

B. Tech (ME) R. Tech (ME) R. T. U. Que. Dec 20

Roll No.

Total Pages : 02

Total No. of Questions : 18

B.Tech.(ME) (2012 Onwards)/(Marine Engg.) (2013 Onwards) (Sem.-3)

APPLIED THERMODYNAMICS-I

Subject Code : BTME-304

M.Code : 59114

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

Answer briefly :

1. Enumerate the characteristics of a good fuel.
2. How I.C. engines are classified?
3. Write the function of knockmeter.
4. Define Pure substance.
5. Define Dryness Fraction.
6. Discuss the working of 'Superheater'.
7. What is the function of cooling tower?
8. Define Stage Efficiency of steam turbine.
9. What are the functions of condenser in a steam plant?
10. State Dalton's law of partial pressure.

SECTION-B

11. Lay down the procedure for determination of minimum air required for complete combustion of coal.
12. Describe the phenomenon of detonation in I.C. engines. On what factors does detonation depend?
13. Determine the external work done during the evaporation and internal latent heat at a pressure of 1 Mpa and dryness fraction of 0.80.
14. Explain the construction and working of a Lancashire boiler with the help of a suitable sketches.
15. The vacuum efficiency of a condenser is 96%. The temperature of condensate is 40 °C. If the barometer reads 752 mm of Hg, find the vacuum gauge reading of the condenser.

SECTION-C

16. Explain, with neat sketches, the sequence of events in the working of a two-stroke diesel engine.
17. State the effects of the following parameter in a Rankine cycle :
 - a) Steam pressure at inlet to turbine
 - b) Steam temperature at inlet to turbine
 - c) Steam pressure at exhaust
18. Dry saturated steam enters a nozzle at a pressure of 10 bar and with an initial velocity of 90 m/s. The outlet pressure is 6 bar and nozzle velocity is 435 m/s. The heat loss from the nozzle is 9 kJ/kg of steam flow. Calculate the dryness fraction and the area at the exit, if the area at the inlet is 1256 mm².

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Roll No.

Total No. of Pages : 03

Total No. of Questions : 15

B.Tech. (ME) (2018 Batch) (Sem.-3)

MACHINE DRAWING

Subject Code : BTME-303-18

M.Code : 76419

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. There are three sections in this question paper. Attempt ALL the questions from SECTION-A.
2. Attempt any TWO questions from SECTION-B and any ONE question from SECTION-C.

SECTION-A

Write briefly :

(2×10=20)

- Q1. What are multi start threads?
- Q2. Explain unilateral and bilateral tolerance.
- Q3. Write various types of riveted joints.
- Q4. What is advantage of providing bush in a bearing?
- Q5. Name various boilers mountings.
- Q6. What is the advantage of protected type flange coupling?
- Q7. Differentiate between allowance and tolerance.
- Q8. What are the functions of steam stop valve?
- Q9. Sketch the weld symbols to indicate weld all round.
- Q10. Give the classification of fits with symbols.

SECTION-B

- Q11. Represent two views of square nut with proportions and diameter of bolt as 30mm. (5)
- Q12. Draw simple sketch of flanged pipe joint. (5)
- Q13. Draw the free hand sectional front view and side view of knuckle joint. (5)

SECTION-C

Q14. Fig. 1 shows the details of a connecting rod. Draw to scale the following views of assembly: (a) Front view, right half in section (b) An outside side view (c) Top view (30)

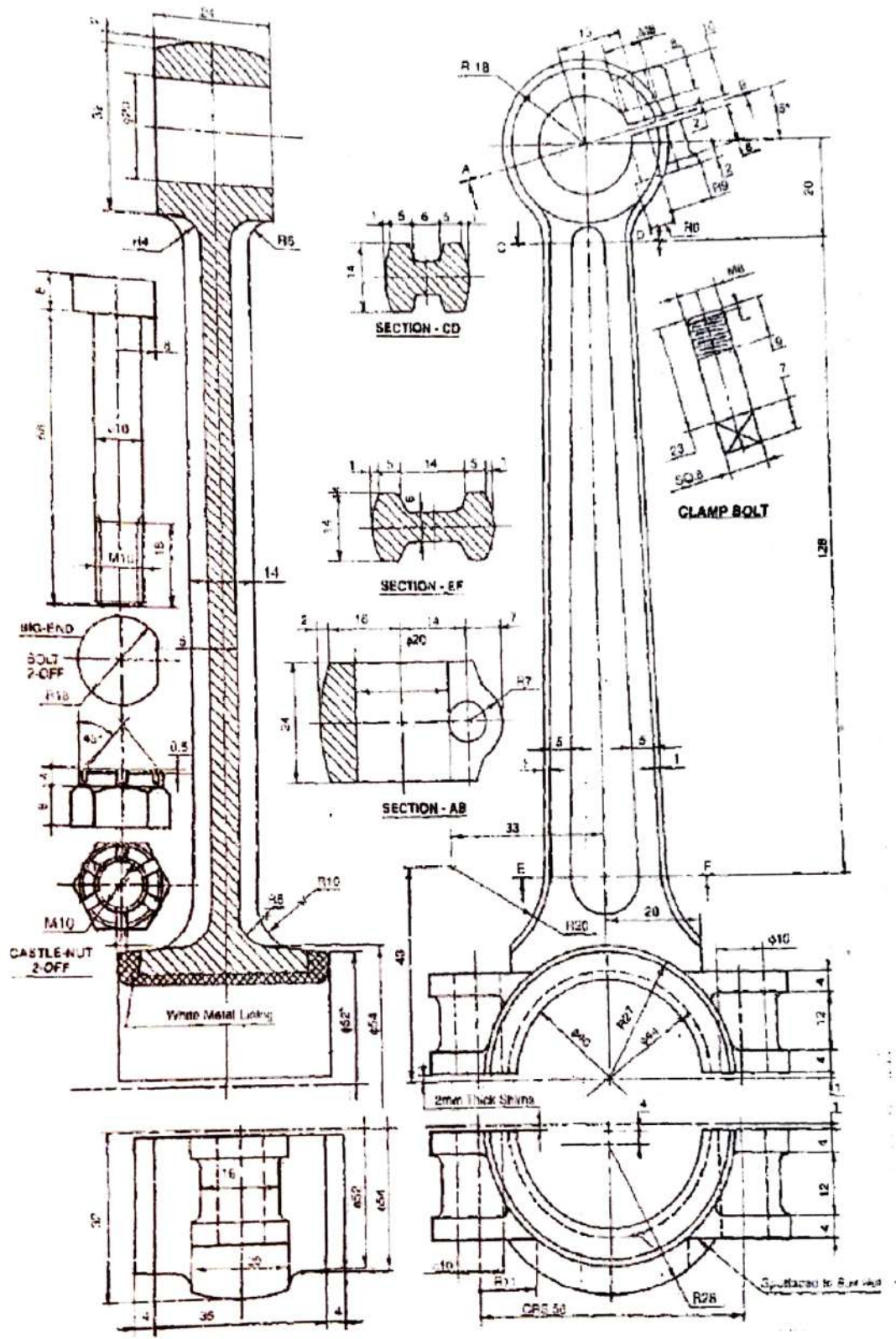


FIG.1

Q15. Draw the following views of a plummer block as shown in Fig. 2 :

(30)

- Elevation left half in section.
- Plan left half in section.

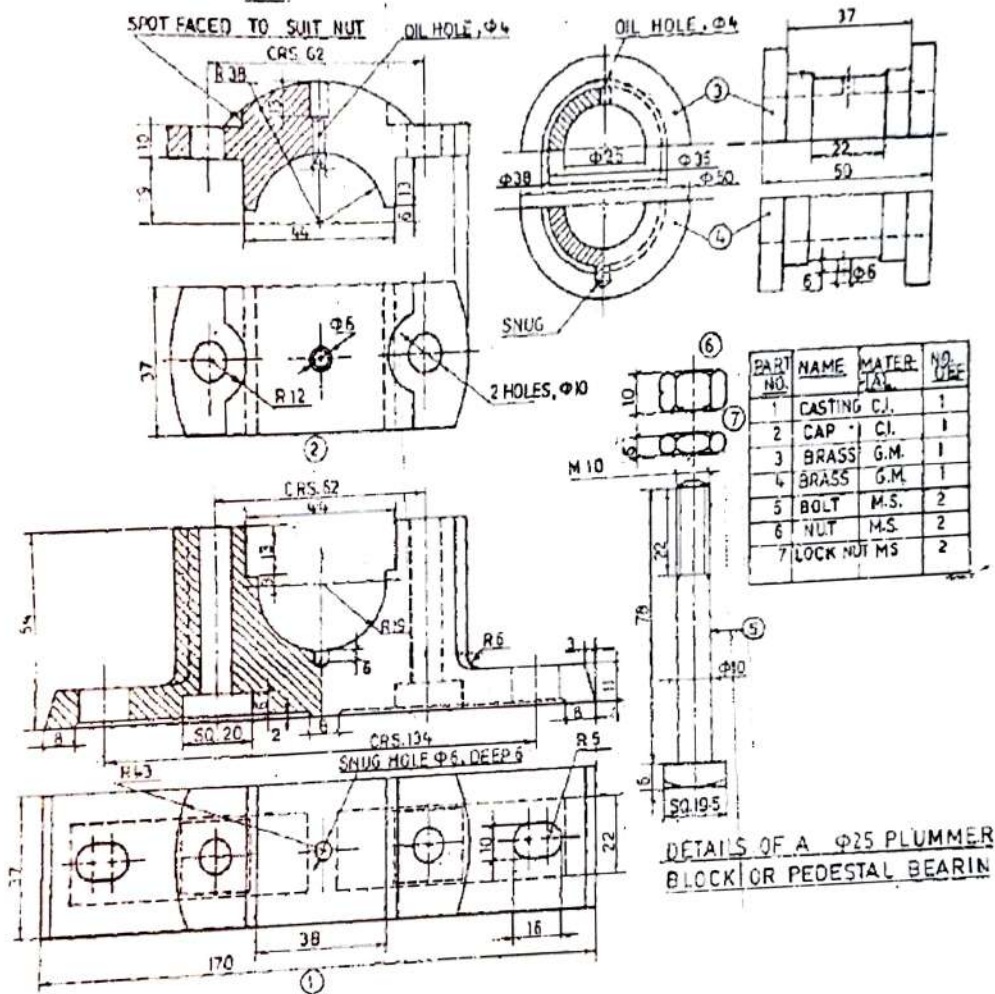


FIG.2

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2018 Batch) (Sem.-3)

BASIC THERMODYNAMICS

Subject Code : BTME305-18

M.Code : 76422

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Explain Microscopic and Macroscopic approaches to thermodynamics.
2. Differentiate Thermal and Thermodynamic equilibrium.
3. Define "Control Volume". How it is different from a system?
4. Define Third Law of Thermodynamics.
5. Define Air Standard Efficiency.
6. Differentiate between heat and work and state their salient characteristics.
7. Define Entropy. How it affects energy conversion?
8. Define "Dryness Fraction".
9. State limitations of Carnot cycle.
10. Define Mean Effective Pressure and Compression ratio.

SECTION-B

11. a) What do you understand by the thermodynamic concept of Enthalpy?
b) State Zeroth Law of Thermodynamics. Why it is called the "Zeroth Law"?
12. Define the first Law of thermodynamics as applied to Cyclic and non-cyclic processes. Also, state limitations of First law.
13. Explain the philosophy of Most Efficient Process (Reversible) ; state conditions and explain why an actual expansion process (with non-ideal gas) does not achieve reversibility?
14. Establish equivalence of two statements of 2nd law of thermodynamics.
15. Define Entropy and show that for an irreversible process.

$$\int ds > \int \delta Q / T$$

SECTION-C

16. Explain principle of working of a two stroke cycle engine with neat diagrams, also plot the cycle on p-v chart and draw its port timing diagram.
17. Discuss the effect of Inter Cooling, reheating and regeneration on gas turbine cycle with the help of P-V and T-S diagrams.
18. Compare the performance of Otto, Diesel and Dual air standard cycles on different aspects with the help of P-V and T-S diagrams.

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B.Tech. (ME) (2018 Batch) (Sem.-3)

STRENGTH OF MATERIALS-I

Subject Code : BTME-304-18

M.Code : 76421

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Distinguish between longitudinal and lateral strain.
2. What do you mean by two dimensional stress system? Give a practical example.
3. Define Shear Force and give its sign conventions.
4. Write the relation between loading, shear force and bending moment.
5. What do you mean by composite beams? Show a composite beam with a sketch.
6. Define Torsion. What is the difference between torsion and torque?
7. Give classification of columns.
8. Define Slenderness Ratio.
9. Give units of slope and deflection.
10. Name various methods used to find slope and deflection.

