirement of an alignment? 2M
2. Define the term conning of wheels? 2M
3. Draw the general layout of an airport? 2M
4. Define wind rose diagram and write any two uses? 2M
5. Differentiate between flexible pavement and rigid pavement. Also bitumen and tar? 2M
6. Explain the concept of saturation system and list out the factors to be consider? 3M
7. Explain the term time mean speed and space mean speed. Also give the relation between them? 3M
8. What are the joints in cement concrete road and explain its necessity? 3M
9. List out the functions of dowel bars and tie bars? 3M
10. Explain creep in rails and what are its effects? 3M

PART – B (Marks 50)

11. (a) Explain the various factors to be consider for controlling of highway alignment? 5M
- (b) The speed of overtaking and overtaken vehicles are 70kmph and 40kmph respectively on a two way traffic road, the average acceleration during overtaking is 0.99m/sec^2 . Calculate overtaking sight distance, minimum and desirable length of overtaking zone, draw a neat sketch of the overtaking zone and show the sign posts. 5M
12. (a) Explain the origin and destination study. What are the various uses of origin and destination studies? 5M
- (b) The following data obtained from the spot speed studies. Calculate the speed limit for regulation and speed to check geometric design elements. 5M

Mid speed	15	25	35	45	55	65	75	85	95
Number of Vehicles	0	6	16	34	28	17	6	3	2

13. (a) Explain the CBR test in detail? 5M
- (b) Explain the terms. i) ESWL ii) ESAL iii) C₁₉ 5M
14. (a) Draw the neat sketch of the layout of left and right hand turnouts with all the details. 5M
- (b) What are different types of rails? Explain functions and requirement of rails? 5M

Contd...2

15. (a) What are the factors to be considered for selection of an airport? 5M
(b) Explain the wind rose diagram with a neat sketch? 5M
16. Write a short note on the following: 10M
(a) 30th highest hourly volume.
(b) Functions of ICAO
(c) Functions of subgrade soil and surface course.
17. (a) Explain the concept of HCM 2000? 5M
(b) Write a note on rotary intersection and the neat sketch of rotary intersection? 5M

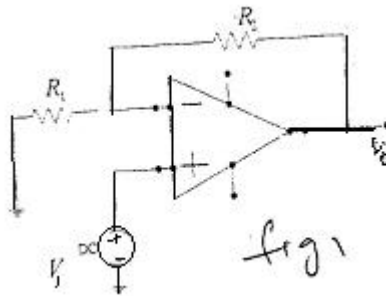
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FACULTY OF ENGINEERING**B.E. 3/4 (EEE/Inst.) I-Semester (Backlog) Examination, May/June 2019****Subject : Linear Integrated Circuits****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

- | | | |
|----|---|---|
| 1 | Define input offset and input bias current. | 3 |
| 2 | What is Slew rate? | 2 |
| 3 | Mention any four applications of an integrator. | 2 |
| 4 | Draw a peak detector circuit diagram. | 3 |
| 5 | Write short notes on 555 timer. | 3 |
| 6 | Draw the circuit diagram flash type D/A converter. | 2 |
| 7 | Draw the pin diagram of a VCO. | 3 |
| 8 | Mention three techniques for A/D and D/A converters. | 2 |
| 9 | What is Hybrid regulator? | 2 |
| 10 | The basic step of a 9-bit D/A is 0.3 mV. If 000000000 represents 0V, what output is produced if the input is 101101111? | 3 |

PART – B (50 Marks)

- | | | |
|-------|---|---|
| 11 a) | Explain the dc/ac balancing techniques for an Op-Amp. | 5 |
| b) | Find the closed loop gain for the Op-Amp shown in fig.1 | 5 |



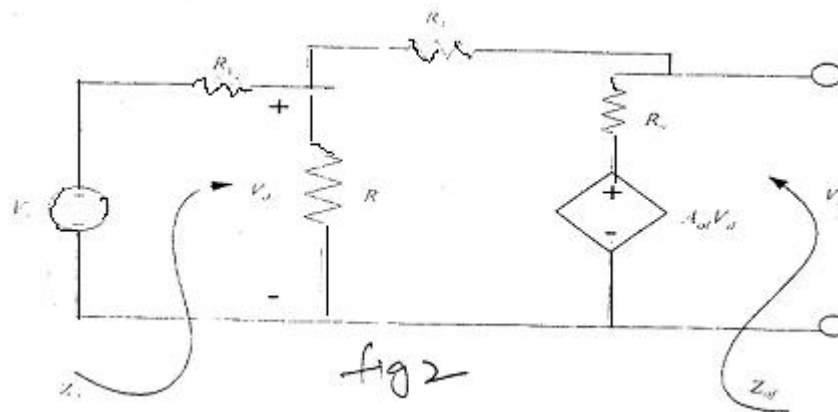
- | | | |
|-------|--|----|
| 12 a) | Explain the operation of difference amplifier with neat circuit diagram. | 5 |
| b) | Write short notes on Schmitt trigger with suitable diagram. | 5 |
| 13 | Derive the closed loop gain for a) An inverted summer b) An integrator with relevant circuit diagram. | 10 |

