Code No. 2656 / CBCS / M

FACULTY OF ENGINEERING

B.E. (Civil) VI – Semester (CBCS) (Main) Examination, Nov./Dec. 2020

Subject: Steel Structures

Time: 2 Hours **Max.Marks: 70**

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

PART – A (5x2 = 10 Marks)

1 Distinguish between the working stress method and Limit state method.
2 Distinguish between web buckling and web crippling
3 Why battens and laces are provided to built-up columns?
4 Find the load for a roof truss having a slope of 28^o
5 Define strength of bolt and explain how to calculate the strength of bolt.
6 Explain theory of plastic analysis.
7 What are the load combinations that are usually considered for truss analysis?
8 List some of the tension members used in buildings and bridges.
9 Explain three modes of failures with diagrams in case of tension members.
10 What is the effective slenderness ration for Laced and Battened columns?

PART – B (4x15 = 60 Marks)

11 Two steel plates of size 210 x 14 mm are to be connected by a double cover butt joint with M20 bolts of grade 4.6, to resist a factored force of 650 KN. Design the joint.

12 A single angle ISA 150mm x 115mm x 10 mm is connected to a 10 mm thick gusset plate at the ends with six M18 bolts of 4.6 grade in one row. Determine the design strength of angle if the gusset is connected to 115 mm leg. Use limit state method.

13 Design a simply supported beam of 6m span carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The total udl is made up of 120kN/m dead load including self-weight plus 130kN imposed load. In addition, the beam carries a point load at mid span made up of 60kN dead load and 60kN imposed load.

14 Design a gusseted base for a steel column ISMB 350. The column carries an axial load of 1000kN, grade of concrete in foundation is M25.

15 Design a built-up laced column with two channels placed back to back to support axial load of 1000kN. The column is 8m long both ends are in position and restrained against rotation. Assume Fe 410 grade steel.

16 The truss for a factory building is spaced at 3.8m c/c and the purlins are spaced at 1.0 m c/c. the pitch of truss is 1/3 and the span of the roof truss is 12m. the vertical load from roof sheets is $250N/m^2$ and wind load normal to roof is $1400\ N/m^2$. Design a channel section purlin.

17 Write short notes on the following:
a) Beam column connection
b) Column splices
c) Bracings in roof trusses

****

Code No. 2676/CBCS/M

FACULTY OF ENGINEERING

B.E. (EEE) VI-Semester (CBCS) (Main) Examination, Nov./Dec. 2020

Subject : Electrical Machines – III

Time : 2 Hours **Max. Marks: 70**

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

PART – A (5x2 = 10 Marks)

1 Why alternator are rated in KVA rather than in KW?
2 Explain the significance of synchronous reactance.
3 Two reaction theory is applied to salient pole alternators. Why?
4 List the advantages of connecting synchronous generators in parallel.
5 Draw the phasor diagram of synchronous motor at lagging p.f.
6 Explain why synchronous motor does not have starting torque.
7 What do you understand by transient stability of synchronous machines?
8 What is meant by synchronizing power?
9 List two properties of switched reluctance motor.
10 List two advantages of brushless D.C. motor.

PART – B (4x15=60 Marks)

11 (a) Distinguish between unsaturated and saturated value of reactance. Which one should be used for higher accuracy in predicting the voltage regulation of a synchronous generator.
(b) A 500 KVA, 1100V 50 HZ star connected 3 phase alternator has armature resistance of 0.1Ω/phase and synchronous reactance of 1.5Ω/ phase. Find its voltage for (a) unity P.F. (b) 0.9 lagging (c) 0.8 leading. Also calculate the voltage regulation in each case.

12 (a) A 480V, 6 pole star connected, 50Hz cylindrical rotor synchronous generator has negligible armature resistance and 1Ω synchronous reactance. The full load armature is 60A. Total losses at full load are 4.2KW. The field current is adjusted such that terminal voltage at NO LOAD is 480V. Find (a) Terminal voltage and regulation at full load at 0.8 p.f. lagging (b) efficiency at full load 0.8 p.f. lagging (c) shaft torque applied by prime mover at 0.8 p.f. lagging.

13 On no load the EMF at a 250 h.p., 220V, 10 pole 50 Hz 3 phase star connected synchronous motor is numerically equal to and 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 3Ω. How far is the rotor retarded when the armature current is 50A?

..2

14 (a) Explain the different methods of synchronization of alternators.
(b) Explain the effect of variation of excitation on p.f. and armature current and out line its significance.

