

**FACULTY OF ENGINEERING****B.E. (Civil) VI – Semester (CBCS) (Suppl.) Examination, December 2019****Subject: Steel Structures****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 Distinguish between the working stress method and limit state method.                                     | 2 |
| 2 Define shape factor and plastic modulus.  | 2 |
| 3 What are tension members? Where they are used?  | 2 |
| 4 Differentiate between stiffened and unstiffened beam end connections.                                     | 2 |
| 5 Briefly discuss the classification of beams as per IS 800.  | 2 |
| 6 Write a note on lug angles to be used in tension member.  | 2 |
| 7 Draw the neat sketch of a column gusseted base.   | 2 |
| 8 Distinguish between web buckling and web crippling.   | 2 |
| 9 What are the various loads considered in the design of roof trusses?                                      | 2 |
| 10 Design an angle purlin of length 3.5 m to carry a moment of 4kNm<br>Take $f_{bt} = 165 \text{ N/mm}^2$ . | 2 |

**PART – B (5x10 = 50 Marks)**

- |   |    |
|---|----|
| 11 Two ISF section 200 mm x 10 mm each and 1.5 m long are to be joined to make a member length of 3.0 m. design a butt joint with the bolts arranged in diamond pattern. The flats are supposed to carry a factored tensile force of 450 kN. Steel is of grade Fe 410. 20 mm diameter bolts of grade 4.6 are used to make connections. Also, determine the net tensile strength of the main plate and cover plates. | 10 |
| 12 Design a tension member of 9m long subjected to a factored tensile load of 1800kN. The section consists of two channels facing each other. The rolled channels ISMC 300@ 358 N/m only available. Assume the channels to be weakened by one bolt hole only, check adequacy of section. Design plates on flanges if required. Use Fe 410 grade steel. The bolts used are of 4.6 grade and 16 mm diameter.          | 10 |
| 13 Design a steel beam section for supporting roof of a hall with 6m clear span 150 mm end bearings, 3m c/c spacing of beams. Consider $9 \text{ kN/m}^2$ of imposed load and $4 \text{ kN/m}^2$ dead load, beam depth is restricted to 375 mm the compression flange of the beam is laterally supported throughout.  | 10 |
| 14 Design a built up column 10m long to carry an axial load of $750 \times 10^3 \text{ N}$ . The column is restrained in position but not in direction at both the ends. Provide single lacing system with riveted connections. Assume $f_y = 250 \text{ MPa}$ . Design the column with two channels placed back-to-back, also design lacing system with welded connections.  |    |

10

..2

- 15 A column ISHB 350 @ 661.2 N/m carries an axial load of 1900 kN. Design a suitable bolted gusset base. The base rest on M20 grade concrete pedestal. Use 24 mm diameter bolts of grade 4.6 for making the connections. 10
- 16 Design an I- section purlin, for an industrial building, to support a galvanized corrugated iron sheet roof for following data: 10
- Spacing of truss c/c = 6.0 m
  - Span of truss = 12.0 m
  - Spacing of purlin c/c = 1.5 m
  - Intensity of wind pressure =  $2\text{kN/m}^2$
  - Weight of galvanized sheet =  $130\text{ N/m}^2$
  - Fe 410 Grade of steel
- 17 Write short note on the following: 10
- a) Block shear
  - b) Difference between bolted and welded connections.

\*\*\*\*

**FACULTY OF ENGINEERING****B.E. VI-Semester (EEE) (CBCS) (Suppl.) Examination, December 2019****Subject : Electrical Machinery – III****Time : 3 Hours****Max. Marks: 70****Note: Answer all questions from Part-A & any five questions from Part-B.****PART – A (20 Marks)**

- 1 What happens to the value of synchronous reactance if air gap is increased? [2]
- 2 A 50Hz alternator has a flux of 0.1 Wb/pole, sinusoidally distributed. Calculate the rms value of the emf generated in one turn of the winding, which spans 3/4 of a pole pitch. [2]
- 3 Why does synchronous impedance method give a poor voltage regulation? [2]
- 4 Explain the effects of armature reaction and how can it be compensated. [2]
- 5 Explain why synchronous motor does not have starting torque. [2]
- 6 What is power circle of a synchronous motor? [2]
- 7 Explain the transient behavior of an Alternator. [2]
- 8 How 'V' and 'Λ' curves of synchronous motor are defined? [2]
- 9 What are the uses of Brushless DC Motors? [2]
- 10 What is difference between brushed and brushless DC motor? [2]

**PART – B (50 Marks)**

- 11 (a) What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator. [5]
- (b) Calculate the EMF of a 4 pole, 3-phase, star connected alternator running at 1500 r.p.m from the following data: Flux per pole = 0.3 Wb, Total number of slots = 48, Conductors per slot (in two layers) = 4, coil span =  $150^\circ$ . [5]
- 12 (a) Explain clearly what is meant by synchronous impedance of an alternator and how it can be determined experimentally. [5]
- (b) O.C and S.C tests were performed on a 3-phase, 0.5MVA, 3.6kV, star- connected alternator.  
The results are given below:  
O.C:  $I_f = 10A$ ,  $V_{oc} = 3000V$   
S.C:  $I_f = 10A$ ,  $I_{sc} = 150A$ ,  $R_{a/ph} = 1 \text{ ohm}$ .  
Calculate the percentage regulation for full load condition at 0.8pf leading. [5]
- 13 (a) Draw the phasor diagram of 3-phase synchronous motor. Explain the effect of  
(i) Change in excitation if load is constant (ii) change of load if excitation is constant. [5]
- (b) Why synchronous motor is not a self starting? Explain the starting methods of synchronous motors? [5]
- 14 (a) What is transient stability? Explain with elementary ideas of transient behavior of an Alternator in power generation. [4]
- (b) Obtain the Swing Equation for Determining the Transient Stability in synchronous generator. [6]

..2..

- 15 (a) Explain the construction and working of brushless DC (BLDC) motor. [5]  
(b) Explain few advantages and applications of brushless DC (BLDC) motor. [5]
- 16 (a) Derive the generalized expression for an induced e.m.f per phase in three phase alternator, when coils are not full pitch and concentrated in one slot. [5]  
(b) A 3-phase, 20-pole, 360 rpm, star connected alternator has a double-layer winding arranged in 180 slots. There are 6-conductors per slot. Find the emf induced per phase, if the flux per pole is 0.042 Wb. The coils are short-chorded by one slot. [5]
- 17 (a) Explain how a synchronous motor can be operated as synchronous condenser. [5]  
(b) A synchronous motor has an equivalent armature reactance of  $3.3 \Omega$ . The exciting current is adjusted to such a value that the open circuit emf is 950V. Find the p.f. at which the motor would operate when it takes 80kW from 800V supply line. [5]

\*\*\*\*\*

**FACULTY OF ENGINEERING****B.E. VI Semester (CBCS)(Inst.)(Supple.)Examination, December 2019****Sub: Biomedical Instrumentation****Time : 3 Hours****Max. Marks: 70****PART – A (20 Marks)****Note: Answer all questions from Part – A & any five questions from Part – B**

- 1 What is the role of ramp generator in optical recorder? [2]
- 2 Define any two characteristics of biomedical instrument. [2]
- 3 Define Tachycardia and Bradycardia. [2]
- 4 Draw and explain briefly Einthoven triangle. [2]
- 5 Define fluoroscopy. [2]
- 6 Define systolic and diastolic pressure. [2]
- 7 Define leakage current. [2]
- 8 Define threshold of perception. [2]
- 9 Why grid is used in radiography? [2]
- 10 Discuss phonocardiography. [2]