...2

- 2 -

14 Find the A_{CL} , A_v and Z_{of} for the practical inverting Op-Amp shown in fig.2

10



- 15 a) Explain working of dual tracking regulator with a neat block diagram. 5
 b) Explain switching regulator working principle with neat circuit diagram. 5
- 16 a) Explain the working principle of Mono-stable multivibrator with relevant circuit diagram. 5
 b) Explain band-stop filters using Op-Amp. 5
- 17 a) Design a Narrow Band Pass filter using Op-Amp with the resonant frequency is 100 Hz and $Q = 2$. Assume $C = 0.01 \mu\text{F}$. 5
 b) Write short notes on Universal filter. 5

FACULTY OF ENGINEERING

BE 3/4 (ECE) I-Semester (Backlog) Examination, May / June 2019

SUBJECT : Automatic Control Systems

Time: 3 Hours

Max. Marks: 75

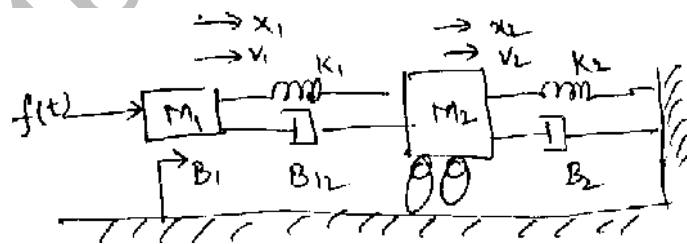
Note: Answer all questions from Part-A & any Five Questions from Part-B.

PART-A (25Marks)

1. Write the advantages of closed – loop systems with any two examples? 3
2. Mention the advantages of synchros 2
3. State and explain Masons gain formula 2
4. Explain the static error coefficients 3
5. Define the order and type of a system 2
6. Define gain margin and phase margin 2
7. Why Lag and lead are called compensating Networks? 3
8. Write any three advantages of a Digital control system 3
9. Compute the state transition matrix (STM) of $A = \begin{bmatrix} 0 & -1 \\ 2 & 3 \end{bmatrix}$ 3
10. List the Advantages of state variable analysis 2

PART-B (50Marks)

11. For the mechanical system given below (i) Find its transfer function, (ii) find equivalent Electrical Circuit using force – voltage analogy 10



12. Sketch the output response of second order system for unit step input, under the different damping factor 10
13. Derive the Transfer function and sketch the root locus of a Lag Network and Lead Network 10
14. a) What are the advantages of Bode Plots 3
 b) Sketch the Bode Plot and Calculate the gain in dB at $\omega = 50$ radians / sec for 7

$$G(s) = \frac{20(s+5)}{s(s^2+12s+20)}$$
15. a) What is the transfer function of Zero order Hold? 4
 b) Explain the block diagram of digital control system? 6

16.a) Discuss the state controllability of the system

5

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ -2 & 1.5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 4 \end{bmatrix} u$$

b) Obtain the state space representation of the system $\frac{c(s)}{u(s)} = \frac{10(s+2)}{s^3 + 3s^2 + 5s + 15}$

5

17. Write short notes on:

10

- BIBO Stability
- PID Controller
- Limitation of Routh Stability Criterion.

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FACULTY OF ENGINEERING**B.E. 3/4 (Mech) I – Semester (Backlog) Examination, May/June 2019****Subject: Manufacturing Processes****Time: 3 Hours****Max.Marks: 75****Note: Answer ALL questions from Part – A and Any five questions from Part – B.****PART – A [10 X 2.5 = 25 Marks]**

- 1 List the types of cores in Standing moulding process.
- 2 State the different pattern allowances in casting.
- 3 What are the five uses of venting in mould preparation?
- 4 When do you prefer investment casting? State five reasons
- 5 State the five advantages of DC welding over Ac welding.
- 6 Suggest a method to join Mild Steel and Aluminum bars give reasons
- 7 What is brazing?
- 8 Why an electrode is coated with flux?
- 9 What is trimming in sheet metal prove
- 10 What are the five disadvantages of hot working?

PART – B (10 X 5 = 50 Marks)

- 11 a) Explain all the properties required for moulding sand.
b) Discuss Chvirnov's rule and its applications in castings design what are its limitations.
- 12 a) Explain briefly the various methods used for inspection for castings.
b) Explain the principle of injection moulding with the help of sketch.
- 13 a) Draw the different types of flames used in gas welding. How do you identify These flames? What are the specific uses of these flames.
b) Explain the working electron beam welding process.
- 14 a) Explain thermit welding process with neat sketch and their chemical reaction equations.
b) Explain friction stir welding process and mention its specific advantages with neat sketch.
- 15 a) Differentiate punching and Blanking in sheet metal operation.
b) Explain rubber pad forming of sheet metal with neat diagram
- 16 a) List various types of casting defects and suggest remedies for them.
b) Explain a the influence of MEMS in manufacturing process.
- 17 Write short notes on
 - a) Spot welding
 - b) SAW
 - c) Explosive forming

FACULTY OF ENGINEERING**B.E. 3/4 (Prod.) I – Semester (Backlog) Examination, May / June 2019****Subject: Metal Forming Technology****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. Define hot working. Mention the advantages and limitations of hot working. 3
2. State the significant features of cold working process. 2
3. How the sheet metal presses specified? Explain. 2
4. What is a compound die? Explain with a neat sketch. 3
5. Differentiate clearly between drawing and extrusion operations. 3
6. Sketch the schematic of flow forming operation. 2
7. How open die forging is different from closed die forging? Explain. 3
8. Write the expression for 'Roll Separating Force' and explain each term. 2
9. Give a brief classification of Rolling Mills? Mention the application of each. 3
10. Mention the properties of material for making rolls. 2