SECTION-B

11. Derive relation to find elongation produced in a bar due to its self weight.
12. A simply supported beam of 10 m length carries concentrated loads of 4 kN, 2 kN and 4 kN at distances 3 m, 5 m and 7 m respectively from the right support. Draw shearing force and bending moment diagrams.
13. A shaft is used to transmit 37.5 kW at 100 rpm. If the allowable shear stress is 70 MN/m^2 , find the diameter of the shaft. The maximum torque transmitted on each revolution exceeds the mean by 30%.
14. Calculate the safe compressive load on a hollow cast iron column one end rigidly fixed and other pin jointed, 150 mm outer and 100 mm inner diameter, 10 metres long. Use Euler's formula with a factor of safety of 5 and take, $E = 90 \text{ GN/m}^2$.
15. A simply supported beam of length L carries a uniformly distributed load of w per unit length over the whole span. Using double integration method, find slope and deflection at mid and end points.

SECTION-C

16. An element in a stressed material has tensile stress of 500 MN/m^2 and a compressive stress of 350 MN/m^2 acting on two mutually perpendicular planes and equal shear stresses of 100 MN/m^2 on these planes. Find principal stresses and position of principal planes by using Mohr's circle method. Also find maximum shearing stress.
17. Three beams have the same length, the same allowable stress and the same bending moment. The cross-sections of the beams are a square, a rectangle with depth twice the width and a circle. Determine the ratios of weights of the circular and the rectangular beams with respect to the square beam.
18. Write short notes on :
 - a) Mohr's circles of stress and its applications.
 - b) Explain the terms : Modulus of rupture, and torsional rigidity, and write their significance.

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B.Tech (ME)

Dec 2020

Roll No.

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B.Tech. (ME) (2018 Batch) (Sem.-3)
BASIC ELECTRONICS ENGINEERING

Subject Code : BTEC305-18

M.Code : 76420

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Differentiate between intrinsic and extrinsic semiconductors.
2. Draw the reverse bias characteristics of a p-n junction.
3. What do you mean by breakdown diode?
4. Why CE configuration is widely used in amplifier circuits?
5. What is adder or summing amplifier?
6. What do you mean by stabilization?
7. Why the input terminals of an op-amp are named as inverting input and non-inverting input?
8. Convert $(7D2.1A)_{16}$ to its decimal equivalent.
9. Which gates are called used as universal gates and why?
10. Convert $(101010.10)_2$ to octal.

SECTION-B

11. Explain the phenomenon of formation of depletion layer in the p-n junction.
12. A single phase full-wave rectifier uses two diodes, the internal resistance of each being 20Ω . The transformer rms secondary voltage from center tap to each end of secondary is 50 V and load resistance is 980Ω . Find :
 - a) The mean load current
 - b) Rms load current
 - c) Output efficiency
13. The emitter current I_E in a transistor is 3 mA . If the leakage current I_{CBO} is $5\mu\text{A}$ and $\alpha = 0.95$. Calculate the collector and base current.
14. Draw the block diagram of internal construction of op-amp and explain the function of each block in detail.
15. Minimize the following using K-map :
 $f(A,B,C,D) = \sum m(0,2,4,6,8,10,12,14)$

SECTION-C

16. a) Simplify the following Boolean equation and realize the same using a combination of AND, OR, NOR gates :
$$Y = (\bar{A} + B)(A + \bar{C})(\bar{B} + \bar{C})$$
 - b) Explain the construction and working of RS-flip flop.
17. a) Show that using Boolean algebra and De Morgan's theorems :
$$\overline{YZ} + \overline{WXZ} + \overline{WXYZ} + \overline{WYZ} = \bar{Z}$$
 - b) Explain the working of inverting summer amplifier.
18. Write short notes on **any two** :
 - a) Differentiator
 - b) Voltage divider bias circuit
 - c) Photo diode

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B.Tech. (ME) (2018 Batch) (Sem.-3)

THEORY OF MACHINES – I

Subject Code : BTME-302-18

M.Code : 76418

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. What is Kinematic Chain?
2. Explain the terms : (a) Lower pair (b) Higher pair.
3. Define Creep of Belt.
4. What is Radial Cam?
5. Define (a) Base circle (b) Pitch circle.
6. Differentiate brake and dynamometer.
7. State any two advantages of V-belt drive over flat belt drive.
8. What is Hunting of Governors?
9. Draw turning moment diagram for a four stroke cycle internal combustion engine.
10. How governor is differ from flywheel?

SECTION-B

11. Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction is 0.25?
12. What is the condition for correct steering? Discuss Ackerman steering mechanism.

13. A cam is to be designed for a knife edge follower with the following data :
- Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.
 - Dwell for the next 30° .
 - During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.
 - Dwell during the remaining 180° .

Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. Take radius of base circle of the cam = 30 mm. Also determine the maximum velocity of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

14. Explain the principle and working of Prony brake dynamometer.
15. The turning moment diagram for a multicylinder engine has been drawn to a scale $1\text{mm} = 600\text{ N}\cdot\text{m}$ vertically and $1\text{mm} = 3^\circ$ horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows : + 52, -124, + 92, -140, + 85, -72 and + 107 mm^2 , when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed $\pm 1.5\%$ of the mean, find the necessary mass of the flywheel of radius 0.5 m.

SECTION-C

16. The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified.
17. a) What do you mean by inversion of the mechanism? Explain any one inversion of four bar chain.
- b) A pulley is driven by a flat belt, the angle of lap being 120° . The belt is 100 mm wide by 6 mm thick and density 1000 kg/m^3 . If the coefficient of friction is 0.3 and the maximum stress in the belt is not to exceed 2 MPa, find the greatest power which the belt can transmit and the corresponding speed of the belt.
18. Write short notes on the following (any two) :
- Universal joint.
 - Whitworth quick return mechanism.
 - Sensitiveness of governors.

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B.Tech. (ME) (2018 Batch) (Sem.-3)

FLUID MECHANICS

Subject Code : BTME-301-18

M.Code : 76417

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

Write briefly :

1. Define Specific Volume and state its units.
2. State Newton's law of viscosity.
3. State Pascal Law.
4. Explain stable equilibrium of submerged body.
5. Define laminar and turbulent flow.
6. Define Vortex Motion.
7. What is the difference between model and prototype?
8. What are the various losses occurred in pipes?
9. Define Coefficient of Resistance.
10. What is Mach number?

SECTION-B

11. What do you mean by Surface Tension? If the pressure difference between the inside and outside of the air bubble of diameter 0.01mm is 29.2 kPa, what will be the surface tension at air-water interface?
12. A wooden block of specific gravity 0.75 floats in water. If the size of block is such that its length is 1 m, width is 0.5 m and height is 0.4 m, find its metacentric height.
13. The velocity potential function for a two dimensional flow is equal to $x(2y-1)$. Find velocity at point P(4,5) and calculate stream function at this point also.
14. Derive equation for sudden enlargement loss in pipes.
15. Explain the working of rota-meter with neat sketch.

SECTION-C

16. Derive Darcy Weisbach Equation for losses in pipes.
17. Derive continuity equation in cylindrical co-ordinates.
18. The pressure difference in a pipe of diameter D and length l due to turbulent flow depends on the velocity V, dynamic viscosity, density and roughness k. Use Buckingham's Pi theorem obtain expression for pressure difference.

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B.Tech. (ME) (2012 Onwards)/ B.Tech. (Marine Engg.) (2013 Onwards)
(Sem.-3)

STRENGTH OF MATERIALS – I

Subject Code : BTME-301

M.Code : 59111

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What do you understand by engineering stress-strain curve?
2. Differentiate between column and beam.
3. What is relationship between modulus of elasticity, modulus of rigidity and bulk modulus?
4. What do you mean by principal planes and principal stresses?
5. What is a flitched beam?
6. What is the difference between UDL and point load?
7. What do you mean by pure bending?
8. What is section modulus?
9. The maximum deflection in a cantilever beam is y . If the beam depth is doubled, what will be the corresponding deflection?
10. What will be the torque transmitted by solid circular shaft?

SECTION-B

11. A steel rod of 20 mm diameter passes centrally through a copper tube of 50 mm external diameter and 40 mm internal diameter. The tube is closed at each end rigid plates of negligible thickness. The nuts are tightened lightly home on the projecting parts of the rod. If the temperature of the assembly is raised by $50\text{ }^{\circ}\text{C}$, calculate the stresses devolved in copper and steel. Take E for steel and copper as 200GN/m^2 and 100GN/m^2 and α for steel copper as 12×10^{-6} per $^{\circ}\text{C}$ and 18×10^{-6} per $^{\circ}\text{C}$.
12. Define a composite bar. How will you find the stresses and load carried each member of a composite bar?
13. A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 rpm. Determine the maximum internal diameter if maximum stress in the shaft is not to exceed 60 N/mm^2 .
14. Derive an expression for the Euler's crippling load for a long column v both ends are fixed.
15. A simply supported beam of length 10 m carries point load of 5 kN each a distance of 3 m & 7 m from left support and also a UDL of 1 kN between the point loads. Draw S.F & B.M diagrams for the beam.

SECTION-C

16. Find an expression for deflection at any section of a simply supported beam with eccentric point load, using Macaulay's method.
17. What is Mohr's circle? Explain the detailed procedure of drawing this circle in case of a general biaxial stress system. Discuss also in detail how point on the circumference of this circle gives the state on a plane represented by the point.
18. Write short note on :
 - a. Failure of columns
 - b. Thermal stress

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B.Tech. (ME) (2012 Onwards) (Sem.-3)

MANUFACTURING PROCESSES-I

Subject Code : BTME-305

M.Code : 59115

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Explain the selection criteria for manufacturing processes.
2. Enumerate the composition of green moulding sand.
3. Explain the functions of core prints and chaplets used in casting process.
4. Explain the working principle of induction furnace.
5. Enumerate design considerations of casting process.
6. Define Nucleation.
7. Explain the working principle of atomic hydrogen welding process.
8. Enumerate different Non-destructive testing methods?
9. Explain the working principle of brazing process.
10. Explain the significance of visual examination methods.

SECTION-B

11. Explain various types of cores used in casting process giving neat sketches.
12. Describe the working principle, applications and advantages of shell mould casting process giving neat sketch.
13. Explain the working of arc welding process giving a neat sketch. Also explain the relative merits and demerits of AC and DC welding processes.
14. Discuss various types of welding defects, their causes and remedies.
15. Explain the dye penetrant test for inspection of castings giving a neat sketch.

SECTION-C

16.
 - a) Explain metallurgical considerations in casting process.
 - b) Explain various elements of gating system giving a neat sketch.
17.
 - a) Explain the working principle, applications, advantages and limitations of friction stir welding process giving a neat sketch.
 - b) Why directional solidification is necessary? How it helps in the production of sound castings? What are the factors through which directional solidification of castings can be controlled?
18.
 - a) Describe the working principle, applications and advantages of TIG welding process giving a neat sketch.
 - b) Explain the working principle of Magnetic Particle inspection giving its advantages and disadvantages.

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SECTION-C

Q16. Synthesize a network using Foster-I and Foster -II forms for the impedance function :

$$Z(s) = \frac{s(s^2 + 9)}{(s^2 + 5)(s^2 + 13)}$$

Q17. Design an m-derived T and π network low pass filter with design impedance of 600Ω and cut off frequency of 1.8 KHz and infinite attenuation at 2 KHz.

Q18. a) Define Composite filters.

b) Find Laplace transform of Fig. 5

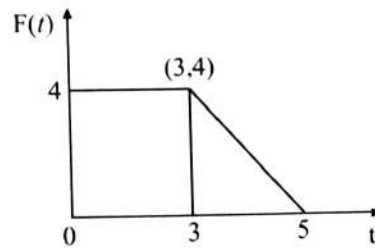


FIG.5

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Roll No.

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B.Tech. (Marine Engg.) (2013 Onwards) / (ME) (2012 Onwards) (Sem.-3)

MACHINE DRAWING

Subject Code : BTME-303

M.Code : 59113

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of NINE questions carrying TWO marks each.
2. SECTION-B contains FOUR questions carrying FOUR marks each and students have to attempt any THREE questions.
3. SECTION-C contains TWO questions carrying THIRTY marks each and students have to attempt any ONE question.

SECTION-A

Answer briefly :

- Q1) Sketch the five types of line used in machine drawing.
- Q2) Explain the term half and full section.
- Q3) What are unilateral and bilateral limits?
- Q4) Draw any two rivet heads by using suitable diameter.
- Q5) Draw edge and corner welding joints.
- Q6) What are multi start threads and where are they used?
- Q7) What is safety valve?
- Q8) Draw a view of connecting rod and show its important parts.
- Q9) What is the function of a tail stock?