**PART – B (50 Marks)**

- 11 Explain in detail optical recorder with neat diagram. [10]
12. a) Write the specifications of ECG recorder. [5]  
b) Write a short notes on natural pacemaker. [5]
13. a) Explain catheterization method for measurement of BP. [7]  
b) Discuss about amplifiers and filters used in phonocardiography. [3]
- 14 a) Explain A and B mode of ultrasound imaging. [5]  
b) Write advantages and disadvantages of Laser surgery. [5]
- 15 Explain Micro shock and Macro shock in detail and their effect on physiological Behavior of the patient. [10]
16. Explain 10-20 electrode system used in EEG. [10]
17. Write a short note on  
a) Potentiometric recorder [5]  
b) Plethysmograph [5]

\*\*\*\*\*

**FACULTY OF ENGINEERING****B.E. (ECE) VI - Semester (CBCS) (Suppl.) Examination, December 2019****Subject : Digital Communication****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  | List the advantages of digital communication system over analog counter part. | 2 |
| 2  | Explain the significance of eye pattern in PCM.                               | 2 |
| 3  | What is base band digital transmission?                                       | 2 |
| 4  | What are the advantages of DM over DPCM.                                      | 2 |
| 5  | Define the term mutual information and self information.                      | 2 |
| 6  | Explain in detail about symmetric channel.                                    | 2 |
| 7  | Explain the need for source coding.   | 2 |
| 8  | Explain Shanon's theorem and write Shanon's capacity theorem.                 | 2 |
| 9  | What are the application and effects of spread spectrum?                      | 2 |
| 10 | Compare and contrast a correlation receiver and a matched filter.             | 2 |

**PART – B (50 Marks)**

- |       |   |    |
|-------|---|----|
| 11 a) | Explain the working of PCM system with neat block diagram. Calculate the mean square quantization noise $\bar{\epsilon}_q^2$ for the same.  | 5  |
| b)    | Calculate the minimum no. of uniform quantizing levels required for speech PCM when the signal to quantization noise ratio is equal to 60 dB and also calculate the system band width required.                             | 5  |
| 12 a) | Discuss in detail about a symmetric channel.  | 5  |
| b)    | Derive the equation for Hartley Shanon's theorem.   | 5  |
| 13 a) | Illustrate the Huffman source coding procedure for a source that emits symbols with probabilities P(x) are given as 0.40, 0.20, 0.12, 0.08, 0.08, 0.08 and 0.04. Determine the code efficiency for a trinary number system. | 6  |
| b)    | Also calculate coding efficiency ' ' using shano fano coding.   | 4  |
| 14    | With a neat block diagram explain the generation and demodulation of QPSK and also calculate its Pe.  | 10 |
| 15 a) | Explain the characteristics of a matched filter.  | 4  |
| b)    | Derive an expression for the probability of error for FSK modulation scheme.  | 6  |
| 16 a) | Explain the application and effects of spread spectrum.   | 5  |
| b)    | Explain in detail the course acquisition of frequency hopped signal.  | 5  |
| 17    | Write short note on :   |    |
| a)    | Generation of PN sequence   | 5  |
| b)    | M-ary signaling   | 5  |

\*\*\*\*\*

## FACULTY OF ENGINEERING

**B. E. (Mech.) (CBCS) VI – Semester (Supply.) Examination, December 2019**

**Subject: Metal Cutting & Machine Tools**

**Time: 3 hours**

**Max. Marks: 70**

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

### PART – A (10 x 2 = 20 Marks)

1. What are the desirable properties of cutting tool materials?
2. What are the types and functions of chip breakers?
3. How temperature is measured by radiation pyrometer?
4. Define machinability. How metals are rated?
5. Difference between Capstan and Turret lathe in terms of operations.
6. Sketch slider-crank quick return mechanism used in shaper.
7. How grinding wheel is specified and selected?
8. Distinguish between gear shaving and gear shaping.
9. Differentiate between a jig and a fixture.
10. Why ductile metals are not machined by AJM?

### PART – B (5 x 10 = 50 Marks)

- |   |   |
|---|---|
| 11. (a) Discuss the composition and applications of HSS, Carbides and Ceramics cutting tools.   | 3 |
| (b) The following data were obtained while orthogonal cutting of M.S rod of 60 mm diameter with $12^\circ$ rake angle tool, cutting speed 15 m/min, feed 0.25 mm/rev, length of chip is 45mm, cutting force 850 N, fed force 110 N. Calculate (i) Shear plane angel (ii) Chip thickness, (iii) Chip velocity and (iv) Power required for cutting. (Missing data may be suitable assumed). | 7 |
| 12. (a) How chip-tool interface temperature is measured by tool-work thermocouple method.   | 5 |
| (b) What are the types of tool wear mechanisms? Explain with neat sketches.   | 5 |
| 13. (a) Explain various operations carried out on milling machine.  | 5 |
| (b) Differentiate between working principle of shaper and planer.   | 5 |
| 14. (a) Explain the following (i) lapping (ii) honing and (iii) ball burnishing.  | 5 |
| (b) Discuss the principle and applications of gear hobbing and gear grinding.   | 5 |
| 15. (a) Discuss 3-2-1 principle of location for fixture design with neat sketches.  | 5 |
| (b) Explain the principle and advantages of EDM with aid of neat sketch.  | 5 |
| 16. (a) Explain the nomenclature of single point cutting tool by ASA system and state inter relation between ASA and ORS.   | 5 |
| (b) Enumerate the factors affecting tool life and explain each factor.  | 5 |
| 17. (a) Derive the shear angle $w = \frac{f}{4} - \frac{s}{2} + \frac{r}{2}$ according to Merchant's theory.  | 5 |
| (b) Explain the working principle of USM with aid of neat sketch.   | 5 |

\*\*\*\*\*

**FACULTY OF ENGINEERING****B. E.VI – Semester (CBCS)(Prod)(Suppl.) Examination, December 2019****Subject: Metal Casting and Welding****Time: 3 Hours****Max. Marks: 70****Note: Answer all questions from Part – A & any five questions from Part-B****PART – A (10 x 2 = 20 Marks)**

1. State four binders extensively used in sand casting processes in India.
2. Name the materials used in permanent mold casting processes.
3. What are different soldering alloys properties?
4. What are metallurgical structures of Low carbon steels?
5. What are properties of composite materials?
6. State the thermoplastic materials properties.
7. State the metallurgy of the joint in explosive welding process.
8. State Cupola furnace suitable for melting cast Iron.
9. State the friction welding variables.
10. What results does the ring test of weld indicate?