PART – B (5x10 = 50 Marks)

- 11 a) Discuss the effects of temperature and friction in metal forming processes.
b) Explain plane stress and plane strain conditions with suitable examples.
- 12 a) Describe the Blanking and Piercing operations with the help of neat sketches.
b) What is spring back? How it related to thickness and bend radius of a sheet?
- 13 a) Discuss the effect of temperature and friction on extrusion processes.
b) Explain the difference between direct extrusion and indirect extrusion with suitable examples.
- 14 a) Describe the process of a wire drawing with the help of a neat sketch
b) Differentiate clearly between Press forging and Machine forging processes.
- 15 a) Explain the principle of Isothermal forging. Mention its advantages and applications.
b) Enumerate various types of defects that occur during forging. Mention their causes and remedy
- 16 a) What is the significance of roll torque on the rolling process? Explain.
b) Describe the principle of *Four high rolling mills* with the help of a neat sketch.
- 17 Write short notes on any TWO of the following:
 - a) Yield criteria
 - b) Stretch Forming
 - c) Power Rolling

FACULTY OF ENGINEERING**B. E. 3/4 (A.E) I – Semester (Backlog) Examination, May/June 2019****Subject: Production Technology****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part – A & any five questions from Part – B.****PART – A (25 Marks)**

1. Distinguish between casting and moulding.
2. Name 5 components manufactured by die casting.
3. Sketch the 3 types of flames and mark their salient features and temperature.
4. Name the three modes of weld metal transfer in GMAW.
5. Define neutral plane and dead zone in rolling with sketch.
6. Sketch and label wire drawing and tube drawing process principles.
7. Sketch the nomenclature of a Single point cutting tool.
8. What are the essential requirements of cutting fluid?
9. Distinguish between Shaper and planer.
10. Name five super finishing operations.

PART – B (50 Marks)

11. (a) Describe in detail the properties of green sand mould.
(b) Explain Investment casting with a neat sketch.
12. (a) With neat sketches explain spot welding principle, process, advantages and limitations.
(b) Explain the welding defects, causes and remedies.
13. (a) Distinguish between forward extrusion, backward extrusion and impact extrusion with sketches.
14. In orthogonal cutting of a 50 mm diameter mild steel bar on a lathe the following data were obtained. Rake angle = 15° , cutting speed = 100m/min. Feed = 0.2 mm/rev, Cutting force = 190 kg, Feed force = 60 kg. Calculate the
 - (a) Shear plane angle
 - (b) Coefficient of friction
 - (c) Cutting power
 - (d) Chip flow velocity
 - (e) Shear force, if the chip thickness is 0.3 mm.
15. (a) Explain Tail stock set over method for taper turning on lathe.
(b) With neat sketches explain 5 operations performed on lathe.
16. (a) Explain Lost wax Casting Process in detail with sketch.
(b) What are the advantages and limitations of Friction Welding?
17. a) Distinguish between engineering strain and true strain in elastic and plastic deformation.
b) Explain with neat sketch the various part of a drilling machine and explain its working principle.

FACULTY OF ENGINEERING
BE 3/4 (CSE) I – Semester (Backlog) Examination, May / June 2019

Subject : Data Communication

Time : 3 Hours

Max. Marks: 75

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

PART – A (20 Marks)

- | | |
|---|---|
| 1 List the key elements of Communication model. | 3 |
| 2 Describe Attenuation. | 3 |
| 3 Write short notes on Frame Relay. | 3 |
| 4 Define Line Coding. | 2 |
| 5 Distinguish between Datagram and Virtual Circuit Operation. | 3 |
| 6 Define Single bit errors and burst errors. | 2 |
| 7 Explain the concept of Parity check and CRC in error detection. | 3 |
| 8 What functions are performed by Bridge? | 2 |
| 9 What is CSMA/CD? | 2 |
| 10 Describe the relative merits and demerits of different LAN topologies. | 2 |

PART-B (5X10 = 50 Marks)

- | | |
|--|----|
| 11 What is Flow Control? Explain in detail. | 10 |
| 12 a) Describe the formula of Shanon for Channel capacity. | 5 |
| b) For the bit stream 11001010 sketch the wave form of any three Digital Encoding formats. | 5 |
| 13 a) Write short notes on Stop and Wait ARQ. | 5 |
| b) Discuss briefly about HDLC Data Link Control protocol. | 5 |
| 14 a) Explain in detail about ATM Protocol Architecture. | 6 |
| b) Explain about HEC operation at receiver. | 4 |
| 15 What is Ethernet? What are the different types of Ethernet? Describe the characteristics for one of the Ethernet types. | 10 |
| 16 a) Explain Bluetooth Architecture. | 6 |
| b) Give Overview of operation of cellular systems. | 4 |
| 17 a) Distinguish Synchronous and Asynchronous transmission. | 6 |
| b) Write short notes on Error Correction techniques. | 4 |

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B. E. ^{3/4} (I.T.) I – Semester (Old) Examination, May/June 2019

SUBJECT: Theory of Automata

Time: 3 Hours

Max. Marks: 75

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

1. Draw the transition diagram for the DFA with the following transition table and give the language of the DFA. (3M)

δ	0	1
$\rightarrow q_0$	q_2	q_1
* q_1	q_1	q_1
q_2	q_2	q_1

2. Establish and list the equivalent states for the automaton shown below (3M)

States	Σ	
	0	1
$\rightarrow A$	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