SECTION-B

- Q10) Sketch two views of a single riveted double strap Butt joint for 16 mm thick plates.
- Q11) Draw the three projections of a standard square nut by using 25 mm nominal diameter.
- Q12) Make a proportionate free hand sketch of a single plate clutch.
- Q13) Draw the free hand front view (lower half in section) of a hydraulic joint for a pipe line.

SECTION-C

Q14) Figure 1 show the detail of a Plummer Block. Assemble the given components and draw the front view (Right half in section) and top view of assembly.

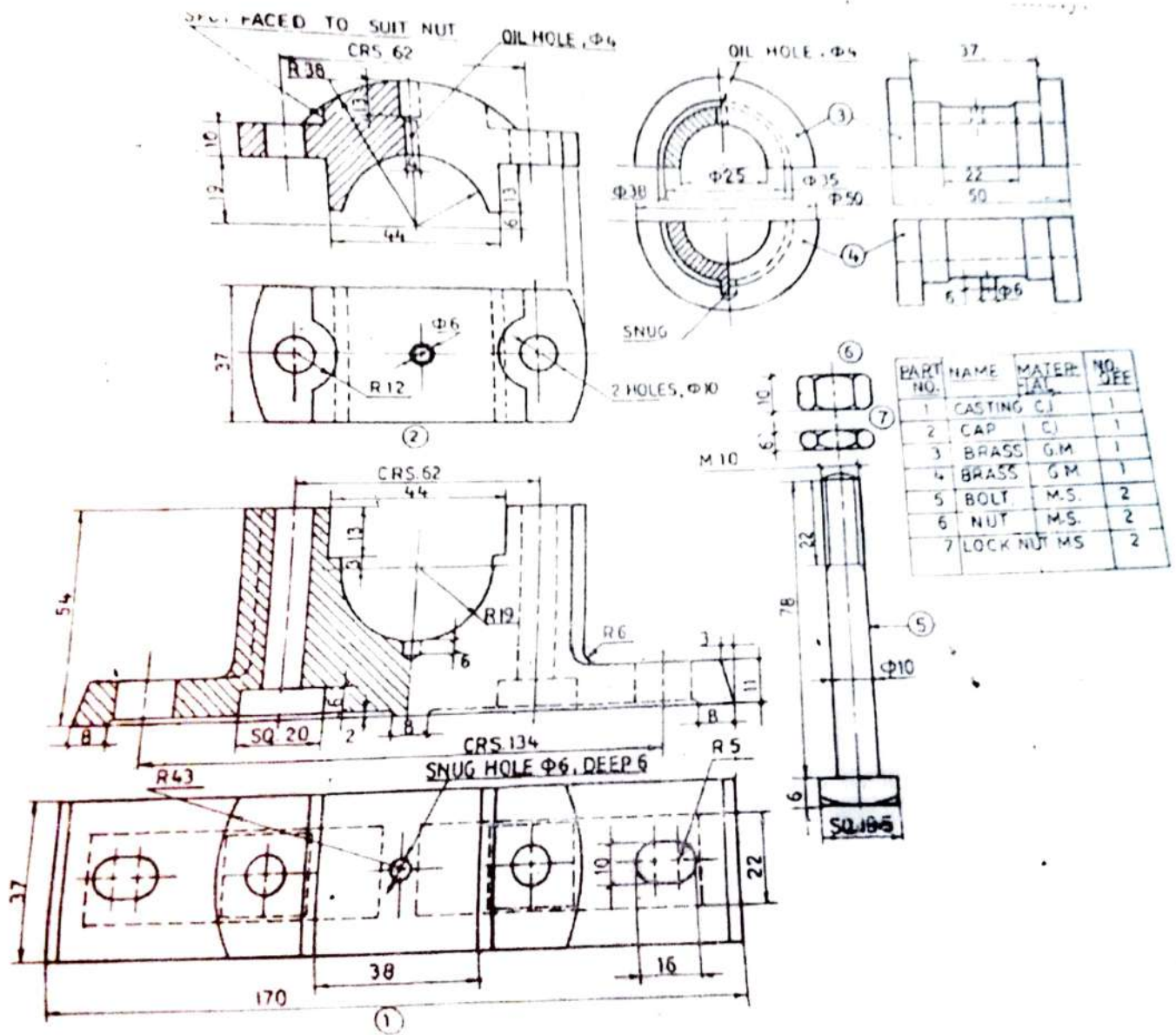


Fig.1 Details of Plummer Block

Q15) Figure 2 show the detail of a cotter joint. Assemble the given components and draw the front view (upper half in section) and top view of assembly.

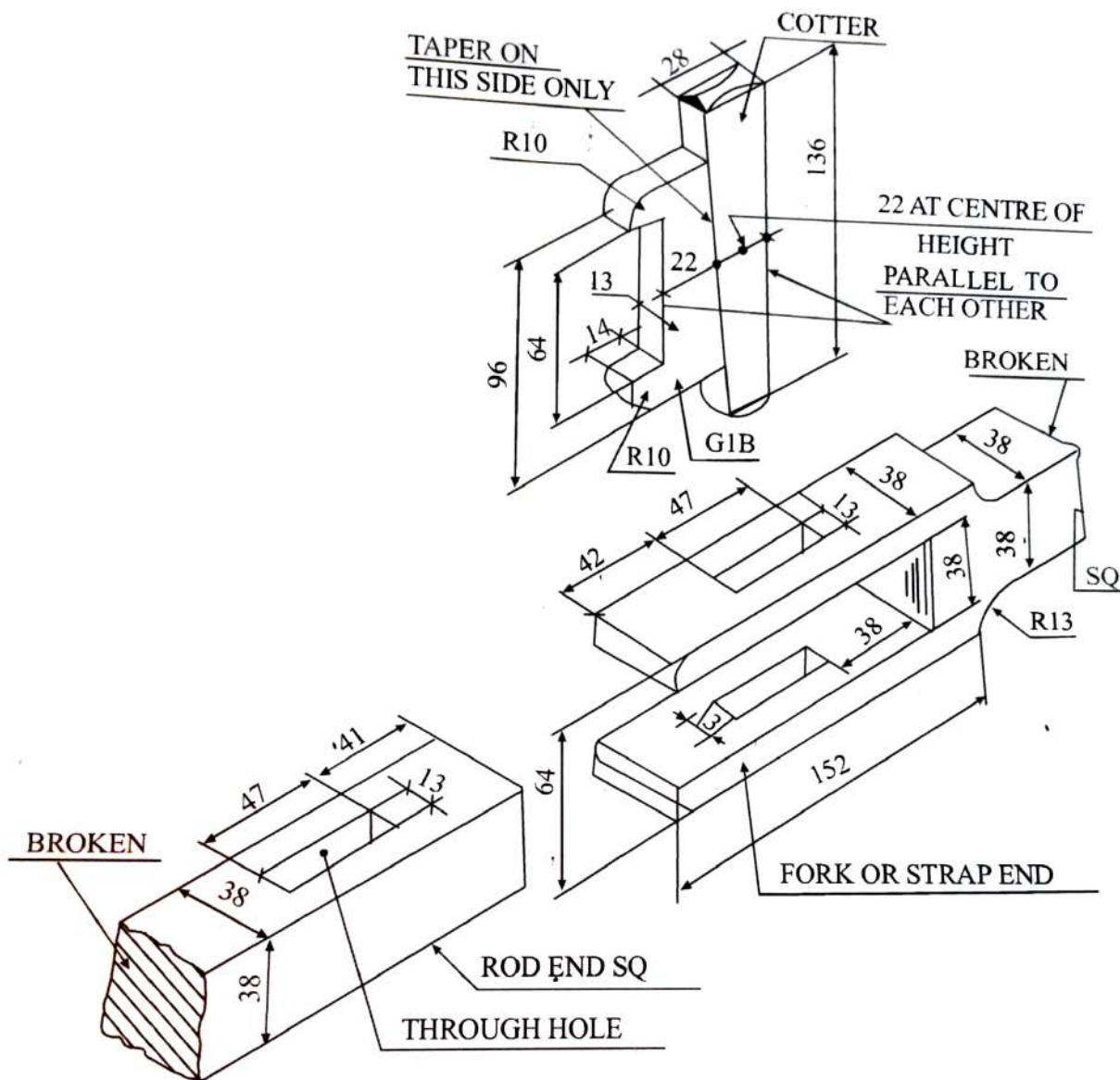


Fig. 2 Detail of Gib and cotter joint for square rod

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B.Tech. (ME) (2012 Onwards)/(MARINE ENGG.) (2013 Onwards)
(Sem.-3)

THEORY OF MACHINES-I

Subject Code : BTME-302

M.Code : 59112

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Why idler pulleys are used in belt drive?
2. Explain the kinematic chain with the help of suitable example.
3. What is the function of a flywheel? How does it differ from that of a governor?
4. Compare the performance of knife-edge, roller and mushroom followers.
5. What is friction? Is it a blessing or curse? Justify your answer giving examples.
6. Differentiate between brake and dynamometer.
7. What is meant by effort and power of a governor?
8. What is the purpose of fast and loose pulley in belt drive? Also mention its applications.
9. What do you understand by hunting?
10. Find the degree of freedom of a four bar mechanism with help of Kutzbach criterion equation.

(S2)-195

SECTION-B

11. Sketch and explain any two inversions of a single slider crank chain.
12. Describe the construction and operation of a Bevis-Gibson torsion dynamometer.
13. A belt runs over a pulley of 800 mm diameter at a speed of 180 rpm. The angle of lap is 165° and the maximum tension in the belt is 2 kN. Determine the power transmitted if the coefficient of friction between the belt and the pulley is 0.3.
14. A double acting steam engine develops 56 kW of power at 210 rpm. The maximum and minimum speeds do not vary more than 1% of the mean speed and the excess energy is 30% of the indicated work per stroke. Determine the mass of the flywheel if the radius of gyration of the flywheel is 500 mm.
15. An Ackermann steering gear does not satisfy the fundamental equation of a steering gear at all positions. Yet it is widely used. Why?

SECTION-C

16. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and retardation. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower.
17. In a Wilson-Hartnell type of governor, the mass of each ball is 5 kg. The lengths of the ball arm and the sleeve arm of each bell-crank lever are 100 mm and 80 mm respectively. The stiffness of each of the two springs attached directly to the balls is 0.4 N/mm. The lever for the auxiliary spring is pivoted at its midpoint. When the radius of rotation is 100 mm, the equilibrium speed is 200 rpm. If the sleeve is lifted by 8 mm for an increase of speed of 6%, find the required stiffness of the auxiliary spring.
18. Write note on :
 - a) Link, mechanism and structure.
 - b) Elliptical trammel

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SECTION-B

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12. Describe the construction and operation of a Bevis-Gibson torsion dynamometer.
13. A belt runs over a pulley of 800 mm diameter at a speed of 180 rpm. The angle of lap is 165° and the maximum tension in the belt is 2 kN. Determine the power transmitted if the coefficient of friction between the belt and the pulley is 0.3.
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 - a) Link, mechanism and structure.
 - b) Elliptical trammel

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Mechanical Engineering) (2012 Onwards)/
(Marine Engg.)(2013 Onwards) (Sem.-3)

ENGINEERING MATERIALS AND METALLURGY

Subject Code : BTME-306

M.Code : 59116

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

1. Write briefly :

- a. Define Space Lattice?
- b. Draw (111) plane in a BCC unit cell.
- c. Why iron is said to be allotropic?
- d. Differentiate between vacancy and interstitial defects.
- e. Define Fick's first law of diffusion.
- f. List any two applications of phase diagram.
- g. What are the limitations of TTT diagram?
- h. What do you mean by decarburization?
- i. What are Ferrite Stabilizers?
- j. List any four purpose of adding alloying elements to steels.

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SECTION-B

2. Write a brief note on various point defects (imperfections) in crystalline materials.
3. Distinguish between the term 'Recovery' and the 'Recrystallization' involved in the process of heating cold-worked metals.
4. What is lever rule? Explain its application to binary isomorphous system.
5. Using suitable portion of Fe-C equilibrium diagram, explain the significance of critical temperature lines.
6. Define Hardenability of steel. On what factors does it depend?

SECTION-C

7. Discuss the construction of TTT diagram for eutectoid steels? In what way it is different from continuous cooling transformation (CCT) diagram?
8. What is the need of alloying in steels? Discuss the effect of various alloying elements on iron-iron carbide diagram.
9. Write brief notes on the following :
 - a) Induction hardening
 - b) Steady state vs. Non-steady state diffusion

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2012 Onwards) (Sem.-4)

STRENGTH OF MATERIALS-II

Subject Code : BTME-401

M.Code : 59129

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly on the following :

1. What is proof resilience?
2. Define Maxwell's theorem of reciprocal deflection.
3. Draw failure envelope for maximum principal stress theory.
4. What are closed coiled springs and what is the use of these springs?
5. What do you mean by discs of uniform strength?
6. Define Strain Energy and discuss about impact loading.
7. Name the important theories of failure.
8. Why leaf spring is called a spring of uniform strength?
9. What do you mean by compound cylinder?
10. Discuss various types of stresses in crane or chain hooks.