15 (a) A 1200 KW, 0.6 p.f. load is connected in parallel with a synchronous motor to raise overall p.f. to 0.9 lagging. The motor draws 50KW input. Find the KVA input of synchronous motor.
(b) What do you understand by hunting and how is it prevented?

16 (a) Explain the torque speed characteristics of brushless D.C. motor.
(b) Derive the torque expression of an SRM.

17 (a) Derive equation for power generated in synchronous generator with and without salient poles.
(b) Discuss briefly the short analysis of an alternator.

*****

Code No: 2680/CBCS

FACULTY OF ENGINEERING

B. E. VI - Semester (EIE) (CBCS)(Main) Examination, November/December 2020

Subject: Biomedical Instrumentation

Time : 2 Hours **Max. Marks: 70**

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

PART – A (5x2 = 10 Marks)

1 State the desirable features of inkjet Recorder.

2 Mention the characteristic of medical instrumentation devices.

3 Mention the working principle of EMG.

4 Define the various heart sounds in a phonocardiogram.

5 Draw and briefly explain the Phonocardiogram.

6 State the Doppler principle of blood flow measurement.

7 State the principle of generation of X-rays.

8 What is the use of fluoroscopy?

9 What are the safety codes used during bioelectric monitoring?

10 What is meant by Medical Imaging?

PART – B (4x15=60 Marks)

11 (a) Describe the special features of Thermo-sensitive and Optical recorder with neat diagram.
(b) Explain the display devices with relevant diagrams.

12 Explain the operating principle with the block diagram of ECG Machine Mention the special types of ECG recorders with the suitable diagrams.

13 (a) Explain clearly the blood flow measurement using the electromagnetic principle.
(b) Explain the origin and characteristics of heart sounds.

14 (a) Write short notes on medical imaging.
(b) Explain in the working of auto-analyzer with neat diagram.

15 Describe in detail the electrical factors governing the hospital design.

16 (a) Distinguish between EEG and ECG, Explain 10-20 Electrode system.
(b) Explain the techniques for indirect measurement of Blood pressure.

17 Write short notes on
(a) MRI
(b) Phonocardiography

****

Code No. 2689 / CBCS / M

FACULTY OF ENGINEERING

B.E. (ECE) VI - Semester (CBCS) (Main) Examination, Nov./Dec. 2020

Subject : Digital Communication

Time : 2 Hours **Max. Marks: 70**

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

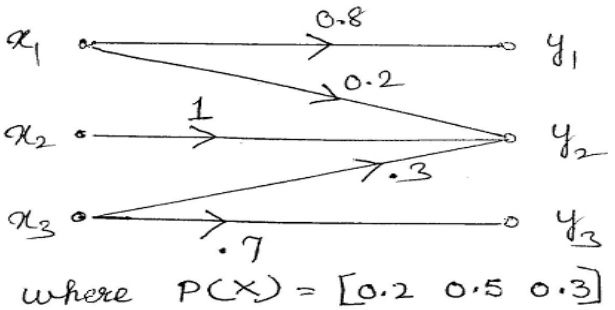
PART – A (5x2 = 10 Marks)

1 List the merits and demerits of digital communication system over analog counter part.
2 Explain the need for quantization.
3 Explain about inter symbol interference.
4 Explain the need for companding in voice PCM.
5 Define the term trans information.
6 Derive an equation for the entropy of a noise free channel.
7 Explain the need for error control coding.
8 Explain SNR and Bandwidth trade off.
9 What are the applications and effects of spread spectrum?
10 What do you understand by tracking in spread spectrum communication?

PART – B (4x15=60 Marks)

11 a) Calculate the (S/Nq) ratio for a PCM system when the input is a sample function of Gaussian random process of zero mean.
b) ADM system is designed to operate at four times the Nyquist rate for a signal with 4KHz Bandwidth. The quantizing step size is 250 mV.
Determine :
i) The maximum amplitude of a 1 KHz input sinusoid for which the delta modulator does not show slope over load.
ii) Determine the post filtered output signal to quantization noise ratio for the signal of part (i).

12 a) Prove that the entropy of a binary DMC is maximum if both the bits are equally likely.
b) Find the transferred information for the channel shown below :



..2

13 Explain the computation of the syndrome vector in LBC.
How is it useful to identify the error position in the received code vector.

14 Calculate the probability of error Pe and the impulse response of a matched filter.

15 a) Explain with neat block diagram the modulation and demodulation of FSK.
b) Calculate Pe for noncoherent P.S.K.

16 a) Explain the advantages of frequency hopping.
b) Explain in detail the coarse acquisition of a direct sequence spread spectrum signal.