3. State pumping lemma for regular languages. (2M)
4. When is a context Free Language said to be inherently ambiguous? How do you remove ambiguity from grammars? (3M)
5. Define PDA and Language accepted by PDA by empty stack. (2M)
6. Eliminate Useless symbols for the case given below. (3M)
- S aAa / aBC , A aS/bD , B aBa /b , C abb/DD , D aDa
7. What do you mean by a) PDA by empty stack b) PDA by final state? (3M)
8. State four undecidable problems about TM specifications. (2M)
9. Give two example for NP-complete problems. (2M)
10. Explain Intractability with a suitable example. (2M)

PART – B (5 x 10 = 50 Marks)

11. (a) Define Epsilon-closure of a state and explain with a suitable example. (5M)
- (b) Design PDA that accept by empty stack , process sequence of if's and else in c program , where " i" stands for if and " e" stands for else. (5M)

Contd...2

12. (a) Prove that $L = \{a^n : n \text{ is a prime number}\}$ is not regular. (5M)
- (b) Design a DFA to accept the language given below: (5M)
- $L = \{w/w \text{ is of even length and begins with } 0s\}$

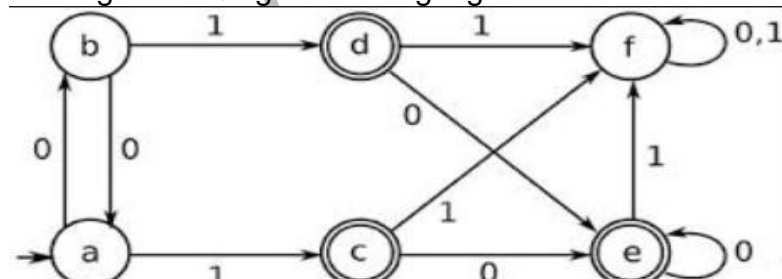
13. Define context-free Grammar and Chomsky Normal Form. Find a grammar (10M)
- equivalent to $S \rightarrow AB/AC, A \rightarrow aA|bAa|a, B \rightarrow bbA|aB|AB, C \rightarrow aCa|aD, D \rightarrow aD|bC$
- with no useless symbols.

- 14.(a) For the PDA $P = (\{q_0, q_1, q_2, q_3\}, \{0, 1\}, \{X, Y, Z\}, q_0, z, \{q_3\})$ with δ defined as (10M)
- | | |
|---|---|
| 1. $(q_0, \epsilon, Z) = \{(q_1, XZ)\}$ | 6. $(q_2, 0, Y) = \{q_2, \epsilon\}$ |
| 2. $(q_1, 0, X) = \{(q_1, YX)\}$ | 7. $(q_2, \epsilon, X) = \{q_2, \epsilon\}$ |
| 3. $(q_1, 0, Y) = \{(q_1, YY)\}$ | 8. $(q_1, \epsilon, Z) = \{q_3, Z\}$ |
| 4. $(q_1, 1, Y) = \{(q_2, \epsilon)\}$ | 9. $(q_2, \epsilon, Z) = \{q_3, Z\}$ |
| 5. $(q_2, 1, Y) = \{(q_2, \epsilon)\}$ | |

Show the sequence of ID's to demonstrate the processing of the strings "01100"

15. Design a TM for $L = \{a^n c b^n \mid a, b = [0, 1]\}$ 10

16. Minimize the following DFA using table filling algorithm 10



- 17.(a) Given the MPCP instance shown below, construct PCP instance. (5M)

	List A	List B
I	w_i	x_i
1	110	110110
2	0011	00
3	0110	110

- (b) Explain the satisfiability problem.

FACULTY OF ENGINEERING**B.E. 3/4 (I.T.) I - Semester (Suppl.) Examination, May / June 2019****Subject : Theory of Computation****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 NFA. Give an example.
- 2 What is epsilon transitions?
- 3 Define a parse tree. Give an example.
- 4 Describe briefly about CFG.
- 5 How the CFG is related to PDA?
- 6 Mention closure properties of CFG.
- 7 Define turing machine.
- 8 Discuss briefly about unrestricted grammar.
- 9 Define NP and NP complete problem.
- 10 Mention any four undecidable problem.

PART – B (50 Marks)

- 11 Explain the procedure to convert nfa-to-dfa with an example. (10)
- 12 Find minimal dfa. For the following language prove that result is minimal. (10)
 $L = \{a^n : n \geq 0, n \neq 3\}$
- 13 (a) State and prove pumping lemma for CFL.
 (b) Determine whether the language $L = \{0^n, 1^n 2^n / n \geq 1\}$ is context free.
- 14 Explain Chomsky Normal form. Comment the following grammar into chomsky normal form

$$S \rightarrow AB / aB$$

$$A \rightarrow aab / \lambda$$

$$B \rightarrow bbA$$
- 15 Explain the following concepts
 (a) Programming technique for turing machine (5)
 (b) Restricted turing machine (5)
- 16 Write in detail about posts correspondence problem. (10)
- 17 Write short notes on the following:
 (a) Regular expressions (3)
 (b) Ambiguity in grammar and languages (3)
 (c) Restricted satisfiability problem (4)