Dec 2020

SECTION-B

11. State and explain Castigliano's theorem.
12. Explain why no single theory of failure can satisfy the failure condition for all materials?
13. A closely coiled helical spring of round steel wire of 10mm in diameter having 10 complete turns with a mean diameter of 12cm is subjected to an axial load of 200N. Determine :
(i) The deflection of the spring (ii) Maximum shear stress in the wire (iii) Stiffness of the spring. Take modulus of rigidity, $G = 8 \times 10^4 \text{ N/mm}^2$.
14. A steam turbine rotor is running at 4200rpm. It is designed for uniform strength for a stress of 85 MN/mm^2 . If the thickness of the rotor at the centre is 25mm and density of the material is 800 kg/m^3 , then find the thickness of the rotor at a radius of 350mm.
15. Plot the shearing stresses distribution and derive an expression for locating the shear centre for a rectangular section.

SECTION-C

16. Explain in detail the procedure of finding resultant stress in case of :
 - a) Circular ring
 - b) Chain link, when they are subjected to a tensile load along the longitudinal axis.
17. Find the thickness of a metal necessary for a cylindrical shell of internal diameter 160mm to withstand an internal pressure of 8 N/mm^2 . The maximum hoop stress in the section is not to exceed 35 N/mm^2 .
18. A cylindrical thin drum 80cm in diameter and 3 m long has a shell thickness of 1cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2 , determine : (i) Change in diameter (ii) Change in length and (iii) Change in volume. Assume modulus of elasticity $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio = 0.25.

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Total No. of Pages : 02

Total No. of Questions : 18

**B.Tech. (ME) (2012 Onwards) (Sem.-4)
MANUFACTURING PROCESSES-II**

Subject Code : BTME-405

M.code : 59133

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- Q1) Classify Metal Forming Processes.
- Q2) Define "Degree of drawing"?
- Q3) Write various variables in extrusion process.
- Q4) What is elastic recovery or spring back?
- Q5) What is 'Tool Signature'?
- Q6) How do you differentiate between orthogonal cutting and oblique cutting?
- Q7) List the various methods of taper turning on lathe machine.
- Q8) List down the various types of milling cutters.
- Q9) Differentiate between drilling and boring.
- Q10) What is meant by dressing and truing of grinding wheels?

SECTION-B

- Q11) What are the various rolling defects? Discuss their causes and also state remedial measures.
- Q12) Explain powder metallurgy process. Also discuss its advantages, limitations and applications.
- Q13) Write the function of coolants and what is the effect of coolants on speeds and feed in metal cutting.
- Q14) Draw a twist drill and explain various angles and terms related to twist drill.
- Q15) Calculate the cutting time for cutting 150 mm long keyway using HSS end mill of 20 mm diameter having four cutting teeth. The depth of keyway is 4.2 mm. Feed per tooth is 0.1 mm and cutting speed is 38 m/min. Assume approach and over travel distance as half of the diameter of the cutter and a depth of 4.2 mm can be cut in one pass.

SECTION-C

- Q16) a) Explain electro hydraulic forming process.
b) How press dies are classified? Explain them briefly.
- Q17) What are different cutting tool materials? Explain the composition, applications, advantages and limitations of high speed steel, alloy carbon steel, diamond and CBN cutting tool materials.
- Q18) a) Explain the five lathe machine operations.
b) Sketch the various shapes of grinding wheels and write their field of applications.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

**B.Tech. (ME) (2012 Onwards) (Sem.-4)
APPLIED THERMODYNAMICS-II**

Subject Code : BTME-404

M.Code : 59132

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Draw Brayton cycle.
2. What is effect of clearance in working of reciprocating air compressor?
3. What is surging and choking?
4. What do you mean by degree of reaction?
5. List merits of gas turbines over I.C engines.
6. Name the different components of axial flow compressors.
7. State the assumptions made in an ideal cycle's analysis of gas turbine.
8. Define Work Ratio and Temperature Ratio.
9. What is the principle of jet propulsion?
10. What is Turbojet?

SECTION-B

11. A simple closed cycle gas turbine plant receives air at 1 bar and 15°C and compressor it to 5 bar and then heats it to 800°C in the heating chamber. The hot air expands in a turbine back to 1 bar. Calculate the power developed per kg of air supplied per second. Take C_p for air as $1 \text{ kJ} / \text{kgK}$.

12. Derive the equation for work per Kg of air compressed by reciprocating air compressor with and without clearance.
13. Describe briefly the distinction between rotary compressor and the reciprocating piston compressor.
14. A turbojet engine flying at a speed of 800 km/hr consumes air at the rate of 45kg/s. Calculate
 - (a) Jet exit velocity, the enthalpy change for the nozzle is 44.5 kcal/kg and the velocity coefficient is 0.95.
 - (b) Fuel flow in kg/hr and thrust specific fuel consumption assuming that air fuel ratio is 80.
15. A multistage axial flow compressor absorbs 6000 H.P. when delivering 20 kg/s of air from stagnation condition of 1 Kgf/cm² and 288 K. If polytropic efficiency of compression is 0.9 and if the stage stagnation pressure ratio is constant. Calculate pressure at compressor outlet.

SECTION-C

16. A centrifugal compressor delivers 580 m³ of free air when running at 800 rpm. Using the following data: inlet pressure and temperature of air = 1.013 bar and 20°C, compressor ratio = 3.5, isentropic efficiency = 83%, flow velocity throughout the compressor = 62 m/s, the blades are radial at the outlet of the impeller tip diameter = 2 times eye diameter, blade area coefficient = 10.94. Find :
 - (a) The input power required to run the compressor.
 - (b) Impeller diameters at inlet and outlet.
 - (c) Breadth of impeller at inlet.
 - (d) Impeller blade angle at inlet.
17. Draw T-S diagram for a single stage reciprocating air compressor and explain it.
18. Explain :
 - (a) Difference between adiabatic and isentropic process.
 - (b) Function of impeller and diffusion in centrifugal compressor.

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SECTION-B

11. Derive an expression to find metacentric height analytically.
12. Determine the total pressure on a circular plate of diameter 1.5m which is placed vertically in water in such a way that the centre of the plate is 3m below the free surface of water. Find the position of centre of pressure.
13. Derive continuity equation in polar coordinates.
14. The velocity potential function for a two dimensional flow is given by $x(2y-1)$, calculate the velocity at the point (4,5). Find the stream function at this point also.
15. Derive Euler's Equation of motion.

SECTION-C

16. The resisting force F of a plane during flight can be considered as dependent upon the length of aircraft, velocity, air viscosity, air density and bulk modulus of air. Express the functionality relationship between these variables and the resisting force using dimensional analysis.
17. Discuss in detail five minor losses in pipes.
18. An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives readings of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. Co-efficient of discharge is 0.6. Find the discharge of water through pipe.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2012 Onwards) (Sem.-4)

THEORY OF MACHINES – II

Subject Code : BTME-402

M.Code : 59130

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- Q1. Draw the diagram of a body experiencing two force system, when (1) Body not in equilibrium (2) Body in equilibrium
- Q2. What do you mean by compound pendulum?
- Q3. Write the expression for balancing a single rotating mass.
- Q4. Explain the term 'Partial balancing of primary force'?
- Q5. Show pressure angle of a gear with the help of a diagram.
- Q6. Give two advantages of a Cycloidal gear profile.
- Q7. Draw diagram of reverted gear train.
- Q8. With the help of diagram, differentiate between spinning and precession of a gyroscope.
- Q9. What is the meaning of dimensional synthesis in a mechanism?
- Q10. Write about dedendum of a gear.

SECTION-B

- Q11. Explain the static force analysis of a Journal bearing considering frictional forces.
- Q12. Write the expression for Correction Couple of a connecting rod of an engine.
- Q13. Write the derivation to obtain the expression for variation in tractive effort of an engine.
- Q14. Derive expression for minimum number of teeth on pinion to avoid interference with wheel.
- Q15. Write in detail about three position synthesis for four bar mechanism.

SECTION-C

- Q16. The number of teeth on each of the two equal spur gears in mesh is 40. The teeth have 20° involute profile and the module is 6mm. If the arc of contact is 1.75 times the circular pitch, find the addendum.
- Q17. An epicyclic gear train consists of a sunwheel S, a stationary internal gear E and three identical planet wheels P carried on a star-shaped planet carrier C. The size of different toothed wheels are such that the planet C rotates at $\frac{1}{5}$ of the speed of the sunwheel S. The minimum number of teeth on any wheel is 16. Determine the number of teeth on different wheels of the train.
- Q18. Explain the Gyroscopic effect on the stability of two wheel vehicle while taking a turn.

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Total No. of Pages : 02

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B.Tech (ME) (2018 Batch) (Sem.-4)

THEORY OF MACHINES-II

Subject Code : BTME-405-18

M.Code : 77550

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN Multiple Choice questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. What do you understand by free body diagrams?
2. Describe the need for balancing of rotating parts.
3. Explain backlash in gears.
4. Define Velocity Ratio in context to gear train.
5. Define Axial Pitch of a helical gear?
6. Write least square techniques in reference to kinematics synthesis.
7. Why is the reciprocating mass not completely balanced? Explain briefly.
8. Write the gyroscopic couple equation explaining all its terms.
9. Explain the transmission angle in reference to kinematic synthesis of mechanism.
10. Explain the term of point of concurrency.

SECTION-B

11. What are the free body diagrams of a mechanism? Explain the implementation of this concept for a four link mechanism.
12. What do you understand by balancing of reciprocating masses? Find out the primary and secondary unbalanced forces for slider crank mechanism.
13. The inertia of the connecting rod can be replaced by two masses concentrated at two points and connected rigidly together. How to determine the two masses so that it is dynamically equivalent to the connecting rod? Show this.
14. Two parallel shafts are to be connected by spur gearing. The approximate distance between the shafts is 600 mm. If one shaft runs at 120 r.p.m. and the other at 360 r.p.m., find the number of teeth on each wheel, if the module is 8 mm. Also determine the exact distance apart of the shafts.
15. For the four bar linkage, the following data are given :
 $\theta_2 = 60^\circ$, $\theta_4 = 90^\circ$, $\omega_2 = 3$ rad/sec, $\alpha_2 = -1$ rad/sec², $\omega_4 = 2$ rad/sec, $\alpha_4 = 0$. Determine the link length ratios with the help of Freudenstein's equation.

SECTION-C

16. A four cylinder vertical engine has cranks 150 mm long. The planes of rotation of the first, second and fourth cranks are 400 mm, 200 mm and 200 mm respectively from the third crank and their reciprocating masses are 50 kg, 60 kg and 50 kg respectively. Find the mass of the reciprocating parts for the third cylinder and the relative angular positions of the cranks in order that the engine may be in complete primary balance.
17. What do you understand by gyroscope? Discuss the effect of the gyroscopic couple on a two wheeled vehicle when taking a turn with neat and clean diagram.
18. a) Two shafts, inclined at an angle of 65° and with a least distance between them of 175 mm are to be connected by spiral gears of normal pitch 15 mm to give a reduction ratio 3:1. Find suitable diameters and numbers of teeth. Determine, also, the efficiency if the spiral angles are determined by the condition of maximum efficiency. The friction angle is 7° .
b) Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Mechanical Engineering) (2018 Batch) (Sem.-4)

MATERIALS ENGINEERING

Subject Code : BTME-404-18

M.Code : 77549

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Differentiate between atomic number and atomic mass.
2. What is Metallic Bond? List their characteristic properties.
3. Using suitable sketch, explain the difference between FCC and BCC unit cells.
4. Explain Theoretical Yield Strength.
5. What do you mean by steady-state diffusion process?
6. Define Phase.
7. Discuss the applications of lever rule.
8. What information can be derived from TTT diagram?
9. What is pearlite?
10. What is stainless steel?

SECTION-B

11. Explain the difference between Edge and Screw dislocations.
12. Explain the difference between slip and twinning.
13. What useful information can be obtained from phase diagrams? Draw and label phase diagram for binary isomorphous system.
14. Using Fe-C equilibrium diagram, explain the difference between Full and Partial annealing processes.
15. Why hardening is always followed by tempering treatment? Explain the various stages of tempering.