**PART – B (50 Marks)**

- |   |   |
|---|---|
| 11. (a) Sketch five types of Cores geometries in sand casting process.                                    | 5 |
| (b) Sketch five different types of Gating design used in Sand Casting Process.                            | 5 |
| 12. (a) Sketch and explain the methodology of ultrasonic testing to find defect in the middle of casting. | 5 |
| (b) Explain neat sketch the procedure for conduction of Shell molding process.                            | 5 |
| 13. (a) Explain torch method of soldering with neat sketch.   | 5 |
| (b) Explain the explosive welding set up equipment with sketch.   | 5 |
| 14. (a) Sketch all defects caused due to resistance welding.  | 5 |
| (b) Explain welding characteristics of A1 and A1 alloys using Metal Arc welding.                          | 5 |
| 15. (a) Explain the root cracking test with neat sketch.  | 5 |
| (b) Explain thermo forming Plastic Moulding Processes with neat sketch.                                   | 5 |
| 16. (a) Explain the role of process parameters in centrifugal casting.                                    | 5 |
| (b) Explain the suitability of thermosetting plastics as moulding materials.                              | 5 |
| 17. (a) Explain the hot crack formation in Casting.   | 5 |
| (b) Explain the details of Weld rod specification.  | 5 |

\*\*\*\*\*



**FACULTY OF ENGINEERING****B. E.VI – Semester (CBCS)(A.E)(Suppl.) Examination, December 2019****Subject: Design of Automotive Components****Time: 3 Hours****Max. Marks: 70****Note: Answer all questions from Part – A & any five questions from Part-B****PART – A (10 x 2 = 20 Marks)**

1. What is the function of "Rocker arm"?
2. List out any two functions of Piston Ribs.
3. Explain Poppet Value and why Exhaust Value is smaller than Inlet value.
4. Define Nipping.
5. Maximum load applied on the leaf spring is 75 kN. Distance between two eye is 1m.  $E=20700N/mm^2$ ,  $b = 9t$ ,  $t=12mm$  and Total Number of spring is 8. Find out Nipping.
6. Explain Wahls factor.
7. Define stiffness of the spring and write the equivalent stiffness equation for the parallel and series connected system.
8. Radial load acting on the ball bearing is 3kN, shaft rotating speed 600 RPM, bearing life in hours 30,000. Find out the bearing life in million revolutions?
9. Write the any two application of bearing life in million revolutions?
10. What is pitting failure?

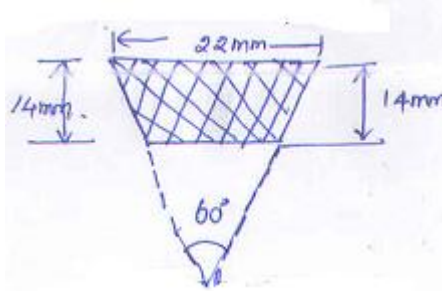
**PART – B (50 Marks)**

11. The bore cylinder of the four stroke diesel engine is 175mm, the maximum gas pressure inside the cylinder is  $3.5 N/mm^2$ . Ultimate tensile strength of cylinder head is  $200 N/mm^2$  and of its factor of safety is 5. Studs are used to fix the cylinder and obtained leak proof. Yield strength of stud material is  $250 N/mm^2$ , factor of safety is 5. Calculate. (10M)
  - i) Number of studs
  - ii) Pitch of studs
12. Following data given for connecting rod: (10M)  
 Engine speed 1500 rpm, length of the connecting rod is 320mm; density of the material is  $7830 kg/m^3$ , thickness of the web is 6mm and Assume the cross section  

$$A = 11t^2 \quad I_{xx} = \left(\frac{419}{12}\right)t^4 \quad \text{and} \quad Y = \frac{5t}{2}$$
 Calculate whipping stress in the connecting rod.
13. A ball bearing subjected to a radial load of 7.5 KN is expected to have of life of 9500 hr at 1700rpm with reliability of 99%. Calculate dynamic load capacity of bearing based on a reliability 90%. (10M)
14. Following data given for a  $360^\circ$  hydro dynamic bearing. Radial load 6.5 kN. Journal speed 1200 PM. Journal diameter 70 mm, Bearing Length 60 mm minimum film thickness is 0.009mm. Calculate viscosity (Assume  $\frac{h_o}{c} = 0.2$  and  $S = 0.446$ ) (10M)

-2-

15. It is require to design a spur of gear with  $20^\circ$  full depth involutes teeth consists of a (10M)  
 20 pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW,  
 1450 RPM electric motor. The starting torque of the motor is 150% of torque,  
 $S_{ut} = 410\text{M}/\text{mm}^2$  of pinion,  $S_{ut} = 200\text{N}/\text{mm}^2$  of gear and  $F_oS = 1.5$ . Design the gear  
 based on the Lewis equation and using Velocity factor to account the dynamic load.
16. V belt connecting to a 20kW, motor to compressor, distance between the pulleys (10M)  
 center is 1m.  $\rho = 0.97\text{ gm/cc}$  and allowable bell tension is 900N. Diameter of driven  
 pulley is 950 mm, diameter of drive pulley is 500 mm, speed of small pulley is 1750  
 rpm, speed of big pulley is 450 rpm, Calculate Number of belts required.



17. Explain:

- Hotch-kiss driv
- Over drive
- Differential Speed ratio calculation

(4)

(2)

(4)

\*\*\*\*\*

## FACULTY OF ENGINEERING

BE VI Semester (CBCS)(CSE)(Suppl.) Examinations, December 2019

Subject: Design & Analysis of Algorithms

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 chromatic number of a graph.
2. State node cover decision problem.
3. What is NP completeness?
4. State travelling sales person problem.
5. Explain linear probing in Hashing with an example.
6. Define articulation point. Give an example.
7. Solve fractional knapsack problem for the given problem instance weights  $W:\{1,4,8,2,6\}$  Profit  $P:\{4,10,5,15,20\}$ . The Knapsack capacity is 30.
8. Explain Game trees.
9. Explain about explicit and implicit constraints of 8-queen's problem.
10. Explain Biconnected components with an example.

### PART – B (5 x 10 = 50 Marks)

11. a) Construct 10 entry Hash Table for hashing the keys 15,32,12,77,85,67,26,48,113,54 using the function  $(i+6)\text{mod } 10$  using linear probing. (7M)  
 b) Write Algorithm to find maximum & Minimum from a set. (3M)
12. Find an optimal binary merge pattern for ten files whose length are 28,43,9,18,74,53,94,36,13,11. (10M)
13. Solve the following instance of optimal Cost Binary Search Tree:  
 $n=4$ ;  $(a_1 - a_4) = (\text{do,if,int,while})$ ,  $P(1:4) = (3,3,1,1)$ ,  $Q(0:4) = (2,3,1,1,1)$ . (10M)
14. Solve the travelling salesman problem using dynamic programming for the following (10M)
 

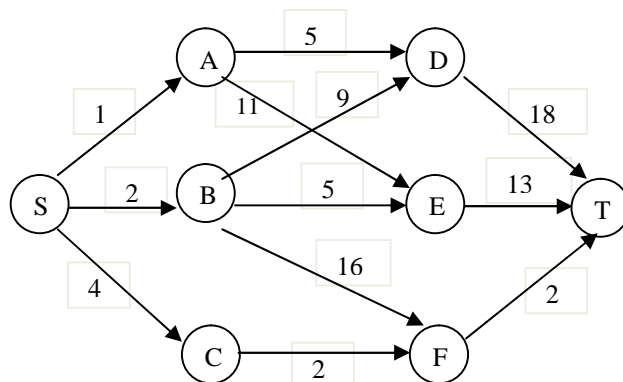
(	0	10	15	20	)
5	0	9	10		
6	13	0	12		
8	8	9	0		
15. a) Define m-coloring problem. Write an algorithm to solve it using back tracking. (7M)  
 b) Difference between NP-Hard and NP-Complete. (3M)
16. Explain an algorithm for merge sort and derive the time complexities. (10M)
17. Write short notes on
  - a) Big O notation (4M)
  - b) Node Cover Decision Problem (3M)
  - c) DAG for common sub expression (3M)

**FACULTY OF ENGINEERING****B.E. VI – Semester (CBCS) (I.T) (Suppl.) Examination, December 2019****Subject: Design and Analysis of Algorithms****Time: 3 Hours****Max. Marks: 70****Note: Answer All Questions From Part – A, & Any Five Questions From Part – B.****PART – A (2 x 10 = 20 Marks)**

- 1) Show that (i)  $6.2^n + n^2 = O(2^n)$   
(ii)  $10 \cdot \log n + 4 = \theta(\log n)$
- 2) Define Heap.
- 3) Solve the recursive relation  $T(n) = 3.T(n/2) + n^2$
- 4) Briefly differentiate quick sort and merge sort.
- 5) Differentiate greedy method and dynamic programming.
- 6) What is multistage graph?
- 7) What is Hamiltonian cycle? How it is different from the tour of travelling salesperson problem?
- 8) Define the properties of LC search.
- 9) Define the terms cliques, node cover.
- 10) Differentiate between NP-hard and NP-complete.