17 a) Explain in detail about ARQ
b) Compare various digital carrier modulation schemes.

******

Code No. 2697 / CBCS

FACULTY OF ENGINEERING

B.E. VI-Semester (Main) Examination, Nov./Dec. 2020

Subject : Metal Cutting & Machine Tools

Time : 2 Hours **Max. Marks: 70**

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

PART – A (5x2 = 10 Marks)

1 List the essential properties of materials used for making cutting tools.
2 Summarize different types of back rake angles adopted on single point cutting tool.
3 Define Machinability Index.
4 What are the limitations of cutting fluids?
5 Express the specification of a lathe.
6 Outline the operations performed on Milling Machine.
7 How the grinding wheel is specified?
8 Recall the principle of Lapping process.
9 Examine any two differences between USM and LBM.
10 Label the usage of jigs and fixtures in Industry.

PART – B (4x15=60 Marks)

11 (a) Describe the geometry of single point cutting tool by ORS system.
(b) In a orthogonal cutting the following data is observed. Back rake angle = 10^o, Feed = 0.2 mm/rev, chip thickness=0.4mm, Cutting force = 100 kgf, feed force = 80 kgf, determine shear force, frictional force, coefficient of friction.

12 (a) Explain the sources of heat generation during metal cutting.
(b) Explain the role and applications of cutting fluids.

13 (a) Explain any four operations on drilling machine.
(b) Distinguish between Shaper and Planer.

14 (a) Describe gear shaping process.
(b) Explain external centerless grinding process.

15 (a) Distinguish between conventional machining with Unconventional machining process.
(b) Explain locating devices used in development of jigs and fixtures.

16 (a) Describe chip breakers and its importance in machining.
(b) Examine the factors affecting the life of a tool.

17 (a) Explain the working of EDM.
(b) Elaborate thread rolling process.

*****

Code No.2702/CBCS /M

FACULTY OF ENGINEERING

B.E. VI-Semester (CBCS) (Prod.) (Mani) Examination, Nov./Dec. 2020

Subject : Metal casting and Welding

Time : 2 Hours **Max. Marks: 70**

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

PART – A (5x2 = 10 Marks)

1 State the elements of gating system.
2 What is chaplet, when and where it is suitable for usage?
3 State the four reasons for selecting slush casting over other processes.
4 An aluminium-copper alloy casting is made in a sand mold using a sand core that weighs 20kg. Determine the buoyancy force (N) tending to lift the core during poring. The density of Al-Cu (92% Al) is 2.81g/cm3.
5 State the advantages of LBW and EBW in metallurgy of Joint.
6 What is groove weld?
7 State the types of Resistance Weld processes.
8 State the parameters for generation of resistance between the electrodes.
9 State the reasons for formation of porosity in weld joints.
10 State the manufacturing application of ABS.

PART – B (4x15=60 Marks)

11 a) In casting experiments performed using a certain alloy an type of sand mold, it took 155 seconds for a cube shaped casting to solidify. The cube has 50mm on the side **a)** determine the value of mold constant in Chvorinov's rule, **b)** if the same alloy and mold type were used, find the total solidification time for a cylindrical casting in which the diameter =30cm and length =50mm.
b) Sketch the steps of Investment mould casting – with explanation.

12 a) A horizontal true centrifugal casting process is used to make a lead pipe for chemical plants. The pipe has length 0.5m, outside diameter 70mm, and wall thickness 6mm, determine the rotational speed that will provide a G-factor of 60.
b) Explain the salient features of cold chamber die casting processes.

13 a) In a certain welding operation to make a fillet weld, the cross-sectional area 0.025cm2, and the travel speed=15cm/min. If the heat transfer factor is 0.95 and melting factor is 0.5, and melting point 2000^0F for the metal to be welded, determine the rate of heat generation required at the heat source to accomplish this weld.
b) State the most suitable application of i) SMAW, ii) SAW, iii) GMAW, iv) GTAW.

…….2

14 a) Sketch of Resistence Seam Weld with temperature generation.
   b) Two flat copper plates, each 1.0mm are being spot welded by 5000A and current flow time 0.25s. The electrode diameter is 5mm, Estimate the heat generated for in the weld zone if resistance is 100micro ohm.

15 a) Explain Non Destructive testing using ultrasonic method to detect weld defects.
   b) Explain the parameters affecting pressure thermo forming process.