SECTION-C

16. What are various surface hardening treatments? Write note on carburizing and flame hardening treatments.
17. Discuss the classification of alloying elements in steels. Explain the effects of adding Si, W and Al on the properties of steels.
18. Write brief notes on the followings :
 - a. Hardenability of steel.
 - b. Factors influencing diffusion

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Mechanical Engineering) (2018 Batch) (Sem.-4)

APPLIED THERMODYNAMICS

Subject Code : BTME-401-18

M.Code : 77546

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) What is Free Air Delivery?
- b) Write the effects of various parameters on volumetric efficiency.
- c) State the principle of combustion.
- d) Define Pure Substance.
- e) Define Degree of Superheat.
- f) What is the function of nozzle?
- g) Define Nozzle Efficiency.
- h) Write the classification of steam turbine.
- i) What are the functions of condenser in a steam plant?
- j) What part is played by a cooling tower?

SECTION-B

2. Discuss the need of multistage compression and write its advantages.
3. What is adiabatic flame temperature and how it is determined?
4. State the methods of improving the Rankine efficiency.
5. What is Critical Pressure Ratio? Discuss its significance and its effects on discharge.
6. Define the term 'Degree of Reaction' as applied to a reaction turbine. Show that for Parson's reaction turbine, the degree of reaction is 50%.

SECTION-C

7. Draw and explain the Carnot cycle and discuss its limitations.
8. The velocity of steam leaving the nozzle of impulse turbine is 1200 m/s and the nozzle angle is 20° . The blade velocity is 375 m/s and the blade velocity coefficient is 0.75. Assuming no loss due the shock at the inlet, calculate for a mass flow of 0.5 kg/s and symmetrical balding :
 - a) Blade inlet angle
 - b) Driving force on the wheel
 - c) Axial thrust on the wheel
 - d) Power developed by the turbine.
9. What are the methods of governing a steam turbine? Describe any one method of governing steam turbines.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech (ME) (2018 Batch) (Sem.-4)

FLUID MACHINES

Subject Code : BTME-402-18

M.Code : 77547

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN Multiple Choice questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- Q1. What is the meaning of degree of reaction?
- Q2. What is draft tube?
- Q3. What is need of priming of a pump?
- Q4. What is effect of cavitation?
- Q5. What is scale effect?
- Q6. What is fluid coupling?
- Q7. What do you understand by governing of a Pelton turbine?
- Q8. Define Negative Slip in reciprocating pump.
- Q9. What is hydraulic accumulator?
- Q10. What are vane pumps?

SECTION-B

- Q11. A turbine is to operate under a head of 25 m at 200 r.p.m. The discharge is $9 \text{ m}^3/\text{s}$. If the overall efficiency is 90 percent. Determine :
- Power generated
 - Specific speed of the turbine
 - Type of turbine.
- Q12. With the aid of a sketch explain the working of a Hydraulic Accumulator.
- Q13. Derive the expression for maximum hydraulic efficiency of a Pelton wheel.
- Q14. Explain why the suction lift of a pump cannot exceed certain limit?
- Q15. The impeller of a centrifugal pump is 1m in diameter and rotates at 1500 rpm. The blades are curved backward and make an angle of 30° to the tangent at the periphery. Calculate the power required if the velocity of the flow at outlet is 20m/s. Determine the head to which water can be lifted when a diffuser casing reduces the outlet velocity to 60%.

SECTION-C

- Q16. Derive expression for the force exerted by the jet of water on a series moving flat plate placed on the periphery of a wheel. Also find the maximum efficiency?
- Q17. A Pelton turbine is required to produce 6MW power when working under a head of 300m. The turbine r.p.m. is 550 and the overall efficiency is 0.85. The turbine works with three jets. Determine :
- The diameter of the runner
 - Discharge per second
 - Diameter of the jet
 - Number of buckets.
- Q18. Explain the principle of operation, construction and working of a centrifugal compressor with necessary sketches.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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Total No. of Questions : 18

B.Tech. (ME) (2012 Onward) Sem.-5)

AUTOMOBILE ENGINEERING

Subject Code : BTME-501

M.Code : 70606

Total No. of Pages : 02

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is the function of a power unit?
2. What is the function of silencers in power unit?
3. What is the use of radiator in the cooling system?
4. What are dependent suspension systems?
5. What is the function of a shock absorber?
6. What is the function of a differential?
7. Define castor action.
8. Draw the neat diagram for a vacuum servo brake.
9. What is a transistorized ignition system?
10. What do you mean by engine tuning?

SECTION-B

11. Explain common Rail Fuel Supply system with diagram.
12. Explain crank case ventilation and dilution.
13. With a neat sectional diagram describe various constructional details of an automobile tyre.
14. What do you mean by perfect steering? What are the requirements to achieve perfect steering?
15. Explain the major tools for maintenance of automobiles.

SECTION-C

16. What are the difference sources of automobile pollutants? Explain the working of exhaust emission control system.
17. Explain with neat diagram the constructional features and working of a centrifugal clutch. What are its advantages over single plate clutch?
18. Discuss in detail various factors affecting tyre life.

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SECTION-B

11. Discuss the various factors to be considered for the selection of materials for the design of machine elements.
12. a) Make a neat sketch of foot lever. Explain its design procedure in detail.
b) Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression.
13. a) Determine the length and thickness of a sunk key for a shaft of 0.09 m diameter.
Assuming that, the shearing resistance of the material of the key is the same as that of the shaft. Width of the key is 25 mm and $f_s = 0.4 \times f_c$.
b) Design an oval flanged pipe joint for a pipe having 50 mm bore. It is subjected to an internal fluid pressure of 7 N/mm². The maximum tensile stress in the pipe material is not to exceed 20 MPa and in the bolts 60 MPa.
14. Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5.
15. Draw the fatigue curve and discuss its importance in the design of a machine element.
16. Two plates of 6mm thickness are to be joined by a double riveted zig-zag lap joint, if the allowable strength of $\sigma_t = 100 \text{ N/mm}^2$, $\tau = 70 \text{ N/mm}^2$, $\tau_{cr} = 130 \text{ N/mm}^2$.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2012 Onwards) (Sem.-5)
MECHANICAL MEASUREMENT AND METROLOGY

Subject Code : BTME-503

M.Code : 70604

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Draw the various blocks of a generalized measurement system.
2. Explain in brief 'Zero Order Systems'.
3. What is wringing. Give the procedure for wringing of slip gauges.
4. A Wheatstone bridge requires a change of 7Ω in the unknown arm of the bridge to produce a change in deflection of 3 mm of the galvanometer. Determine the sensitivity.
5. Explain why a monochromatic light is used for interferometry work and not the white light?
6. Explain why it is not preferred to use sine bar for measuring angles more than 45° ?
7. State the working principle of dead weight gauge tester.
8. Give the working principle of a stroboscope.
9. Draw a schematic view of radiation pyrometer.
10. Draw a neat sketch of LVDT.

SECTION-B

11. Differentiate between primary, secondary and tertiary types of measurements. Cite suitable examples for each one.
12. Derive the expression for time response for a second order underdamped system when subjected to a unit step input. Sketch the response.
13. What is sine bar? How it is used for angle measurement?
14. A parallel plate capacitive transducer uses plates of area 500 mm^2 which are separated by a distance of 0.2 mm . Calculate the value of capacitance when the dielectric is air having a permittivity of $8.85 \times 10^{-12} \text{ F/m}$.
15. Explain construction and working of liquid-in-glass thermometers.

SECTION-C

16. In a test, temperature is measured 100 times with variations in apparatus and procedures. After applying the corrections, the results are :

Temperature °C	397	398	399	400	401	402	403	404	405
Frequency of occurrence	1	3	12	23	37	16	4	2	2

Calculate :

- a) The mean
 - b) Mean deviation
 - c) Standard deviation
 - d) The probable error of one reading
 - e) The probable error of mean
17. Describe the construction, working and theory of McLeod gauge for measurement of vacuum. List its advantages and disadvantages.
 18. What are dynamometers? How are they classified? Explain the difference between absorption, transmission and driving dynamometers.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2012 Onwards) (Sem.-5)
INDUSTRIAL AUTOMATION AND ROBOTICS

Subject Code : BTME-504

M.Code : 70605

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Define Flexible Automation.
2. List basic types of hydraulic control circuits.
3. Draw standard graphical symbol for a flow control valve.
4. Define Robotics.
5. Sketch the standard symbol for double acting pneumatic cylinder.
6. Draw sketch of cylindrical robot.
7. Write the truth table for OR gate.
8. Write a brief note on spray painting robots.
9. Write advantages of orienting devices.
10. What do you mean by robotic vision?

SECTION-B

11. (a) What is meant by coanda effect?
(b) Sketch any fluidic device and explain its operation. State its applications.
12. What do you mean by flow control valve? Also explain its working.
13. Explain architecture of a Programmable Logic controller with the help of neat sketch.
14. What are the different configurations of robots? Discuss with the help of neat sketches.
15. Discuss the use of centrifugal hopper feeder with the help of diagram.

SECTION-C

16. Write short notes on :
 - (a) Applications of hydraulics automation
 - (b) Criteria used for the design of pneumatic systems.
17. Write short note on the following :
 - (a) Truth table
 - (b) Transfer devices
 - (c) Ladder logic diagrams.
18. How is robotic vision sensed? What are the component systems used in most common vision based applications?

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Total No. of Questions : 18

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B.Tech. (ME) (2012 Onwards) (Sem.-5)
COMPUTER AIDED DESIGN AND MANUFACTURING

Subject Code : BTME-502

M.Code : 70603

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. List down various functions of a graphic package.
2. What is a graphic standard IGES stands for?
3. Explain using suitable examples application of Geometrical transformations.
4. What is CSG in GM?
5. Define and give equation of B-spline curve.
6. List down certain points related to recent development in FEM.
7. Give the advantages of CNC over NC machine.
8. Explain the concept of fixed zero and floating zero.
9. What is a part family?
10. Give benefits of FMS.

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SECTION-B

11. Discuss with suitable examples various application areas of CAD.
12. Using suitable 2D examples explain various types of Geometric transformations.
13. Explain how mass and volumetric properties calculation is done for parametric modeling technique?
14. Give differences between Bezier and B-spline curves.
15. Write a short note on Combined DNC/CNC system.

SECTION-C

16.
 - a) Explain the concept of Group technology machine cells.
 - b) How group technology can be implemented in industries?
17. Discuss the concept and benefits of CAPP and also explain its types.
18.
 - a) Explain the basic concept of CIMS using flexibility.
 - b) Discuss the physical components of an FMS.

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Roll No.

Total No. of Questions : 18

Total No. of Pages : 02

B.Tech. (ME) (2012 Onwards) (Sem.-5)

MATHEMATICS-III

Subject Code : BTAM-500

M.Code : 70601

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Write briefly :

1. Expand $f(x) = |\sin x|$ in Fourier series.
2. Find Laplace transform of $\sin h t \cos^2 t$.
3. Find Laplace transform of $\frac{e^{-at} - e^{-bt}}{t}$.
4. Find inverse Laplace transform of $\frac{e^{-7s}}{(s-3)^3}$.
5. Express $x^4 + 2x^3 - 6x^2 + 5x - 3$ in terms of Legendre polynomials.
6. For Legendre polynomial $P_n(x)$, show that $P_n'(1) = \frac{n(n+1)}{2}$.
7. Form a partial differential equation by eliminating arbitrary functions from the relation $z = yf(x) + xg(y)$.
8. Solve $xp + yq = 3z$.
9. Show that the function $f(z) = |z|^4$ satisfies the Cauchy-Riemann equations only at region.
10. State Cauchy Integral Theorem.

SECTION-B

11. Find the Fourier series expansion of the function $f(x) = x^2, -\pi < x < \pi$. Deduce that

$$\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$$

12. State and prove Convolution theorem for Laplace transform.
13. For Bessel's function $J_n(x)$, show that $J_0^2 + 2(J_1^2 + J_2^2 + J_3^2 + \dots) = 1$
14. Solve by Charpit's method $q + xp = p^2$.
15. Evaluate $\oint_C \frac{dz}{(z^2+4)^2} = \frac{\pi}{16}, C: |z-i|=2$

SECTION-C

16. a) Using Laplace transform, solve $y' + 2y = 1 - H(t-1), y(0) = 2$, where $H(t)$ is Heaviside's unit step function.
- b) Find inverse Laplace transform of $\frac{1}{s^2(s+1)}$.
17. a) Using Frobenius method, find two linearly independent solutions of the equation $2x^2y'' + xy' - (x^2 + 1)y = 0$.
- b) A rod of length l with insulated side is initially at a uniform temperature u_0 . Its ends are suddenly cooled at 0°C and kept at that temperature. Find the temperature function $u(x, t)$.
18. a) Find all Taylor and Laurent series expansions of $f(z) = \frac{1}{z(z-1)}$ about the point $z=0$.
- b) Compute the residues at all the singular points of $f(z) = \frac{z^2}{(z^2+1)^2}$.