FACULTY OF ENGINEERING

**B.E. (Civil) IV-Semester (CBCS) (Main & Backlog) Examination,
May/June 2019**

Subject : Surveying - II

Time : 3 hours

Max. Marks : 70

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

PART – A (20 Marks)

- 1 What are the desired relations between fundamental lines of a theodolite? 2
- 2 What instrumental errors are eliminated by face left and face right observations? 2
- 3 What are the different types of EDM instruments used for surveying? 2
- 4 What is axis signal correction? Give the required equation. 2
- 5 Calculate the ordinates at 10m distance for a circular curve having a long chord of 80m and a versed sine of 4m. 2
- 6 With a neat sketch explain the first tangent and the second tangent. 2
- 7 What is transition curve? State the various types of transition curves. 2
- 8 What is tangent correction? 2
- 9 What is Remote sensing? Give any four applications of remote sensing to civil engineering problems. 2
- 10 What are the advantages of aerial photogrammetry? 2

PART – B (50 Marks)

- 11 a) Explain the permanent adjustments of a theodolite. 5
b) Differentiate between the loose needle and fast needle method of theodolite traversing. 5
- 12 a) What is effort of closure? How is it balanced by using Bowditch's Method? 4
b) A tacheometer is setup at an intermediate point on a traverse course AB and the following observations are taken on a staff held vertically 6

Staff Station	Bearing	Vertical Angle	Staff Intercept	Axial reading
A	40° 35'	-4° 24'	2.172	1.962
B	220° 35'	-5° 12'	1.986	1.866

The instrument is fitted with an anallatic lens and $K = 100$. The R.L. being 350.75m. Calculate the length of AB and R.L. of B.

- 13 A compound curve is to be connected between two straights having a deflection angle of 90° . As determined from the plan; the length of the two tangents are 350m and 400m respectively. Calculate the lengths of the two arcs if the radius of the first curve is to be 300m. Draw a neat sketch of the curve. 10
- 14 Calculate the RL's of various station pegs on a vertical curve connecting two uniform grades of 0.5% and -0.7%. The chainage and RL of the point of intersection are 550m and 375.5m respectively. Take the rate of change of grades as 0.1% per 20m. 10
- 15 What is aerial photogrammetry? What are its principles? What are the different types of photographs? 10
- 16 a) What do you understand by omitted measurement? Briefly describe the various cases. 5
b) Briefly explain the computation of the length of a transition curve. 5
- 17 Write short notes on 10
a) EMR spectrum
b) Use of substance bar
c) Refraction and curvature corrections

FACULTY OF ENGINEERING**B.E. IV-Semester(CBCS)(EEE) Examination, May / June 2019****PAPER:- Power system - I****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 Maximum Demand & Load Factor? 2M
- 2) What are the requirements of Tariff? 2M
- 3) Explain the operation of Air Preheater in thermal power plant? 2M
- 4) Differentiate between Impulse and Reaction Turbines? 2M
- 5) Give differences between solar Concentrating collector and solar flat plate collector? 2M
- 6) Explain the concept of Nuclear Fission? 2M
- 7) List out the advantages of suspension insulators over pin type insulators? 2M
- 8) Explain the concept of capacitance grading in cables? 2M
- 9) Explain about self & mutual GMD? 2M
- 10) Explain the concept of transposition in over head lines? 2M

Part-B (50 Marks)

11. a) A power station has following daily load cycle :

Time in Hours	6 - 8	8 - 12	12 - 16	16 - 20	20-24	24 - 6
Load in MW	20	40	60	20	50	20

- Plot the daily load curve, Load duration curve & find the energy generated per day ? 6
- b) A power station has a maximum demand of 15000 KW, Annual load factor 50% & Plant capacity factor 40% .Find the reserve capacity of the plant? 4
12. a) Explain with neat diagram the working of solar flat plate collector? 5
 b) Explain the working of Gas Turbine Power Plant? 5
- 13) Draw the schematic diagram of Thermal Power station and explain the working of different components of it? 10
- 14)a) Explain any two methods of equalizing the potential across a string of suspension insulators? 5
 b) Draw the layout diagram of Hydro–Electric power plant and explain its operation? 5
15. a) A transmission line has a span of 200 meters between level supports. The conductor has a Cross-sectional area of 1.29 cm^2 , weighs 1170 kg/km and has a breaking stress of 4218 kg/cm^2 . Calculate the sag for a safety factor of 5, allowing a wind pressure of $122 \text{ kg per square meter}$ of projected area. 6
 b) The three conductors of a 3-phase line are arranged at the corners of a triangle of sides 2 m, 2.5 m and 4.5 m. Calculate the inductance per km of the line when the conductors are regularly transposed. The diameter of each conductor is 1.24 cm. 4

16. Derive the expression for capacitance of an unsymmetrical transposed transmission line? 10
17. Answer any two of the following : 10
- a) Base load and peak load operation
 - b) Different insulating materials & mechanical protection of underground cables?
 - c) Working of Pressurized water Reactor?

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FACULTY OF ENGINEERING

B.E IV-Semester (CBCS)(Inst)(Main & Backlog) Examination, May /June 2019

Subject : Transducer Engineering

Time: 3 Hours

Max Marks: 70

Note: Answer all questions from Part-A & Any Five questions From Part-B.