**PART – B (5 x 10 = 50 Marks)**

- 11 a) Explain briefly
  - (i) Hash function
  - (ii) Collision resolution techniques (5 M)
- b) Draw the worst case tree using weighting rule of Union after implementing following set of operations Union(1, 2), Union(3, 4), Union(5, 6), Union(7, 8),  
Union(1, 3), Union(5, 7), Union(1, 5) (5 M)
- 12 a) What is knapsack problem? Explain. (3 M)
- b) Find the optimal solution to the knapsack problem when  
 $(W_1, W_2, W_3, W_4) = (10, 15, 6, 9)$ ,  $(P_1, P_2, P_3, P_4) = (2, 5, 8, 1)$ .  
Knapsack capacity = 25, where  $W_i$ 's are weights and  $P_i$ 's are profits. (7 M)
- 13) Consider the given multistage graph. Find the shortest path from S to T. (10 M)



14. a) Explain solution of graph coloring problem using backtracking. (5 M)  
b) What is Branch and Bound strategy? Explain. (5 M)
15. a) State Cook's theorem. Explain its significance in NP –complete theory. (5 M)  
b) Write a non-deterministic algorithm for sorting. (5 M)
- 16 a) Write an algorithm for all pairs shortest paths. (5 M)  
b) Sort the following number 3, 7, 16, 12, 15, 11, 14, using heap sort. who the step by step procedure. (5 M)
- 17) Write short notes on any two of the following
- a) Kruskal's algorithm for minimum cost spanning tree. (5 M)  
b) Big-oh, Omega, Theta notation (5 M)  
c) Optimal cost binary search trees (5 M)

\*\*\*\*\*

OU - 1607 OU - 1607

**FACULTY OF ENGINEERING****B.E 3/4 (Civil) II Semester (Backlog) Examination, Dec 2019****Subject: Steel Structures****Time : 3 HOURS****Max. Marks: 75**

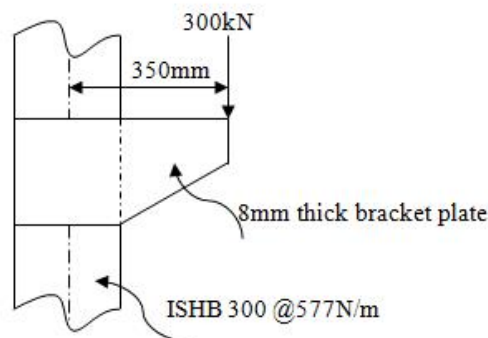
**Note: Answer All Questions from Part-A and Any Five Questions from Part-B  
Use of IS 800 2007 is permitted**

**PART – A (25 Marks)**

- 1 Distinguish between working stress method and limit state method. 2M
- 2 Write the advantages of Friction Grip bolts over Ordinary black bolts. 2M
- 3 With the help of neat sketch, explain the failure of bolt in single and double shear. 2M
- 4 Explain three modes of failures with diagrams in case of tension members. 2M
- 5 Distinguish between laterally supported and laterally unsupported beams. 2M
- 6 Explain about Web buckling and Web crippling. 3M
- 7 Define slenderness ratio and effective length of a compression member. 3M
- 8 Explain about column splicing. 3M
- 9 What are the various loads considered in design of roof trusses? 3M
- 10 Write the formulae for self wt of truss and economical spacing of truss. 3M

**PART – B (50 Marks)**

- 11 Design a double cover butt joint to connect two plates of 300mmX20mm carrying a factored load of 1000KN. The cover plates are of 8mm thickness and also find efficiency of joint. use M20 bolts of grade 4.6 and Fe410 grade steel plates.
- 12 A bracket is bolted to a flange of column as shown in fig. use 8mm thick bracket plate. use M20 bolts of grade 4.6 and Fe410 grade steel plate is used. Design the connection



- 13 A single angle tension member carry a working load of 200KN. Design the member if it is connected to the gusset plate through a single row bolted connection. Adopt limit state method. Use Fe410 steel and M20 bolts of grade 6.8.
- 14 Design a simply supported beam which has an effective span of 6m. It is subjected to a factored load of 50KN/m, design the beam if it is laterally supported. Use limit state method

-2-

- 15 Design a built up column consisting of two channels back to back subjected to a working load of 1000KN. Design a battened column if the effective length is 5.5m. Use Fe410 grade plate. Use limit state method
- 16 Design an I section purlin to support A.C sheet roof. The purlin are 1.5m apart over roof truss spaced 5m c/c. the roof surface has an inclination of  $15^\circ$  to the horizontal. The dead load is  $0.25 \text{ KN/m}^2$  and live load of  $1 \text{ KN/m}^2$ . The wind load on the roof surface is  $2.6 \text{ KN/m}^2$ .
- 17 Write short notes on the following
- (a) Block shear with help of neat sketch
  - (b) Section modulus, plastic modulus and shape factor with formulae
  - (c) Lug angle with neat sketch

\*\*\*\*\*

OU - 1607 OU - 1607

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (EEE) II - Semester (Backlog) Examination, December 2019**

**Subject : Electrical Machinery - III**

**Time : 3 Hours**

**Max. Marks: 75**

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

**PART – A (25 Marks)**

- 1 Explain armature reaction in an alternator & its ill effects.
- 2 Which type of alternator is suitable for hydroelectric power plant & Why ?
- 3 Why synchronous method of finding regulation considered as pessimistic method ?
- 4 List the conditions for connecting the alternators in parallel.
- 5 Bring out an analogy between synchronous motor & induction motor.
- 6 Does the speed of synchronous motor change when loaded ? If not explain how the motor takes load ?
- 7 Define the term transient stability with respect to synchronous machines.
- 8 State the features of switched reluctance motors.
- 9 Discuss the validity of the following statements: The change of excitation in one of the alternators operating in parallel does not change the load sharing between them.
- 10 Why centrifugal switches are provided on many single phase induction motor ?  
What happens to the motor if the centrifugal fails to open ?

**PART – B (50 Marks)**

- 11 (a) Derive the expression for voltage induced in an alternator .Discuss the role of different factors which appear in the expression  
 (b) A 1500KVA ,11KV 3 phase star connected alternator has synchronous impedance of  $(0.5+j8)$  per phase . At rated voltage ,it delivers full load current at a p.f of 0.9lag. Determine the terminal voltage for the same excitation & current at 0.9 p.f lag.
- 12 (a) Explain why alternators are rated in KVA /MVA & what is the necessity to mention p.f on name plate.  
 (b) Two 11 KV 3 phase 50 HZ star connected synchronous generators supply a load of 5000KW at 0.8 p .f lagging .The synchronous impedance of the two machines are  $(0.8+j12)$  &  $(0.5+j10)$  respectively . The two machines share equal loads & the first machine delivers 250A at lagging p.f .Determine the current , p.f , induced emf & load angle of each machine.
- 13 On no load the EMF of a 250h.p, 2200V ,10 pole 50 HZ 3 phase star connected synchronous motor is numerically equal to & in phase with terminal voltage .When a certain load torque is applied the rotor is retarded by 1 mechanical degree .Calculate the armature current if the synchronous reactance per phase is 3 . How far is the rotor retarded when the armature current is 50A?
- 14 (a) What do you mean by hunting of a synchronous motor? What are the causes of hunting & how do you prevent them ?  
 (b) Describe how the torque is produced in hysteresis motor ? Why is these motor noise is less & list its applications?