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Total No. of Pages : 02

Total No. of Questions : 16

B.Tech. (ME) (2012 Onwards) (Sem.-6)

DESIGN OF MACHINE ELEMENTS-II

Subject Code : BTME-601

M.Code : 71185

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.
3. Only PSG Design data book is allowed in the exam.

SECTION-A

Answer briefly :

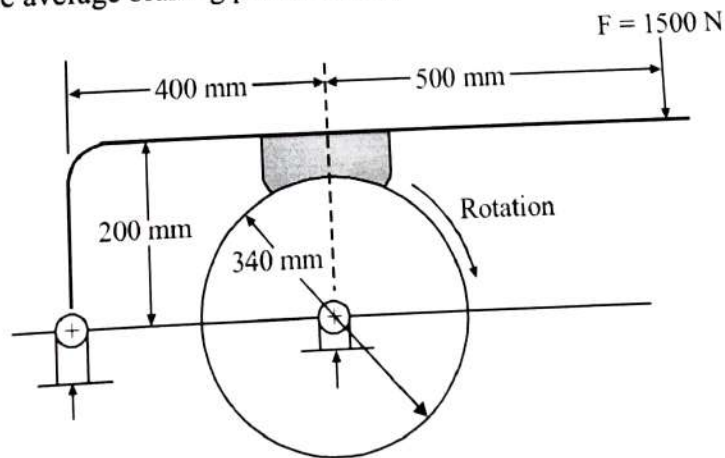
1. What are the factors upon which the coefficient of friction between the belt and the pulley depends?
2. Classify springs according to their shapes.
3. What is the main function of a flywheel in an engine?
4. List the important factors upon which the capacity of a brake depends.
5. Why it is necessary to dissipate the heat generated when clutches operate?
6. What is meant by hydrodynamic lubrication?
7. What are the advantages of pivoted shoe brake over fixed shoe brake?
8. Where are the angular contact and self-aligning ball bearings used? Draw neat sketches of these bearings.
9. What are the various forces acting on a bevel gear?
10. Differentiate between helical and worm gears.

SECTION-B

11. A pulley of 0.85 m diameter revolving at 210 rpm is to transmit 7.8 kW. Find the width of a leather belt if the maximum tension is not to exceed 150 N in 10 mm width. The tension in the tight side is twice that in the slack side. Determine the diameter of the shaft and the dimensions of the various parts of the pulley, assuming it to have six arms. Maximum shear stress is not to exceed 63 MPa.

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12. Design a cast iron flywheel for a four stroke cycle engine to develop 115 kW at 160 rpm. The work done in the power stroke is 1.3 times the average work done during the whole cycle. Take the mean diameter of the flywheel as 3 metres. The total fluctuation of speed is limited to 5 per cent of the mean speed. The material density is 7300 kg / m^3 . The permissible shear stress for the shaft material is 45 MPa and flexural stress for the arms of the flywheel is 25 MPa.
13. A cone clutch is to be designed to transmit 8 kW at 920 rpm. The cone has a face angle of 12° . The width of the face is half of the mean radius and the normal pressure between the contact faces is not to exceed 0.08 N/mm^2 . Assuming uniform wear and the coefficient of friction between the contact faces as 0.21, find the main dimensions of the clutch and the axial force required to engage the clutch.
14. A journal bearing is to be designed for a centrifugal pump for the following data :
 Load on the journal = 14 kN ; Diameter of the journal = 76 mm ; Speed = 1460 rpm ;
 Atmospheric temperature of the oil = 18°C ; Operating temperature of the oil = 60°C ;
 Absolute viscosity of oil at 60°C = 0.023 kg/m-s . Give a systematic design of the bearing.
15. Design a spur gear drive required to transmit 50 kW at a pinion speed of 820 rpm. The velocity ratio is 3.5 : 1. The teeth are 20° full-depth involute with 18 teeth on the pinion. Both the pinion and gear are made of steel with a maximum safe static stress of 180 MPa. Assume a safe stress of 40 MPa for the material of the shaft and key.
16. Figure below shows a brake with only one shoe, being applied by a 1.5 kN force. Four seconds after force F is applied, the drum comes to a stop. During this time the drum makes 110 revolutions.
- Use the short-shoe approximation and an estimated coefficient of friction of 0.35.
- What is the magnitude of the torque developed by the brake?
 - How much work does the brake do in bringing the drum to a stop?
 - What is the average braking power during the 4-second interval?



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Total No. of Questions : 18

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B.Tech. (ME) (2012 Onwards) (Sem.-6)

HEAT TRANSFER

Subject Code : BTME-602

M.Code : 71186

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Define Thermal conductivity.
2. What are the different assumptions applied while doing heat conduction analysis?
3. In case of insulating an electric wire, should the outer radius of insulation be more or less than the critical radius, briefly explain with reason.
4. Why thin fins are preferred over a thick fin?
5. Define the term NTU. What does it interpret?
6. Define the term intensity of radiation.
7. Define Grashoff Number. What are the forces associated with it?
8. In which type of condensation heat transfer coefficient remains more and why?
9. What is Newtonian heating of solids?
10. What is the limitation of Rayleigh's method of dimensional analysis?

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SECTION-B

11. What are the three dimensions in case of spherical coordinate system? How they are obtained?
12. Derive the relation of temperature distribution and heat transfer for rectangular fin losing heat at the tip.
13. Prove by dimensional analysis for natural convection that Nusselt no. is a function of Grashoff no. and Prandtle no.
14. Explain different theories of nucleation.
15. State and explain Kirchoff's law.

SECTION-C

16. An electric wire with 2mm diameter is covered with 2.5mm thick layer of insulation with $k = 0.5 \text{ W/mK}$. Heat is dissipated to the atmosphere at 25°C with $h=10\text{W/m}^2\text{K}$. The wire is maintained at temperature of 120°C . Estimate the heat dissipation from the wire with and without insulation. Calculate the thickness of insulation when the heat dissipation rate is maximum, also maximum value of heat dissipation rate.
17. The A parallel flow, heat exchanger has hot and cold water streams running through it and has the following data : $m_h = 10\text{kg/min}$, $m_c = 25\text{kg/min}$, $C_{ph} = C_{pc} = 4.18 \text{ kJ/kg}^\circ\text{C}$, $t_{h1} = 70^\circ\text{C}$, $t_{h2} = 50^\circ\text{C}$, $t_{c1} = 25^\circ\text{C}$. Heat transfer coefficients on both sides are 50 W/m^2 . Calculate:
 - a) The area of heat exchanger
 - b) The exit temperatures of hot and cold fluids if hot water flow rate is doubled.
18. Write short notes on :
 - a) Hydrodynamic and thermal boundary layer
 - b) Variable thermal conductivity

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13. An inward flow reaction turbine is supplied $0.233 \text{ m}^3/\text{s}$ of water under a head of 11 m. The wheel vanes are radial at inlet and the inlet diameter is twice the outlet diameter. The velocity of flow is constant and equal to 1.83 m/s . The wheel makes 370 rpm.
- Determine :
- a) Guide vane angle
 - b) Diameter of the wheel
 - c) Width of the wheel at inlet and outlet.
- Assuming that the discharge is radial and there are no losses in wheel and speed ratio is 0.7.
14. A turbine is to operate under a head of 25 m at 200 rpm. The discharge is $9 \text{ m}^3/\text{s}$. If the efficiency is 90%, determine the performance of turbine under 20 m head.
15. Derive an expression for minimum starting speed for starting a centrifugal pump.

SECTION-C

16. A centrifugal pump impeller having external and internal diameters 480 mm and 240 mm respectively is running at 100 rpm. The rate of flow through the pump is $0.0576 \text{ m}^3/\text{s}$ and velocity of flow is constant at 2.4 m/s . The diameter of suction and delivery pipes are 180 mm and 120 mm respectively and, suction and delivery heads are 6.2 m (abs.) and 30.2 m of water respectively. If the power required to drive the pump is 23.3 kW and outlet vane angle is 45 degree,
- Determine :
- a) Inlet vane angle
 - b) Manometric and overall efficiency of pump.
17. A acting reciprocating pump has a stroke length of 150 mm, suction pipe is 7 m long and the ratio of suction pipe diameter to the piston diameter is $3/4$. The water level in the sump is 2.5 m below the axis of the pump cylinder and the pipe connecting the sump and pump cylinder is 75 mm in diameter. If the crank is running at 75 rpm, determine the pressure head on the piston at the beginning, middle and end of the suction stroke. Take $f = 0.01$.
18. a) Explain the working of hydraulic ram.
b) Discuss working and construction of torque converter.

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B.Tech.(CSE/IT /ECE) (2012 to 2017) (Sem.-6)
SOFTWARE ENGINEERING

Subject Code : BTCS-603

M.Code : 71109

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Write at least two disadvantages of waterfall model.
2. Explain in brief about feasibility study.
3. Explain the term modularity in brief.
4. Explain in brief about code review.
5. Define the term test case.
6. Explain in brief about white-box testing.
7. Differentiate between Static and dynamic analysis.
8. Explain in brief about cost estimation.
9. Explain in brief about project scheduling
10. Explain in brief about Rayleigh-Norden results.

SECTION-B

11. What do you mean by functional and non-functional requirements? Give at least two examples of each type of requirements.
12. Explain in detail about DFD and structure chart.
13. Write a detailed note on black box testing.
14. Write a detailed note on reliability growth modeling.
15. Write a detailed note on Component-based software Engineering.

SECTION-C

16. Explain in detail about following software life cycle model
 - (a) Spiral Model
 - (b) Evolutionary model
17. (a) Write a detailed note on coding standards.
 - (b) Explain in detail about Software reliability metrics.
18. Write a detailed note on ISO and SEI CMMI.

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Total No. of Pages : 02

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**B.Tech. (ME) (2012 Onwards) (Sem.-6)
STATISTICAL AND NUMERICAL METHODS IN ENGINEERING**

Subject Code : BTME-604

M.Code : 71188

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Give two properties of normal distribution.
2. What do you mean by stratified sampling?
3. A bag contains 6 white, 4 red and 10 black balls. Two balls are drawn at random. Find the probability that they will both be black.
4. Differentiate bisection and Newton-Raphson methods.
5. Discuss Modified Euler's Method.
6. Define level of significance.
7. How Histogram is different from bar chart?
8. Calculate median of this data set (1, 2, 3, 4, 5, 6, 7, 8). Round off your answer to one decimal place.
9. Mean is greater than median (True or false).
10. State Simpson's $1/3$ rule.

11. The specimen of copper wires drawn from a large lot have the following breaking strength (in kg. weight) :

SECTION-B

578, 572, 570, 568, 572, 578, 570, 572, 596, 544

Test (using t-statistic) whether the mean breaking strength of the lot may be taken to be 578 kg. weight (Test at 5% level of significance and table value of $t = 2.262$ at 9 d.f.).

12. Consider B. Tech. class with 45 female students and 55 male students. Only 25 females of above information, answer the following questions :
- What is the probability that a randomly chosen student is a male?
 - What is the probability that a randomly chosen student has cleared the exam?
 - What is the approximate probability that a randomly chosen student has cleared the exam, given the student is female?
13. Find the number of terms of the exponential series such that their sum gives the value of e^x correct to six decimal places at $x = 1$.
14. Find a real root of $2x - \log_{10} x = 7$ correct to four decimal places using iteration method.
15. In the table below, the values of y are consecutive terms of a series of which 23.6 is the 6th term. Find the first and tenth terms of the series :

x :	3	4	5	6	7	8	9
y :	4.8	8.4	14.5	23.6	36.2	52.8	73.9

SECTION-C

16. From the table below, for what value of x , y is minimum? Also find this value of y .

x :	3	4	5	6	7	8
y :	0.205	0.240	0.259	0.262	0.250	0.224

17. Solve $10x - 7y + 3z + 5u = 6$,

$$-6x + 8y - z - 4u = 5,$$

$$3x + y + 4z + 11u = 2,$$

$$5x - 9y - 2z + 4u = 7 \text{ by Gauss-Jordan method.}$$

18. Apply Runge-kutta method to find approximate value of y for $x = 0.2$, in steps of 0.1, if $dy/dx = x + y^2$, given that $y = 1$ where $x = 0$.