Part – A (20 Marks)

1. Identify the differences between threshold and Resolution. 2m
2. A thermometer is calibrated between 150 °C-200 °C, the error is specified as ±0.25% of span. Find its maximum error in °C. 2m
3. List a few basic electrical requirements of the transducers. 2m
4. Justify how force can be measured using strain gauges. 2m
5. Discuss the principle of RVDT. 2m
6. Define the working of hygrometer. 2m
7. State the laws of thermocouple. 2m
8. Write the general equation of resistance dependence on temperature of Thermistor. 2m
9. A pressure gauge reads 10PSI. What is the absolute pressure if the atmospheric pressure is 14.4PSI? 2m
10. State the principle of Knudsen gauge. 2m

Part – B (50 Marks)

11. Explain the terms: Linearity, Hysteresis, Repeatability, Reliability and maintainability. 10m
12. Find the frequency response characteristics of the given first order system

$$T(s) = \frac{20}{1 + 3s}$$
 Also plot the response(magnitude and phase) for different values of frequency 'w'. 10m
13. a) Derive the equation of Gauge factor of strain gauge. 7m
 b) A bonded stain gauge has the following specifications: Gauge factor=2, Maximum tensile and compressive strain= 2×10^{-2} and supply voltage=10V. Find the output voltage if half bridge configuration is used. 3m
14. a) Explain the operating principle and construction of any two variable capacitance transducers. 7m
 b) For an area of 1 in², separated by 0.01in, the capacitance of an air capacitor is 3m
15. a) Discuss the means for the calibration of Temperature measurement. 5m
 b) Explain the laws use to study the behavior of thermocouple. 5m
16. a) Explain the use of Manganin alloy for the high pressure measurement. 5m
 b) Discuss the Dead weight tester use for the calibration of pressure. 5m
17. With short notes on: a) Elements for pressure measurement b) LM 335 ICs or any other IC for temperature measurement. 10m

FACULTY OF ENGINEERING**B.E. (ECE) IV - Semester (Main & Backlog) Examination, May / June 2019****Subject : Probability Theory and Stochastic Process****Time : 3 Hours****Max. Marks: 70****Note: Answer all questions from Part-A & any five questions from Part-B.****PART – A (20 Marks)**

- 1 State the axioms of the probability. 2
- 2 A card is drawn at random from a deck of 52 playing cards. Find the probability that the card turns out to be a Red face (figure) card or a spade king. 2
- 3 Define 'Moment generating function' of a random variable X. What is its application? 2
- 4 The probability density function of an exponentially distributed random variable is given by $f_x(x) = 2e^{-2x}$; $x > 0$. Find the cumulative distribution function $F_x(x)$. 2
- 5 State any two properties of Joint probability density function $f_{XY}(x, y)$ of two random variables X and Y. 2
- 6 The joint density functions of two random variables X and Y is given by, $f_{XY}(x,y) = \frac{1}{10}, 0 \leq x \leq 2, 0 \leq y \leq 5$. Find $f_Y(y)$. 2
- 7 Define a Random Process. 2
- 8 Write any two properties of Auto-Correlation $R_{XX}(\tau)$ of random process $X(t)$. 2
- 9 Find the average power of the Random process $X(t)$ having an Auto correlation Function $R_{XX}(\tau) = \frac{A^2}{2} \cos \tau$. 2
- 10 Distinguish between white noise and coloured noise. 2

PART – B (50 Marks)

- 11 a) Three coins are tossed simultaneously Heads and Tails are denoted by numbers 0 and 1 respectively. A random variable X is formed by adding the outcomes of three coins. Indicate the sample spaces S. Find $P[X \leq 2]$. 6
 - b) Define : Joint Probability, Conditional Probability. Density and distribution functions. 4
- 12 a) 10 students appear for a written examination. The probability of any student qualifying is 0.6. Find the probability that the number of disqualified students will be less than or equal to 3 assuming Binomial distribution. 5
 - b) Derive an expression for the Characteristic function of Poisson distributed Random variable and find the mean value using the expression. 5
- 13 a) Derive mean and variance of a Poisson distributed Random Variable. 6
 - b) Derive an expression for the Characteristic function of a Uniformly distributed Random variable X between 0 and 10. Find Mean of X. 4
- 14 a) X is a random variable with probability density function $f_X(x) = \frac{1}{2}e^{-x/2}; x \geq 0$.
Y is a uniformly distributed random variable between 0 and 2. If $Z = X + Y$, find the probability density function $f_Z(z)$ and mean of Z. 6
 - b) Define various Joint moments about origin and joint central moments. 4

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- 15 a) Define : Mean-ergodic random process and Auto-correlation ergodic random process. 4
- b) The random process $X(t)$ is given by $x(t) = A_c(\cos \omega_c t + \phi)$ where A_c and ω_c are constants and ϕ is a uniformly distributed random variable between 0 and 2π . Find the auto correlation function $R_{XX}(\tau)$ of $X(t)$. 6
- 16 a) Derive the relation between Auto Correlation function and power density spectrum of a Random Process. 5
- b) A wide sense stationary noise process $N(t)$, has an auto correlation function $R_{NN}(\tau) = N_0 e^{-3|\tau|}$ where $N_0 = \text{constant}$. Find the power density spectrum of the Noise process $N(t)$. 5
- 17 Write short technical notes :
- a) Co-Variance and correlation of two random variables. 3
- b) Properties of Power Density spectrum of a Random process. 3
- c) Moment generating function. 4