16 a) A cylindrical riser must be designed for a sand casting mold. The casting itself is a steel rectangular plate with dimensions 7.5cmx12.5cmx2.0cm. The total solidification time for this casting 1.6min. The cylinder for the riser will have a diameter-to-height ratio 1.0. Determine the dimensions of the riser for solidification time 2.0min.
   b) Discuss the One Inspection Method for evaluation of casting defects with neat sketch.

17 a) A horizontal true centrifugal casting process is used to make a brass bushing with following dimensions. Length 10cm, outside diameter 15cm, inside diameter 12cm, a) determine the required rotational speed in order to obtain a G-factor of 70, b) when operating at this speed, what is the centrifugal force per square meter (Pa) imposed by the molten metal on the inside of the wall of the mold?
   b) Explain the weld testing procedure by Cruciform test.

****

Code No.2704/CBCS /M

FACULTY OF ENGINEERING

B.E. (A.E) VI-Semester (CBCS) (Main) Examination, Nov./Dec. 2020

Subject : Design of Automotive Components

Time : 2 Hours **Max. Marks: 70**

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

PART – A (5x2 = 10 Marks)

1 Sketch the crank shaft and show the forces acting in the crank shaft.
2 What is the effect of side thrust on IC Engine cylinder liner?
3 What is clash allowance in compression springs?
4 Explain the utility of center bolt, U-clamp, rebound clip and camber in a leaf spring.
5 Explain the details of the SKF designated bearing 6108.
6 Explain Bearing characteristic number and bearing modulus.
7 What are the design considerations of gear drive?
8 Differentiate between cycloidal and involute tooth profiles used in gears.
9 Why the face of the pulley is crowned?
10 What is a function of the differential in an automotive vehicle.?

PART – B (4x15=60 Marks)

11 Design the cross section of connecting rod of petrol engine, from the following data: Diameter of piston =80mm, Length of connecting rod =30mm. Maximum explosion pressure =2.2 N/mm^2, Factor of safety =5, the rod of I-section, with width 4t and depth 5t where 't' is the thickness of the web and flanges.
Compare the values of 't' obtained in direct compression and buckling.

12 A four stroke diesel engine has the following specifications: Brake power = 5kW, speed =1200 rpm, IMEP =0.35 N/mm^2, η mech =80%. Determine **a)** bore and length of the cylinder **b)** Thickness of cylinder head **c)** size of the studs for the cylinder head.

13 A spring is made source wire of 1.5 mm diameter and 700 N/mm^2 as its yield strength. For a mean diameter of 30 mm and 14 active coils of the spring Determine:
a) Static load corresponding to the yield point of the material and deflection corresponding to that. Take G =0.85 x 10^5 N/mm^2.
b) Solid height, assuming that the ends are square and ground.
c) Stiffness of the spring.
d) Pitch of the coil so that the stress will not exceed the yield point.

…….2

14 A semi elliptic leaf spring 1100mm long and 50mm wide is held together at the center by a band of 100mm wide. If the thickness of each leaf is 5mm, find the number of leaves required to carry a load of 4500 N. Assume a maximum working stress of 490 MPa. If the two of these leaves extend the full length of the spring, find the deflection of the spring. The young's modulus of the spring material may be taken as 210 k N/mm^2.

15 A pair of helical gears consist of 18 teeth pinion meshing with a 45 teeth gear. An electric motor of 60kW running of 2000 rpm is supplying power to the pinion. The helix angle is 23^0 and the normal pressure angle is 20^0. Determine the tangential, radial and axial loads between the meshing teeth of the module of 8mm in the normal plane to the teeth.

16 A pair of straight tooth bevel gears transmits 15kW at 1250 rpm of 120mm diameters case hardened steel pinion of 350 MPa, to a heat-treated cast steel gear of 190 MPa at a speed ratio of 3.5. Use 14 ½ involute tooth system. The angle between shaft axes is 90^0 take service factor as 1.25 design the gears and suggest suitable hardness for the gears.

17 Write short notes on
   a) Ring Gear
   b) Limited Slip Differentials
   c) Hotchikss drive
   d) Torque tube drive

****

Code No.2716/CBCS/M

FACULTY OF ENGINEERING

B. E. (CSE) VI – Semester (CBCS) (Main) Examination, Nov./Dec. 2020

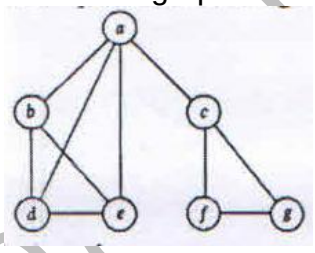
Subject: Design & Analysis of Algorithms

Time : 2 Hours **Max. Marks: 70**

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

PART – A (5x2 = 10 Marks)

1. For a given problem P, two algorithms A1 and A2 have respectively time complexities T1(n) and T2(n) in terms of size n, where T1(n) = $2n^2$ + 3 and T2(n) = 1000n+5000.
   Which of the algorithms is efficient and explain the reason why?
2. Write an algorithm for inserting an element into max heap.2
3. Write the recurrence relation of merge sort algorithm and derive the complexity in the worst case.
4. What is Principle of Optimality?
5. Explain travelling salesperson problem.
6. Draw bi connected components of the graph.