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Total No. of Questions : 18

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B.Tech. (CSE) (2018 Batch) (Sem.-3)
MATHEMATICS-III
Subject Code : BTAM304-18
M. Code : 76438

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Solve the following :

1. Show that the limit for the function $f(x, y) = \frac{2x-y}{2x+y}$ does not exist as $(x, y) \rightarrow (0, 0)$.
2. Evaluate the integral $\int_0^1 \int_0^x e^{y/x} dy dx$
3. Check the convergence of the following sequences whose nth term is given by
$$a_n = \frac{n}{n^2 + 1}$$
4. State Leibnitz test for convergence of an alternating series $x = \frac{\pi}{2}$
5. Write down the Taylor's series expansion for $\cos x$ about $x = \frac{\pi}{2}$.
6. Solve by reducing into Clairaut's equation: $y = px + p^2$, where $p = \frac{dy}{dx}$
7. Solve the differential equation $\frac{dy}{dx} + y = x$

8. Determine whether the differential equation is exact. If found exact solve it.
- $$(x^2 + y^2) dx + 2xy dy = 0$$

9. Solve the differential equation $16 \frac{d^2 y}{dx^2} - 8 \frac{dy}{dx} + 5y = 0$

10. Find Particular solution of the differential equation :

$$\frac{d^2 y}{dx^2} - 3 \frac{dy}{dx} + 2y = e^{3x}$$

SECTION-B

11. Find the maximum and minimum distance of the point $(1, 2, -1)$ from the sphere $x^2 + y^2 + z^2 = 24$.

12. Evaluate $\iint_D e^{-(x^2+y^2)} dy dx$, where D is the region bounded $x^2 + y^2 = 1$

13. For what value(s) of x does the series converge (i) conditionally (ii) absolutely?

$$x - \frac{x^2}{2} + \frac{x^3}{3} - \dots - \dots - \dots \text{to } \infty. \text{ Also find the interval of convergence.}$$

14. Solve the differential equation by finding integrating factor

$$(xy + 1) y dx + x(1 + xy + x^2 y^2) dy = 0$$

15. Solve the differential equation $\frac{d^2 y}{dx^2} - 3 \frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$

SECTION-C

16. a) Show that the series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges for $p > 1$ and diverges for $0 < p \leq 1$.

- b) Using double integration, find the area bounded between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$.

17. a) Solve the Bernoulli's equation $\frac{dy}{dx} + \frac{y}{x} = \frac{y}{x^2}$

b) Solve the differential equation $xp^2 - 2yp + x = 0$, where $p = \frac{dy}{dx}$

18. a) Solve by Method of Variation of parameters

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = \frac{e^{2x}}{x}$$

b) Find the complete solution of $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = e^{2x} \sin 2x$

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B.Tech. (CSE / ECE) (2018 Batch) (Sem.-3)

DEVELOPMENT OF SOCIETIES

Subject Code : HSMC-101-18

M.Code : 76439

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Society
2. Evolution
3. Birth of capitalism
4. Social structure
5. Oligarchy
6. Marxism
7. Development in Post-British Period
8. Relevance of Jajmani system in Indian history
9. Governing systems
10. Gandhi's idea of development

(S2)-1083

SECTION-B

11. Distinguish between clan and family.
12. What are the advantages of democracy over monarchy?
13. Write an essay on capitalism.
14. What is meant by Buddhist economics?
15. How does decentralization help in economic development?

SECTION-C

16. Discuss how social development is related to Family system?
17. What do we learn from history about contemporary political systems? Elaborate.
18. Discuss in detail the idea of development in current context.

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SECTION-B

11. Explain with examples the different (Variable) storage classes used in C++.
12. What are the advantages of using new operator as compared to the function malloc()? Explain with examples.
13. What is object oriented programming? Explain any five characteristics of object oriented programming languages.
14. Explain public, private and protected access specifiers and show the ambiguity in multiple and multipath inheritance.
15. Explain the various techniques of defining pure virtual function.

SECTION-C

16. Define Operator Overloading. Explain how to overload unary operator and binary operator.
17. Describe the terms private inheritance and protected inheritance with the help of an example program.
18. What is file mode? Describe the various file mode options available.

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Total No. of Questions : 18

Total No. of Pages : 02

B.Tech. (CSE) (2018 Batch) (Sem.-3)
DATA STRUCTURE & ALGORITHMS

Subject Code : BTCS-301-18

M.Code : 76436

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. What is the need of data structure?
2. Big O notation
3. Applications of stacks
4. Why binary search cannot be performed on linked list? Justify your answer.
5. B trees.
6. Hashing.
7. AVL tree.
8. Insertion sort
9. What are the objectives of sorting?
10. Write any two applications of graph.

SECTION-B

11. Explain the differences between linear and non-linear data structure. Give one example of each.
12. Explain the mechanisms of deleting an element from stack and queue by showing suitable example.
13. Write an algorithm for searching a node from a link list.
14. Discuss merge sort with suitable example.
15. Construct a binary search tree using the following numbers.
49, 23, 37, 23, 66, 39, 59, 50

SECTION-C

16. Convert the given infix expression into postfix expression using stack and show the details of stack at each step of conversion.
Expression : $(a + b \wedge c * d) * (e + f/g)$
17. Discuss Heap sort with suitable example.
18. Write short note on the following :
 - a) Quick sort
 - b) Graph traversal algorithm

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Total No. of Questions : 18

Total No. of Pages : 02

B.Tech. (CSE/IT) (2018 Batch) (Sem.-3)

DIGITAL ELECTRONICS

Subject Code : BTES-301-18

M.Code : 76435

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Perform the subtraction $1001_2 - 1110_2$ using 1's complement method of subtraction.
2. Convert 38_{16} hexadecimal number to binary.
3. Convert the BCD number 00011000 to decimal number.
4. Write the truth table of 3-input OR gate.
5. Give the functional difference between a NAND gate and a negative OR gate.
6. Construct a truth table for the given Boolean expression $AB+BC$.
7. Give the comparison between synchronous & Asynchronous sequential circuits.
8. Determine the resolution of the output from a DAC that has a 12-bit input.
9. What is the difference between static RAM and dynamic RAM?
10. Draw the logic diagram for SR latch using two NOR gates.

SECTION-B

11. Using the Boolean Algebra, simplify the expression:

$$(A + \bar{A})(AB + ABC\bar{C})$$

12. Use a Karnaugh map to simplify the function to its minimum sum of product form:

$$X = \overline{ABCD} + \overline{ABC\bar{D}} + \overline{AB\bar{C}D} + \overline{ACD} + \overline{ABC\bar{D}}$$

13. Design a Excess-3 to BCD code converter using minimum number of NAND gates.
14. Explain the operation of master-slave J-K flip flop. Give its advantages.
15. Design a 4-bit asynchronous up/down counter and explain its working with the help of timing diagram.

SECTION-C

16. Simplify using K-map

$$f(ABCD) = \Pi M(1,3,5,7,8,9,10,13,15) \text{ and implement using NAND/NOR logic.}$$

17. a) Explain how a 4-bit R/2R register DAC works?
b) Design and working of a synchronous MOD- 6 counter using JK FF.
18. Write short notes on **any two** :
- a) PLA
 - b) Ring Counter
 - c) BCD to 7 segment decoder

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SECTION-B

11. Find the dimensions of the rectangular box, open at the top of maximum capacity whose surface is 432 sq. cm.
12. Find the area bounded by the parabola $y = x^2$ and the line $y = 2x + 3$.
13. For what value(s) of x does the series converge (i) conditionally (ii) absolutely?
$$\sum_{n=1}^{\infty} \frac{(-1)^n (x+2)^n}{n2^n}$$
. Also find the interval of convergence
14. Solve the differential equation :
 $(x^2 + y^2 + 3) dx - 2xy dy = 0$
15. Solve the differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$

SECTION-C

16. a) Check the convergence of the series $\sum_{n=2}^{\infty} \frac{n!2^n}{n^n}$
- b) Find the volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$
17. a) Solve the differential equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$
- b) Solve the differential equation $p^2 + xp + py + xy = 0$, where $p = \frac{dy}{dx}$
18. a) Solve by Method of Variation of parameters $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{-x} \cos x$
- b) Solve $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = \sin(\ln x)$

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B.Tech. (IT) (2018Batch) (Sem.-3)

COMPUTER ARCHITECTURE

Subject Code : BTES-302-18

M.Code : 76394

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Define Register mode and Absolute Mode with examples.
2. Distinguish pipelining from parallelism.
3. State the principle of operation of a carry look-ahead adder.
4. Execute the following instruction using one address format :
 $x=c*b/r-d$.
5. What is DRAM semiconductor?
6. What is the difference between isolated I/O and memory mapped I/O?
7. What is Cache Coherence?
8. How do vector processors work?
9. What is SISD and SIMD?
10. Define Vectored Interrupts.

SECTION-B

11. What is instruction set computer architecture? Discuss its types and also differentiate the two types of instruction set computer architecture.
12. An instruction is stored at location 300 with its address field at location 301. The address field at location 301. The address field has the value 400. A processor register R1 contains the number 200. Evaluate the effective address if the addressing mode of the instruction is :
 - a) Direct
 - b) Immediate
 - c) Relative
 - d) Register indirect
 - e) Index with R1 as the index register
13. Explain the difference between hardwired and micro programmed control.
14. What are different pipelining hazards and how are they eliminated?
15. Describe in detail booth's multiplication algorithm and its hardware implementation?

SECTION-C

16. What is direct memory access (DMA)? Why are the read and write control lines in a DMA controller bi directional?
17. What is the basic approach of page replacement? Discuss all the page replacement algorithms and which page replacement algorithm is best?
18.
 - a) Explain the mapping process followed in cache memory. Also discuss the relative advantages and disadvantages of the mapping techniques used.
 - b) What do you mean by instruction cycle and interrupt cycle? Draw the flowchart for instruction Cycle.

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B.Tech. (Computer Science & Engineering)/(Electronics &
Communication Engineering) (2018 Batch) (Sem.-3)

PHILOSOPHY

Subject Code : HSMC-102-18

M.Code : 77082

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Vidya
2. Nasidiya Sukta
3. Purana
4. Knowledge as power
5. Satyam
6. Definition of creativity
7. Knowledge about the self
8. Knowledge about morals
9. Caraka
10. Knowledge as discovery

SECTION-B

11. Difference between Vidya and Avidya.
12. Write a note on Plato's Symposium.
13. Write a note on M. Foucault's knowledge as oppression.
14. Knowledge about polity.
15. What do you understand by Tantrayuktis?

SECTION-C

16. Write an essay on Socratic method of knowledge as discovery.
17. Explain the fourteen Knowledge bases as sources of Vidya.
18. Elaborate on the tools of acquiring knowledge.

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B.Tech. (IT) (2018 Batch) (Sem.-3)
OBJECT ORIENTED PROGRAMMING

Subject Code : BTIT-302-18

M.Code : 76392

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Explain the Role of Using Scope Resolution Operator.
2. Why we use Destructor?
3. What do you mean by virtual base class?
4. Why we use Access specifiers in C++?
5. Write down Benefits of OOPs.
6. Why do we use this Pointer?
7. Explain the benefit of using Inline Function.
8. Explain the use of different file modes.
9. Explain the benefit of using Array of Objects.
10. Why we use Static member?

SECTION-B

11. Explain the concept of Operator Overloading with the use of an example.
12. Differentiate between Early and Late binding.
13. Explain the concept of Memory management in C++.
14. Write a Programme to demonstrate the concept of Function Overloading.
15. What do you mean by Formatted I/O?

SECTION-C

16. How Exception Handling is performed in C++?
17. Why we use constructors? Explain its types with the use of suitable examples.
18. What is Inheritance? Explain different types of inheritance with suitable example.

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B.Tech. (IT) (2018 Batch) (Sem.-3)
DATA STRUCTURE & ALGORITHMS

Subject Code : BTIT-301-18

M.Code : 76391

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. How the AVL trees are different Binary trees?
2. Write briefly about working principle of Priority Queue.
3. How do space complexity affect performance of a program?
4. Define Data Structure.
5. Write name of Best Sorting Algorithm. What are its time and space complexities?
6. What are applications of Graphs?
7. Write down the necessary condition for a tree to become binary search tree.
8. Define Hashing.
9. What do you understand by shortest path in a graph?
10. List various types of linked lists and define advantage of using linked list.

SECTION-B

11. What are various operations applicable for graphs? Discuss.
12. What is the role of data structures in computer science? Discuss different mathematical notations and time space tradeoff of data structures.
13. Elaborate following :
 - a) Enqueue and Dequeue operations.
 - b) Circular and doubly link list.
14. What are the various steps involved in insertion sort? Explain with example.
15. What is the benefit of using AVL Trees as data structure?

SECTION-C

16. What are the applications of Stack? Discuss different stack operations. Elaborate by evaluating any sample postfix expression using stack.
17. How binary search trees are helpful in information searching in comparison to other data structures? How they are different from AVL Trees?
18. Compare selection sort and quick sort algorithm. Explain their working.