FACULTY OF ENGINEERING**B.E IV-Semester (CBCS) (Mech) (Main & Backlog) Examination, May / June 2019****Subject : Applied Thermodynamics****Time: 3 Hours****Max. Marks: 70**

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

PART- A (20 Marks)

1. Define and derive an expression for volumetric efficiency of reciprocating air compressor in terms of pressure ratio, index of compression and expansion?
2. Define FAD of reciprocating air compressor?
3. Define "Ignition delay" as referred to a SI engine and give its significance?
4. Define indicated thermal efficiency of an IC Engine?
5. Write short notes on knocking of CI engine?
6. Explain with a neat sketch "simple carburetor" of an IC engine?
7. Differentiate between "Fire-tube and "Water-tube" boilers?
8. Define condenser and explain any one type of jet condenser?
9. How does "regeneration" contribute to improvement of the efficiency of a Rankine cycle?
10. Explain with sketch for variation of pressure convergent divergent nozzle?

PART-B (5x10=50 Marks)

11. A single-stage double acting reciprocating air compressor takes in 14m^3 of air per minute measured at 1.013bar and 15°C , the delivery pressure is 7bar and the compressor speed is 300rpm and the compressor has clearance volume 5% of swept volume with a compression & expansion index of $n=1.3$. Calculate (i) swept volume of the cylinder, (ii) delivery temperature and (iii) indicated power.
12. In a trial of single cylinder oil engine working on dual cycle the following observations were made: Compression ratio= 15 ; oil consumption= 10.2kg/hr ; the calorific value of the fuel= 43900kJ/kg ; air consumption= 3.8kg/min ; speed= 1900rpm ; torque on the brake drum= 186 N-m ; quantity of cooling water circulated= 15.5kg/min ; temperature rise= 36°C ; exhaust gas temperature= 410°C ; room temperature= 20°C ; C_p of exhaust gas= 1.17kJ/kg K ; C_p of water= 4.18kJ/kg K , Calculate (i) B.P, (ii) bsfc, (iii) η_{bth} and (iv) draw the heat balance sheet on minute basis.
13. Describe the combustion phenomena of CI engine with P- diagram and how knocking occurs in it?
14. a) Explain the working principle of stirling boilers.
b) Differentiate between surface and jet type steam condensers.
15. A steam power plant operates on an ideal Rankine cycle between a boiler pressure of 45bar , 350°C and a condenser pressure of 0.037bar . Calculate cycle efficiency, work ratio and specific steam consumption for

- i) Ideal Rankine cycle
- ii) Rankine cycle when expansion process has an isentropic efficiency of 85%.

16. Define critical pressure of nozzle and derive condition for critical pressure.

17. a) Describe briefly the functioning of wet-sump lubrication system with neat sketch.

b) Write notes on fire tube boiler with at least one example.

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FACULTY OF ENGINEERING**B. E. IV – Semester (CBCS) (Prod.)(Main & Backlog) Examination, May/June 2019****Subject: Applied Thermodynamics & Heat Transfer****Time: 3 Hours****Max. Marks: 70****Note: Answer all questions from Part - A, & any five questions from Part-B.****PART – A (Marks 20)**

- (1) Why intercooler is used in reciprocating air compressor?
- (2) Draw indicator diagram for two stage reciprocating air compressor with clearance and inter cooling?
- (3) With sketch, name the elements of simple carburettor?
- (4) For same power output, why 4stroke engines are heavier as compared to 2 stroke engines?
- (5) Name different types of cooling systems used in IC engine?
- (6) Name different parts to be lubricated in IC engines?
- (7) How thermal conductivity of liquids and gases vary with temperature?
- (8) State Kirchoff law of radiation?
- (9) Write two dimensional conduction equations with heat generation at unsteady state ?
- (10) Write reciprocity theorem?

PART – B (Marks 50)

- (11) Describe the methods to improve isothermal efficiency of reciprocating air compressor?
- (12) (a) Compare SI engines with CI engines ?
(b) Mention the factors to control knock in SI engines?
- (13) (a) Derive an expression for temperature distribution in a slab with variable thermal conductivity with temperature as $K = K_0(1+aT)$.
(b) Derive an expression for overall heat transfer coefficient for heat transfer through cylinder with internal and external convection ?
- (14) (a) With sketch, discuss about battery ignition system in IC engine ?
(b) Briefly describe different types of combustion chambers for CI engines ?
- (15) State Buckingham pi theorem? Apply Buckingham pi theorem, to generate non dimensional numbers relevant to forced convection ?
- (16) The following observation were recorded in a test of one hour duration in single cylinder oil engine working on four stroke cycle.
Bore 300mm, stroke 450mm , fuel used 8.8 kg , calorific value of fuel 41800Kj/Kg , speed 200rpm , mean effective pressure 5.8 bar
Brake friction load 1860 N , Quantity of cooling water 650 Kg and its temperature rise 22°C , Diameter of brake wheel 1.22m ,
Draw heat balance sheet ?
- (17) A composite cylinder consists of 10 cm radius steel pipe of 25mm thickness over which two layers of insulation 30mm and 35mm are laid. The thermal conductivities are 25 W/mK , 0.25 W/mK, and 0.65 w/mK . The inner side of cylinder is exposed to convection at 300°C with $h=65 \text{ W/m}^2\text{K}$. Outside is exposed to air at 30°C with $h= 15 \text{ W/m}^2\text{K}$. Determine heat loss per meter length. Also find interface temperatures ?