..2..

- 15 (a) What are the different methods of starting of a single phase Induction motor ?  
(b) A 4 pole ,60 HZ ,115V single phase Induction motor is rotating in clockwise direction at a speed of 1710 rpm. Determine its per unit slip (i) in the direction of rotation (ii) in opposite direction .Also determine the effective resistance in forward & backward direction if rotor standstill resistance is 12.5
- 16 The input to an 11000V 3 phase star connected synchronous motor is 60A. The effective resistance & synchronous reactance per phase respectively are 1 & 30 . Find the power supplied to the motor & induced electromotive force for a power factor of i) 0.8lag ii) 0.8 leading
- 17 (a) Draw the connection diagram & Explain the operation of two phase servo motors. What is the advantage of drag cup type rotor?  
(b) Write short notes on shaded type motors

\*\*\*\*\*

OU - 1607 OU - 1607

**FACULTY OF ENGINEERING****B.E 3/4 (Inst.) II – Semester (Backlog) Examination, December 2019****Subject: Process Control****Time: 3 Hours****Max. Marks: 75****Note: Answer all questions from Part-A & any five questions from Part-B.****PART – A (25 Marks)**

- 1 What are the elements of Process dynamics? [3]
- 2 What is Gibb's Phase Rule? [3]
- 3 What are the merits and demerits of P+D controller? [2]
- 4 What are different Signal transmission standards in Process Industries? [3]
- 5 What is velocity error? [2]
- 6 Define Stabilization time. [2]
- 7 Find the valve coefficient pumping liquid flow rate of  $500 \text{ m}^3/\text{sec}$  with a maximum pressure of 50 Psi. the liquid specific gravity is 1.3. [3]
- 8 What is the necessity of an Actuator? [3]
- 9 What is the role of "watchdog timer" in PLC? [2]
- 10 Draw the Ladder diagram for NOR Gate. [2]

**PART – B (50 MARKS)**

- 11 a) With a schematic diagram explain the temperature control system indicating all the elements of the process control loop. [5]
- b) A thermometer having time constant response requires 5 minutes to indicate 98% of the response to sudden input. What is the time constant? [5]
- 12 Explain the P+I controller operation. Write all the relevant equations and graphical interpretation and also obtain its electronic implementation. [10]
- 13 a) Explain in detail about single speed floating controller.
- b) With a neat diagram explain the current to pressure converter. [5]
- 14 Discuss the different types of sliding stem control valves? [10]
- 15 Explain the open loop transient response method for controller parameter setting. [10]
- 16 a) Explain the PLC Programming with an example. [5]
- b) With a neat diagram explain the PLC operation. [5]
- 17 Write short notes on
  - a. Resistance Element. [4]
  - b. Control Valve Sizing. [3]
  - c. Discrete State Process. [3]

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (ECE) II – Semester (Backlog) Examination, December 2019**

**Subject: Digital Signal Processing**

**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. Compute DTFT of  $(1/2)^n U(n)$ . (2)
2. What is In-place computations and Bit-reversal order related to FFT? (3)
3. Compare Bilinear and Impulse Transformation techniques. (3)
4. What is aliasing? (2)
5. Mention the advantages and disadvantages of FIR and IIR filters. (2)
6. List out the characteristics of Rectangular window. (3)
7. Discuss the advantages of multi-rate signal processing. (2)
8. Draw the diagram where an Interpolator can be placed for efficient implementation of FIR structure. (3)
9. Name few architectures used for P-DSP's. (3)
10. Which addressing modes are specifically tailored for DSP applications? (2)

**PART – B (50 Marks)**

- 11.(a) Find the Linear Convolution of the following sequences using DFT method  
 $x(n) = \{1, 0, 2\}$ ,  $h(n) = \{1, -1, 1, -1\}$  (6)  
 (b) State and prove any two properties of DFT. (4)
- 12.(a) Compute DRT of the sequence  $x(n) = \{1, 3, 3, 3\}$ , sketch the magnitude and phase spectrum. (5)  
 (b) Compute 8-point DFT of the discrete time signal  $x(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$  using DIT-FFT algorithm. (5)
13. Design a High Pass Filter of length 7 with cutoff frequency of 2 rad/sec using Hamming window. (10)
- 14.(a) Describe the decimation process with a factor of D. Obtain the necessary expression. (6)  
 (b) Discuss the implementation of Multi-stage Decimators and Interpolators. (4)
15. Design a Butterworth digital IIR Low pass filter using Bilinear transformation technique by taking  $T = 0.2$  sec, to satisfy the following specifications. Draw direct form I structure. (10)
 
$$0.7 \leq |H(e^{j\omega})| \leq 1.0, \text{ for } 0 \leq \omega \leq 0.4\pi$$

$$|H(e^{j\omega})| \leq 0.3, 0.7\pi \leq \omega \leq \pi.$$
16. Draw the block diagram of TMS320C54X processor and explain the functions of each block. (10)
17. Write short notes on any two: (10)
  - (a) Over Lap ADD method.
  - (b) CISC, RISC and DSP characteristics.
  - (c) Impulse Invariant Technique.

**FACULTY OF ENGINEERING**

**B.E. 3/4 (Mech.) II - Semester (Backlog) Examination, December 2019**

**Subject : Metal Cutting and Machine Tool Engineering**

**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 State the features of cutting oils.
- 2 Sketch Orthogonal and oblique cutting process.
- 3 What is machinability?
- 4 State the types of tool wear.
- 5 State specification of Lathe machine.
- 6 What are work holding devices in lathe operations?
- 7 Sketch external thread rolling process.
- 8 State a principle of burnishing.
- 9 State the special features of Jig.
- 10 State or sketch the 3-2-1 principle of location.

**PART – B (50 Marks)**

- 11 a) Explain the properties of tool materials.  
b) Sketch tool geometry nomenclature according to DIN system.
- 12 a) Sketch different sources of heat generation and its distribution in single point cutting mechanism.  
b) Explain the i) high speed test method of tool life estimation ii) variable speed test for tool life.
- 13 a) State different work holding devices in drilling operation.  
b) Explain with neat sketch the drive mechanism used in slotting machine.
- 14 a) State eight types of milling operations.  
b) Sketch i) external centre-less grinding ii) internal on-centre and off-centre grinding.
- 15 a) Explain with sketches the principles of location used in machine.  
b) Explain the working of EDM process with neat sketch.
- 16 a) Sketch and explain the resultant cutting forces in turning operation due to single point cutting tool in orthogonal cutting.  
b) Explain with sketch the thread grinding method on the Lathe machine.
- 17 a) Explain the difference between slotter and shaping machine.  
b) Sketch and explain the gear hobbing process.

\*\*\*\*\*

**FACULTY OF ENGINEERING****B.E. 3/4 (Prod.) II – Semester (Backlog) Examination, December 2019****Subject: Metal Casting and Welding****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part-A and any five questions from Part-B****PART – A (10x 2½ = 25 Marks)**

- 1 Which sand has best refractory properties in India
- 2 What is the difference between true centrifugal and semi-centrifugal casting?
- 3 State the elements of Arc welding system
- 4 What is weldability?
- 5 State the mechanical properties of plastics
- 6 State the simulation tests conducted in weld joint for casting.
- 7 What pattern materials are used in Die casting process?
- 8 What are carbon equivalent tests on weld – State?
- 9 List the testing methods for casting.
- 10 State the principles of good soldering.