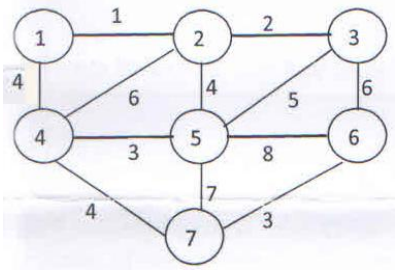


7. What is Hamiltonian cycle?
8. What is DFS and list its applications?
9. Explain Satisfiability.
10. Find an optimal binary merge pattern for files whose lengths are 2, 4, 8, 10, 12, 13, 20.

PART – B (4x15=-60 Marks)

11. (a) What are the collision resolution policies in hashing? Write an algorithm for hashing with linear probing.
    (b) Explain set representation. Write algorithms for 'Union' and 'FIND' and discuss time complexities.

12. (a) Write a recursive algorithm for finding both the minimum and maximum elements in an array A of n elements. What is the running time?
    (b) Define spanning tree and explain Kruskal's algorithm for finding MST of the graph using the graph given below and write its time complexity.



…..2

13. Write recurrence relations for solving OBST using dynamic programming and construct the tree for given data:
    N = 4, (a_1, a_2, a_3, a_4) = (end, got, print, stop)
    P(1:4) = (1/20, 1/5, 1/10, 1/20) q(0:4) = (1/5, 1/10, 1/5, 1/20, 1/20)

14. (a) Write an algorithm for n Queens using backtracking approach.
    (b) Differentiate LIFO and FIFO branch and bound techniques.

15. (a) Explain what are NP-Hard and NP-Complete problems.
    (b) Explain node cover decision problem.

16. Find an optimal solution to 0/1 knapsack using LCBB when
    P: {20, 30, 35, 12, 3}, w: {2, 5, 7, 3, 1}, Knapsack capacity, m:19.

17. Explain about
    (a) Multistage graphs.
    (b) Job sequencing with deadlines using Greedy Approach.

******

Code No. 2724/CBCS/M

FACULTY OF ENGINEERING

B.E. (I.T.) VI-Semester (CBCS) (Main) Examination, Nov./Dec. 2020

Subject : Design and Analysis of Algorithms

Time : 2 Hours **Max. Marks: 70**

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

PART – A (5x2 = 10 Marks)

1 What is hashing ?List any five popular Hashing Functions?
2 Write any four specifications of an algorithm?
3 Briefly differentiate quick sort and merge sort.
4 Write the control abstraction for Greedy approach.
5 Define Travelling sales person problem?
6 Explain the 0/1 Knapsack problem?
7 Differentiate Backtracking with branch and bound?
8 Explain the Graph Coloring Problem?
9 Write a Nondeterministic sorting algorithm?
10 Define max clique problem?

PART- B (4x15=60 Marks)

11 (a) Write and Explain Asymptotic Notations (O, Omega, Theta)?
(b) Sort the following numbers 3, 16, 12, 14, 11, 15 using Heap sort. show the step by step procedure.?

12 (a) Let profits (P1,P2,P3,P4) =(100,10,15,27) and dead lines (d1,d2,d3,d4)=(2,1,2,1). Find the feasible solution and total profit Gain?
(b) Write an Algorithm for merge sort ?

13 (a) Briefly Explain Multistage Graph Problem?
(b) Consider the knapsack for the instance n = 4, (w1, w2, w3, w4) = (10, 15, 6, 12) and (P1, P2, P3, P4) = (2, 5, 8, 1) and m = 21. Generate the sets S^i and find optimal solution.

14 What are Hamiltonian Cycles? Present an Algorithm that finds all the Hamiltonian Cycles of a Given Graph?

15 Explain the P , NP , NP-Hard and NP-Complete Classes? Give Relationship between them?

16 (a) What is Branch and bound strategy? Explain with example.
(b) Write short notes on performance analysis of an Algorithm?

17 Write a short Notes on
(a) Minimum Spanning Trees
(b) Reliability Design

*****