FACULTY OF ENGINEERING**B.E IV-Semester (CBCS) (A.E) (Main & Backlog) Examination, May / June 2019****Subject: Metallurgy and Material Testing****Time: 3 Hours****Max. Marks: 70**

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

PART-A (20 Marks)

1. What is critical resolved shear stress? Write the equation relating tensile stress and critical resolved shear stress.
2. Define the term fracture. Write the characteristics of ductile fracture.
3. Differentiate creep curve with stress rupture curve.
4. List the applications of diffusion in mechanical engineering field.
5. Explain Gibb's phase rule.
6. State the characteristics of plain carbon steels?
7. Differentiate Austempering with Martempering?
8. How full annealing is different from normalizing?
9. List Five various non-destructive testing methods.
10. State the differences between Izod and Charpy tests.

PART- B (5 x 10 =50 Marks)

11. a) Explain the terms "Recovery", "Recrystallisation" and "grain growth". Discuss their influence on mechanical properties and microstructure of material.
b) Explain the Griffith theory of brittle fracture.
12. a) What is cumulative fatigue? Explain the method of estimation of fatigue damage.
b) Explain the creep deformation mechanisms.
13. a) Define the following structural components:
i) Ferrite ii) Pearlite iii) Austenite and iv) Cementite
b) Write the invariant reactions that occur in Iron-Iron carbide alloy system.
14. a) Draw the TTT diagram for 0.8% carbon steel and label all the phases.
b) What is surface hardening? Explain the process of flame hardening treatment.
15. a) Describe tensile test on Universal testing machine.
b) Draw stress-strain diagram for ductile materials indicating the salient points.
16. a) Write the differences between cold working and hot working processes.
b) Differentiate carburizing with nitriding.
17. Write short notes on:
a) Low cycle fatigue
b) Ductile cast Iron
c) Magnetic particle testing.

FACULTY OF ENGINEERING**BE IV- Semester (CBCS) (CSE) (Main & Backlog) Examination, May / June 2019****SUBJECT: OOP USING JAVA****TIME : 3HOURS****MAX. MARKS: 70**

Note: Answer All Questions From Part-A, & any FIVE Questions From Part-B

PART- A (20 Marks)

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| 1. Differentiate overloading and overriding | 2M |
| 2. Write java program using ternary operator to find maximum of three numbers. | 2M |
| 3. What is the use of PrintWriter Class. | 2M |
| 4. How can thread be suspended from execution. | 2M |
| 5. List the different collection classes and collection interfaces. | 2M |
| 6. Explain about BitSet and Timer. | 2M |
| 7. What are Event Listeners. | 2M |
| 8. List the different AWT controls. | 2M |
| 9. Define swing in java with example. | 2M |
| 10. Define socket. | 2M |

Part - B (50Marks)

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|---|----|
| 11. (a) Write a program to demonstrate dynamic method dispatch and explain. | 5M |
| (b) Write a java program to simulate the operation of numerical calculator to perform the functions Addition(+),Subtraction(-),Multiplication(*),Division(/) | 5M |
| 12. (a) Explain the features and benefits of object oriented development. | 5M |
| (b) Write a java program to read 'n' numbers from console and print their sum and Average. | 5M |
| 13. (a) What is the difference between a string and String Buffer class? Explain with Example. | 5M |
| (b) Write a program to create and use user defined exception. | 5M |
| 14. (a) Write a java program to illustrate the use of string tokenizer. | 5M |
| (b) Briefly discuss about collection classes and collection interfaces. | 5M |
| 15. (a) Write a program for keyboard event handling. | 5M |
| (b) Write a program to read username and password for any application. | 5M |
| 16. (a) Write a program to copy one file content into another file. | 5M |
| (b) What combination of classes can be used to write and read serializable directs to and from a file? Illustrate with an example. | 5M |
| 17. Write short notes: | |
| (a) Packages. | 4M |
| (b) Printwriter class. | 3M |
| (c) Comparators. | 3M |

FACULTY OF ENGINEERING**B.E. IV-Semester (CBCS) (I.T) (Main & Backlog) Examination, May / June 2019****Subject: OOP Using JAVA****Time: 3 Hours****Max. Marks: 70**

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

PART – A (20 Marks)

1. What is the difference between an instance variable and class member?
2. What is the use of String Tokenizer?
3. What are interfaces? What is the use of interface?
4. What is the use of final keyword in java?
5. What is the difference between throw and throws clause
6. Explain about thread priorities
7. List different collection classes and collection interfaces.
8. List any two methods available in stream class.
9. What is event handling mechanism? Give different event handling classes.
10. What is a layout manager? What are different layout managers?

PART – B (50 Marks)

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|--------|---|----|
| 11. a) | Explain Java Buzz words in Detail. | 8 |
| b) | Define a two dimensional array of different row sizes? | 2 |
| 12. a) | Write a program to demonstrate dynamic method dispatch and explain? | 8 |
| b) | What is the use of super keyword? | 2 |
| 13. | Why do we need Thread Synchronization? Give an example program | 10 |
| 14. | What is serialization? Write a program to demonstrate the concept of Serialization? | 10 |
| 15. | Give an example program to illustrate on handling menus and mouse events. | 10 |
| 16. | Explain the different iterators used for accessing the elements with example. | 10 |
| 17. | Explain the AWT component classes with suitable example program | 10 |