**PART – B (5x10 = 50 Marks)**

- 11 a) Explain the allowances provided in wood pattern and metal pattern. 5  
b) Explain how sand mould is tested for hardness with sketch. 5
- 12 a) Sketch the five most common defects occurring in die casting process. 5  
b) Sketch and explain continuous casting method with also five types of geometric sections produced by this process. 5
- 13 a) Explain the Arc welding processes parameters with equipment setup. 5  
b) Explain the electrode classification (i) AWS-ASTM, (ii) BHS, (iii) IS system. 5
- 14 a) Explain the welding of austenitic stainless steel. 5  
b) Explain electric resistance spot welding electrodes shapes with sketch. 5
- 15 a) Explain the hot cracks formation with neat sketch. 5  
b) Explain plastic injection moulding processes with neat sketch with advantages. 5
- 16 a) Explain welding characteristics of Al and Al alloys using resistance welding. 5  
b) Explain the welding of austenitic stainless steel properties using GTAW. 5
- 17 a) Sketch the procedure for Investment casting. 5  
b) Sketch the defects occurring of cast iron components. 5

\*\*\*\*

**FACULTY OF ENGINEERING****B.E. 3/4 (AE) II – Semester (Backlog) Examination, December 2019****Subject: Performance and Testing of Automotive Vehicles****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. Explain with a neat sketch aerodynamics effects on vehicle functions.
2. What are the affects of rear end geometry and front end geometry on drag coefficient?
3. Show the location of fluid coupling in the transmission system.
4. Draw a neat sketch of epicyclic gear box.
5. How do you ensure safety of the vehicle? Justify with your answer.
6. Will traffic conditions and driving habits effects the fuel economy? How?
7. Write the characteristics of automotive brakes.
8. What are the advantages of independent front end suspension?
9. Explain how the gear box is to be tested.
10. Explain how the suspension is to be tested.

**PART – B (50 Marks)**

11. (a) Explain the relation between engine revolution and vehicle speed.  
(b) Briefly explain the term rolling resistance.
12. (a) Describe the construction and working of constant mesh gear box.  
(b) How will you find the total gear ratio from engine to rear wheels for the above?
13. (a) Define engine rating and explain RAC, SAE, DIN rating.  
(b) Explain brake thermal efficiency, ideal air standard efficiency and relative efficiency.
14. Explain the mechanics of a hydraulic braking system  
Force on front pedal = 80N  
Pedal leverage ratio = 3.5  
Master cylinder stroke be 1 cm and area = 4.5cm<sup>2</sup>  
Front piston area = 19 cm<sup>2</sup>  
Rear piston area = 5 cm<sup>2</sup>
15. Draw the rack and pinion steering system and explain the mechanism briefly.
16. Explain briefly any 4 engine testing methods with neat sketches.
17. Derive an expression for frictional torque acting on ring of single plate(Single dic).

\*\*\*\*\*

**FACULTY OF ENGINEERING****BE 3/4 (CSE) II Semester (Backlog) Examinations, December 2019****Subject: Design & Analysis of Algorithms****Time: 3 Hours****Max. Marks:75****Note: Answer all questions from Part – A & any five questions from Part – B****PART-A (25 Marks)**

1. Write the control abstraction for Greedy approach? (2M)
2. Show the following: (2M)
  - (a)  $10n^2 + 9 \neq O(n)$
  - (b)  $n^3 + 10n^2 = \Theta(n^3)$
3. Find an optimal binary merge pattern for files whose lengths number of records are 2, 5, 7, 9, 12, 13, 15 (3M)
4. Write an Algorithm to insert an element into a Heap? (3M)
5. Write a Nondeterministic knapsack algorithm (3M)
6. What is meant by satisfiability? (2M)
7. Define optimal binary search tree with an example. (3M)
8. State the methodology of Branch and Bound. (3M)
9. Explain the Hamiltonian Circuit Problem (2M)
10. What is DFS and list its applications? (2M)

**PART – B(5x10=50 Marks)**

11. a) Explain Reliability Design Problem with suitable example. (4M)
  - b) Solve the following instance of 0/1 Knapsack problem using Dynamic programming  
 $n = 3; (W_1, W_2, W_3) = (3, 5, 7); (P_1, P_2, P_3) = (3, 7, 12); M = 4.$  (6M)
12. Explain Travelling sales person problem LCBB procedure with the following instance and draw the portion of the state space tree and find an optimal tour (10M)
 
$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$
13. Explain the P, NP, NP-Hard and NP-complete classes? Give relationship between them? (10M)
14. a) Sort the Following Numbers using Quick sort 30 40 50 10 20. (4M)
  - b) Find the feasible solution for job sequencing with deadlines for the instance  $n=5$ ,  
 $(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$  and  $(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$  (6M)
15. a) Explain Space Complexity of an Algorithm? (4M)
  - b) Write and explain the final algorithm for collapse rule with an example. (6M)

contd...2

- 16.a) Explain 4-queens problem using backtracking (4M)
- b) Consider the knapsack for the instance  $n = 4$ ,  $(w_1, w_2, w_3, w_4) = (10, 15, 6, 12)$  and  $(P_1, P_2, P_3, P_4) = (2, 5, 8, 1)$  and  $m = 21$ . Generate the sets  $S^i$  and find optimal solution. (6M)
- 17.a) Briefly explain spanning trees and their applications. (3M)
- b) State Cook's theorem. Explain its significance in NP-complete theory. (7M)

\*\*\*\*\*

OU - 1607 OU - 1607



**FACULTY OF ENGINEERING**  
**BE 3/4 (I.T) II Semester (Backlog) Examination, December 2019**

**Subject: Data ware Housing and Data Mining**

**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 Data Mining.  | 3M |
| 2 List out the preprocessing techniques.                         | 2M |
| 3 What is Binning? Give example.                                 | 3M |
| 4 What is a Metadata Repository?                                 | 2M |
| 5 Explain briefly Market Basket Analysis.                        | 3M |
| 6 What is Apriori Principle?                                     | 2M |
| 7 Compare Classification and Prediction.                         | 2M |
| 8 Define classifier accuracy measures.                           | 3M |
| 9 Define Concept hierarchy with an example.                      | 2M |
| 10 Draw Boxplots that are used for measuring dispersion of data. | 3M |

**PART – B (50 Marks)**

- |   |    |
|---|----|
| 11 (a) List and describe five primitives for specifying a data mining task.   | 5M |
| (b) Discuss various techniques used in data integration and transformation.   | 5M |
| 12 (a) Explain three tier data warehouse architecture.  | 5M |
| (b) Explain Attribute Oriented Induction approach to data generalization.   | 5M |
| 13 (a) Explain Apriori Algorithm.   | 4M |
| (b) Apply Apriori algorithm to find all frequent item sets and strong association rules for the following database, where min_sup = 60% and min_conf = 80%. | 6M |

Tid	Items
T100	{K, A, D, B}
T200	{D, A, C, E, B}
T300	{C, A, B, E}
T400	{B, A, D}

- |  |    |
|--|----|
| 14 (a) Explain the nearest neighboring classification technique, give its algorithm.   | 5M |
| (b) Explain how does the Naive Bayesian classification works?  | 5M |
| 15 (a) What is clustering? What are different types of clusters?   | 5M |
| (b) Compute the Distance between the two data objects given as<br>X(22,1,24,10,46) and Y(12,2,24,23,46) using Manhattan, Euclidean distance. | 5M |
| 16 (a) Describe the role of Data Mining in Spatial Databases.  | 5M |
| (b) Explain in detail about text mining applications.  | 5M |
| 17 Write short notes on:   |    |
| (a) OLAP Cube Operations.  | 4M |
| (b) Mining various kinds of association rules.   | 3M |
| (c) Bayesian Classifier.   | 3M |

\*\*\*\*\*

## FACULTY OF ENGINEERING

B. E. (Civil) (AICTE) III – Semester (Main) Examination, December 2019

Subject: Solid Mechanics

Time: 3 hours

Max. Marks: 70

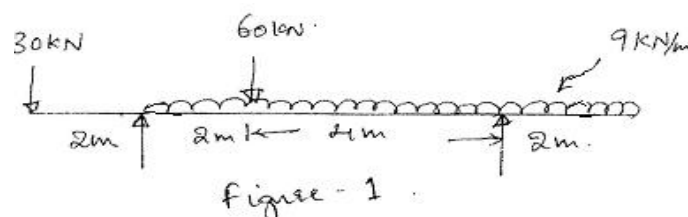
**Note:** Answer all questions from Part-A. Answer any FIVE questions from Part-B.

### PART – A (20 Marks)

1. Define Poisson's ratio and give the relation between Poisson's ratio, Bulk modulus and modulus of rigidity.
2. Find the maximum bending moment diagram of a simply supported beam of span 4m subjected to a central point load of 20 KN and sketch BMD.
3. Sketch the shear stress distribution across a square section and write the relation between maximum and average shear stress for it.
4. A point in a strained material is subjected to a pure shear of 20MPa. Calculate major and minor Principal stresses.
5. What is core of a section? Sketch the core of I-section.
6. A thin cylinder of 800mm internal diameter is subjected to an internal pressure of 6 N/mm<sup>2</sup>. Calculate the thickness of the cylinder if the permissible tensile stress is 240 N/mm<sup>2</sup>.
7. Sketch the radial pressure and hoop stress distribution across the thickness of a thick cylinder and write relevant equations.
8. Differentiate between coiled and laminated springs.
9. Calculate the section modulus of a hollow circular section of 100mm external and 80mm internal diameter.
10. Define strain energy and give the relation between stress due to gradually applied load and suddenly applied load.

### PART – B (50 Marks)

11. A steel rod of 20mm diameter is enclosed in a copper tube of 22mm internal and 24mm external diameter. The ends are rigidly fastened by nuts and washers. The nuts are tightened until there is a tension of 20kN in the rod. Calculate the stresses in rod and tube if the temperature of the assembly is raised by 60°C.  $E_s = 200 \text{ GN/m}^2$ ,  $E_c = 100 \text{ GN/m}^2$ ,  $\alpha_s = 12 \times 10^{-6}/^\circ\text{C}$  &  $\alpha_c = 18 \times 10^{-6}/^\circ\text{C}$ .
12. Draw shear force and bending moment diagrams for the simply supported beam shown in fig.1.



13. A point in a strained material is subjected to principal stresses of  $100\text{N/mm}^2$  (tensile) and  $60\text{N/mm}^2$  (comp). It is also accompanied by a simple shear stress of  $20\text{N/mm}^2$ . Find the principal stresses, maximum shear stress and the position of principal planes.
14. A thin cylindrical shell of 600mm internal diameter is subjected to an internal pressure of 4MPa. Calculate the thickness, if the change in diameter is 0.096mm. Also calculate the change in length of cylinder.  $E = 200\text{GPa}$ ,  $\nu = 0.3$ .
15. (a) A solid circular shaft is to transmit 240KW at 120 RPM. If the maximum torque exceeds the mean by 30% and the shear stress is not to exceed  $80\text{N/mm}^2$ , calculate the diameter of the shaft.
- (b) A closely coiled helical spring has mean coil diameter equal to 10 times of wire diameter. If the permissible shear stress and deflection under a load of 300 N are  $60\text{N/mm}^2$  and 50mm respectively, calculate the number of coils and the wire diameter.  $C = 80\text{GPa}$ .
16. Sketch the shear stress distribution across an I – section whose top flange is 120mm x 10mm, bottom flange 150mm x 10mm and the depth of web is 180mm with 10mm thickness, if the section is subjected to a shear force of 200KN.
17. A compound cylinder is made by shrinking a cylinder of external diameter 300mm and internal diameter 250mm over another cylinder of external diameter 250mm and internal diameter 200mm. The radial pressure at the junction after shrinking is  $8\text{N/mm}^2$ . Calculate the final stresses across the section when water is admitted into the compound cylinder with an internal pressure of  $80\text{N/mm}^2$ .

\*\*\*\*\*

## FACULTY OF ENGINEERING

B.E III-Semester (AICTE) (EEE/Inst)(Main)Examination, December 2019

Subject: Electromagnetic Fields

Time: 3 Hours

Max. Marks: 70

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

### PART – A (20 Marks)

- 1 What are the various types of charge configurations, and give the charge densities? also give the mathematical expression to compute the charge on the configuration.
- 2 What is equi-potential surface. Give the mathematical expression.
- 3 What is Gaussian surface and what are the conditions to satisfy the surface as Gaussian surface?
- 4 State divergence and stokes theorems, also give mathematical expressions.
- 5 What is the difference between resistance and reluctance, give its mathematical expressions.
- 6 Given the function  $A = (x + z)ax + (-3z)ay + (x - 3y - z)az$ , show that it is both irrotational and solenoidal.
- 7 Given the potential function  $V = x^2 - y^2 + z^2$ , show that its satisfies the Laplace equation.
- 8 Give the mathematical expression for differential volume for cylindrical and spherical coordinate systems.
- 9 Define intrinsic impedance and give mathematical expression for it.
- 10 Give the mathematical expression for the travelling electromagnetic wave in free space.

### PART – B (50 Marks)

- 11 a) A conducting triangular shaped conductor with A(3,1,1), B(5,4,2) and C(1,2,4) carrying a current of 0.2 A in the presence of Magnetic field  $0.2 ax - 0.1 ay + 0.3 az$ . Find the torque on the loop at origin (0, 0, 0).  
b) State and explain Biot-Savart Law and deduce field intensity due to a long conductor. 5+5
- 12 a) The potential function is given as  $V = 2y^4 + 10x^3$  in free space. Determine the Volume charge density at point P (2,0,0). 5+5  
b) Determine the boundary conditions between two perfect dielectric materials.
- 13 a) A charge of 6C is moved during the path designed by  $y = 3x^2 + z$ ;  $z = x + 4$  against the electric field  $\vec{E} = -8xyax - 4x^2ay + az$  v/m. Determine the work done to move the charge. 6+4  
b) State and explain Biot-Savart Law.
- 14 a) A point charge  $Q = -12C$  has a velocity  $\vec{V} = (5ax + 2ay - 3az)$  m/sec. Find the magnitude of force exerted on the charge, if  
 $E = -18ax + 5ay - 10az$  v/m and  
 $B = -4ax + 4ay + 3az$ . 6+4  
note that electric and magnetic fields exists individually and both are present.  
b) Find the polarization in dielectric material with relative permittivity 2.8 and the flux density is  $3 \times 10^{-7} C/m^2$ . ...2

15. a) A parallel plate capacitor is Quarter filled with a dielectric slab of  $\epsilon_r = 3$  The area of cross reaction is  $10 \text{ cm}^2$  and the separation distance is 4 mm. Find the capacitance of the capacitor. 5+5
- b) Deduce the expression for self and mutual inductance is term of physical parameters.
16. a) State and deduce the expression for Electromagnetic power using Poynting theorem. 6+4
- b) Given  $\vec{A} = \sqrt{2}ar + 3az$ , determine the Equirident Cartesian Coordinates at  $(3, 3\frac{f}{4}, 9)$ .
17. a) Write Troile Constant Maxwell's Equation and derive how they are converted with toie varying Maxwell's Equations. 5+5
- b) Derive the Laplace and Poission Equation.

\*\*\*\*\*

**FACULTY OF ENGINEERING****B.E. (ECE / CSE / IT) III – Semester (AICTE) (Main) Examination, December 2019****Subject: Digital Electronics****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 State and prove distributive laws and show their implementation using fundamental gates.
- 2 What is K-Map? Discuss the types of K-Maps.
- 3 Design half adder using only NAND gates.
- 4 Draw and write the truth table of active high 2x4 line decoder
- 5 Write the comparison between CPLD and FPGA.
- 6 Write Verilog code for 3-input AND gate
- 7 Compare and contrast between latches and Flip-Flops.
- 8 What is race-around condition? How to avoid it?
- 9 What is Finite State Machine (FSM)? Classify FSMs.
- 10 Define ASM chart. Tabular the notable differences between conventional flow chart and ASM chart.

**PART – B (5x10 = 50 Marks)**

- 11 a) Expand  $\bar{X} + \bar{Y}$  to minterms and maxterms. 4
- b) Reduce the following functions using a K-Map and identify prime implicants and essential prime implicants. 6
$$f(a, b, c, d) = m(0, 1, 2, 3, 6, 7, 13, 15)$$
- 12 a) What is a full adder? Draw the block diagram and truth table of a full adder. Obtain the design equations. Show an implementation of a full adder using fundamental gates. 5
- b) Define magnitude comparator? Draw the block diagram and truth table of a one bit magnitude comparator. Show an implementation using logic gates. 5
- 13 a) Design a 3-bit Binary to Gray code converter using 3x8x3 PLA. 5
- b) Explain CPLD architecture with a neat circuit diagram. 5
- 14 a) Convert T Flip-Flop to JK Flip-Flop. 3
- b) Design a Mod-10 asynchronous counter (ripple) using T Flip-Flops and explain its operation with a timing diagram. 7
- 15 Design a sequence detector to detect the sequence of 0101 with D-Flip-Flops and the overlapping is permitted, i.e. for example, if the input sequence is 01010010101 the corresponding output is 00010000101. 10
- 16 a) What are the advantages and disadvantages of K-Map and Tabulation method? 2
- b) What is meant by a Prime Implicant, an Essential Prime Implicant, and a secondary Prime Implicant? 3
- c) Design BCD to seven segment decoder and implement segments **a** and **b** using NAND gates only.
- 17 a) Write Verilog code for 2x4 line decoder using data flow style of modeling. 5
- b) Explain SISO shift register and its applications using D Flip-Flops. 5

**FACULTY OF ENGINEERING****B E III – Semester (AICTE)(M/P)(Main) Examination, December 2019****Subject: Metallurgy and Material Science****Time: 3 hours****Max Marks: 70****Note: Answer All Questions from part-A, and Any Five questions from Part-B****PART – A (10 x 2 = 20 Marks)**

- 1 What are line imperfections? State different line imperfections?
- 2 Define endurance limit?
- 3 What is ductile brittle transition temperature?
- 4 Distinguish between proportional limit and elastic limit?
- 5 Why annealing should not be the final heat treatment of hyper eutectoid steels?
- 6 What are intermediate phases?
- 7 Define critical cooling rate?
- 8 What are Stainless steels?
- 9 What are the general properties of ceramics?
- 10 What is Munz metal?

**PART – B (5 x 10 = 50 Marks)**

- 11 a) Distinguish between cold working and hot working? (5M)  
b) What is critical resolved shear stress? derive an equation for critical resolved shear stress? (5M)
- 12) a) Distinguish between ductile and brittle fracture? (5M)  
b) Explain about creep deformation mechanism? (5M)
- 13) a) Draw the Iron-Iron carbide equilibrium diagram and label all regions? Explain the phase reactions that take place in the system. (6M)  
b) Discuss Hume- Rothery rules for solid solubility? (4M)
- 14) a) Differentiate between Martempering and Austempering? (5M)  
b) What are alloy steels? How are they classified? (5M)
- 15) a) Explain the various steps in age hardening treatment? (5M)  
b) A continuous and aligned polyester resin Glass fiber reinforced composite contains 40 Vol% of fibers having modulus of elasticity of 69 Gpa, Modulus of elasticity of resin is 3.4 Gpa, Assume no voids calculate the modulus of elasticity of the composite in longitudinal direction? (5M)
- 16) a) Differentiate between slip and twining? (5M)  
b) Sketch and explain how fatigue test data is plotted? (5M)
- 17) Write Short notes on
  - a) Cast irons (3M)
  - b) Maraging steels (3M)
  - c) Thermo plastics. (4M)

\*\*\*\*\*

**FACULTY OF ENGINEERING****B. E. (AICTE) (A.E) III – Semester (Main) Examination, December 2019****Subject: Fluid Mechanics & Machinery****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. Define the following and write their units  
(a) Viscosity (b) Kinematic Viscosity 2
2. Define Surface Tension and write the formula of Surface tension on a liquid droplet. 2
3. Differentiate Turbulent flow and Laminar flow. 2
4. What is Velocity Potential Function? 2
5. Write the Darcy-Weishbach formula and express each term. 2
6. Define Syphon and write its uses. 2
7. Differentiate between Impulse Turbine and Reaction Turbine. 2
8. Draw the inlet and outlet velocity triangles for a Pelton Turbine and indicate the direction of velocities. 2
9. Define the Over-all efficiency of Centrifugal Pumps and write its formula. 2
10. What is the difference between the turbine and Pump? 2

**PART – B (50 Marks)**

11. (a) The Right Limb of a simple U-tube Manometer containing Mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of Specific gravity of 0.9 is flowing. The centre of pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm. 6  
(b) How the Fluid is classified and explain them in detail. 4
12. Define the equation of continuity. Obtain an expression for Continuity Equation for a three dimensional flow. 10
13. (a) At a sudden enlargement of water main pipe from 240 mm to 480mm diameter, the hydraulic gradient rises by 10mm. Estimate the rate of flow. 7  
(b) Define the Hydraulic Gradient line. 3
14. A Pelton wheel is having a mean bucket diameter of 1 meter and is running at 1000 rpm. The net head on the Pelton wheel is 700m. If the side clearance angle is  $15^\circ$  and discharge through nozzle is  $0.1\text{m}^3/\text{s}$  find (i) Power available at the nozzle (ii) Hydraulic efficiency of the turbine. 10
15. (a) Explain the working of double acting Reciprocating Pump with a neat sketch. 5  
(b) Define the specific speed of a Centrifugal Pump and derive an expression for the same. 5
16. (a) A 30cm x 15cm Venturimeter is inserted in a vertical pipe carrying water, flowing in the upward direction a differential mercury Manometer connected to the inlet and throat gives a reading of 20cm, find the discharge. Take  $C_d = 0.98$ . 6  
(b) How the viscosity depends upon temperature, explain in detail. 4
17. (a) A plate 0.025mm distant from a fixed plate, moves at 60cm/s and requires a force 20N per unit area i.e  $2\text{N}/\text{m}^2$  to maintain this speed. Determine the fluid viscosity between the plates. 6  
(b) What is laminar boundary Layer? Explain. 4

\*\*\*\*\*