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B.Tech. (CSE/ECE/IT/Electronics Engg/Electronics & Computer Engg)
(2012 to 2017) (Sem.-3)

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code : BTCS-305

M.Code : 56595

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is the use of an Abstract class?
2. What is a Friend function? Why is it required?
3. What are the properties of a static member function?
4. What is meant by Overloading Operators?
5. What are the differences between the Accesses specifies private and protected?
6. Explain briefly what Exception Handling is.
7. List the syntax of any two functions used to display output to the user in C++.
8. What are the differences between sequential and random access files?
9. What are Dangling Pointers?
10. What is the purpose of defining a Destructor function?

SECTION-B

11. What is Object Oriented Programming? Distinguish between Procedure Oriented Programming and Object Oriented Programming.
12. Write a program in C++ to print first N prime numbers, where N is the integer value entered by user.
13. Explain the concepts of Function Overloading and Function Overriding with the help of examples.
14. What is a Template? Explain with the help of an example how to create a Function Template.
15. Explain the concept of Virtual and Pure Virtual Functions with the help of examples.

SECTION-C

16. Create a class which keeps track of the number of its instances and also assigns unique identification to each of them. Use static data member, constructors and destructors to maintain updated information about active objects.
17. What is inheritance? Explain with example how to inherit a class in C++. Also show in what order the constructors are called in a class hierarchy when an object of a derived class is created?
18. What are the two methods available for opening the files? Write a program to write characters onto a file and to read characters from a file.

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B.Tech. (CSE / IT) (2012 to 2017)
(Sem.-3)

MATHEMATICS – III

Subject Code : BTAM-302

M.Code : 70808

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. State and prove second shifting theorem for Laplace transforms.
2. Show that $|z|^2$ is not analytic at any other point except $z = 0$.
3. Discuss modified Euler's method.
4. Find the half-range cosine series for the function $f(x) = (x - 1)^2$ in the interval $0 \leq x \leq 1$.
5. Solve $pq = p + q$.
6. Evaluate $L(e^{at} \sin bt)$.
7. Find the inverse Laplace transform of $(6 + s) / (s^2 + 6s + 13)$.
8. Write Cauchy-Riemann equations in polar form.
9. In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
10. State Cayley-Hamilton theorem.

SECTION-B

11. Find Fourier series expansion of $f(x) = x + x^2$ in the interval $-\pi < x < \pi$. Hence show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$.

12. Show that if $L(f(t)) = F(s)$ then $L(t^n f(t)) = (-1)^n \frac{d^n}{ds^n} F(s)$ where $n = 1, 2, 3, \dots$. Hence evaluate $L(t^3 e^{-3t})$.

13. If $f(z)$ is an analytic function of z , prove that :

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4 |f'(z)|^2$$

14. Solve

$$4x - 3y - 9z + 6w = 0$$

$$2x + 3y + 3z + 6w = 0$$

$$4x - 21y - 39z - 6w = -24$$

15. The following table shows the distribution of digits in numbers chosen at random from a telephone directory :

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory.

SECTION-C

16. Solve $(x^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$.

17. Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$.

18. Evaluate $y(0.8)$ using Runge's method of order four, given that $\frac{dy}{dx} = \sqrt{x+y}$; $y(0.4) = 0.4$ (Take $h = 0.2$).

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B.Tech.(CSE)/(IT) (2012 to 2017) (Sem.-3)

DIGITAL CIRCUITS & LOGIC DESIGN

Subject Code : BTCS-303

M.Code : 56593

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write Briefly :

1. Convert a D flip flop into T flip flop
2. Design a 4:1 MUX
3. Parity Checker
4. MOSFET RAM
5. Function of Multivibrator
6. RTL versus DCTL
7. Convert 11001_2 to decimal
8. What is resolution in A/D Converter?
9. Find the state diagram to design a sequence detector circuit, which detects three or more consecutive 1's in a string of bits coming through an input line.
10. EEPROM

(S2)-304

SECTION-B

11. Design full subtractor using De-Multiplexer.
12. Using Boolean algebra show that :
$$AB + \bar{A}C + BC = AB + \bar{A}C$$
13. Explain the structure of typical RAM cell.
14. Draw and explain logic diagram of a mod-8 ripple counter using three JK flip flops.
15. What is difference in 1's and 2's Complement? Which of two is better to represent negative numbers? Why?

SECTION-C

16. What are the different A/D and D/A conversion techniques? Explain in detail.
17. What do you understand by Boolean expressions and need of their minimization? Elaborate SOP and POS.
18. a. Draw a truth table for 4-input 'OR' Gate and 3-input 'NAND' Gate
b. Define Interfacing and show the interfacing of two TTL gates. Also discuss their characteristics.

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B.Tech. (CSE)/(IT) (2012 to 2017)

(Sem.-3)

DATA STRUCTURES

Subject Code : BTCS-304

M.Code : 56594

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

Write Briefly :

1. Differentiate between Stack and Queue.
2. What are the circular queues and their use?
3. Why it is necessary to analyze an algorithm?
4. Define Priority Queue.
5. How heaps are represented in memory?
6. What is data structure for graphs?
7. What are AVL trees?
8. Define Sparse Matrices.
9. What is the purpose of garbage Collection?
10. What is sorting and searching?

SECTION-B

11. Write an algorithm to implement Quick sort.
12. Are B trees of order 2 are full binary trees? If yes, explain how.
13. Make a binary search tree by considering the following eight numbers :
55, 34, 41, 24, 74, 38, 65, 49
14. Write an Algorithm to traverse a graph using Breadth First Search.
15. Build a heap H from the following list of numbers :
42, 35, 5, 8, 34, 56, 70, 32

SECTION-C

16. Consider an array: 99, 2, 34, 17, 75, 12 Depict the state of the array after each pass if selection sort is applied.
17. Suppose a binary tree T is in memory. Write non-recursive procedure for each of the following :
 - a) Finding the number of nodes in T.
 - b) Finding the depth D of T.
 - c) Find the number of terminal nodes in T.
18. a) Suppose weighted graph G is maintained in memory by a node array DATA and weight matrix W as follows :

$$W = \begin{bmatrix} 0 & 0 & 3 & 0 \\ 5 & 0 & 1 & 7 \\ 2 & 0 & 0 & 4 \\ 0 & 6 & 8 & 0 \end{bmatrix}$$

Draw the picture of G.

- b) Write an algorithm to delete an node from linked list.

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B.Tech. (CSE) / (IT) (2012 to 2017) (Sem.-3)

COMPUTER ARCHITECTURE

Subject Code : BTCS-301

M.Code : 56591

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) What do you mean by register transfer language in computer architecture?
- 2) What is an instruction format in computer architecture?
- 3) Discuss array processors.
- 4) Compare RISC with CISC?.
- 5) What are the benefits of virtual memory?
- 6) Discuss timing and control.
- 7) Define Instruction level pipelining.
- 8) What is mapping functions in cache memory?
- 9) Write the benefits of serial communication?
- 10) Discuss memory synchronization.

SECTION-B

- 11) What are the special registers in a typical computer? Explain their purposes in detail.
- 12) What do you understand by interrupt? Explain the steps through which the processor handles the interrupts.
- 13) What are the advantages and disadvantages of hardwired and microprogrammed control?
- 14) What is DMA? Give an example where DMA mode of data transfer is useful?
- 15) What are addressing modes? Explain the various addressing modes with examples.

SECTION-C

- 16) Describe in brief the architecture of a vector processor. What are some of the key limitations of this architecture?
- 17) Write short notes on following :
 - a. Interprocessor communication and synchronization
 - b. Asynchronous data transfer
- 18) Explain various mechanisms of data transfer from a peripheral device.

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B.Tech CSE
P.T. 15 Dec 2018

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Total No. of Questions : 18

B.Tech. (CSE / IT/Electronics & Computer Engg) (2012 to 2017)
(Sem.-4)

MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING

Subject Code : BTCS-404

M.Code : 56607

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Explain the following :

1. What is the purpose of PUSH and POP instructions in 8085 Microprocessor instruction set?
2. What is the difference between opcode and operand? Explain with suitable example.
3. Explain the PSW of 8085.
4. Write the differences between RISC and CISC processors.
5. Name the different modes of DMA controlled data transfer.
6. Define Interpreter.
7. Write about the concept of memory segmentation in 8086 microprocessors.
8. Write a program to add 7BH and 6AH using ADI instruction.
9. What are the advantages of 8086 microprocessor over 8085 microprocessor?
10. Differentiate MOV and MVI with suitable examples.

SECTION-B

11. Explain the architecture of 8085 microprocessor.
12. Explain the following 8085 signals: ALE, TRAP, READY, HLDA and \overline{IO}/M .
13. Explain different addressing modes of 8085 in detail with examples.
14. Explain 1 byte, 2 byte and 3 byte instructions along with suitable examples.
15. Write about the different data transfer techniques used in microprocessors.

SECTION-C

16. Explain the interfacing of 8085 microprocessor with seven segment display in detail.
17. Discuss architecture and pin diagram of 8086 Microprocessor in detail.
18. a) Differentiate between instruction, machine and clock cycle.
b) Write a note on evolution of microprocessors.

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13. Compare paging with segmentation with respect to the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses.
14. What is Disk Scheduling? Explain the following types of disk scheduling by giving an example :
 - a. SCAN
 - b. C-SCAN Scheduling
15. What is Distributed Operating System? Explain main issues in designing distributed operating system.

SECTION-C

16. Discuss Preemptive and Non-preemptive CPU Scheduling algorithms. Assume you have the following jobs to execute with one processor, with the jobs arriving in the order listed here :

i	T(pi)
0	80
1	20
2	10
3	20
4	50

- a. Suppose a system uses FCFS scheduling. Create a Gantt chart illustrating the execution of these processes?
 - b. What is the turnaround time for process p3?
 - c. What is the average wait time for the processes?
17. What do you mean by Virtual Memory? Why it is needed? Discuss the hardware support required by the operating system to implement the virtual memory concept.
 18. Write a Short note on :
 - a. Dining Philosophers problem
 - b. Bad block vs. Boot Block in Disk Scheduling.

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g) There is no self-regulation in Nature.

प्रकृति में कोई आत्म-नियमन नहीं है।

ਕੁਦਰਤ ਵਿੱਚ ਕੋਈ ਆਤਮ-ਨਿਯਮਤਾ ਨਹੀਂ ਹੈ।

h) Developing ethical competence in individual ensures professional ethics.

व्यक्ति में नैतिक क्षमता का विकास पेशेवर नैतिकता सुनिश्चित करता है।

ਵਿਅਕਤੀ ਵਿੱਚ ਨੈਤਿਕ ਸਮਰੱਥਾ ਦਾ ਵਿਕਾਸ ਪੇਸ਼ੇਵਰ ਨੈਤਿਕਤਾ ਪੱਕੀ ਕਰਦਾ ਹੈ।

i) Holistic technologies should be eco-friendly and people-friendly.

समग्र प्रौद्योगिकियों पर्यावरण के अनुकूल और लोगों के अनुकूल होना चाहिए।

ਸਰਬੰਗੀ ਤਕਨੀਕਾਂ ਪਰਿਆਵਰਣ ਦੇ ਅਨੁਕੂਲ ਅਤੇ ਲੋਕਾਂ ਦੇ ਅਨੁਕੂਲ ਹੋਣੀਆਂ ਚਾਹੀਦੀਆਂ ਹਨ।

j) The value "care" is related with body.

मूल्य "ध्यान" शरीर के साथ संबंधित है।

ਮੁੱਲ ਧਿਆਨ ਸਰੀਰ ਦੇ ਨਾਲ ਸੰਬੰਧਤ ਹੈ।

SECTION-B

(5 × 4 = 20)

2. Explain self-organisation and health.

आत्म संगठन और स्वास्थ्य के बारे में बताएं।

ਆਤਮ ਸੰਗਠਨ ਅਤੇ ਸਿਹਤ ਦੇ ਬਾਰੇ ਵਿੱਚ ਦੱਸੋ।

3. Explain harmony in family.

परिवार में तालमेल के बारे में बताएं।

ਪਰਿਵਾਰ ਵਿੱਚ ਤਾਲਮੇਲ ਦੇ ਬਾਰੇ ਵਿੱਚ ਦੱਸੋ।

4. What are the basic guidelines of value education?

मूल्य शिक्षा की बुनियादी दिशानिर्देश क्या हैं?

ਮੁੱਲ ਸਿੱਖਿਆ ਦੀ ਬੁਨਿਆਦੀ ਦਿਸ਼ਾਨਿਰਦੇਸ਼ ਕੀ ਹਨ?

5. What is prosperity ? What is the difference between prosperity and wealth?

समृद्धि क्या है? समृद्धि और धन के बीच क्या अंतर है?

ਖੁਸ਼ਹਾਲੀ ਕੀ ਹੈ? ਖੁਸ਼ਹਾਲੀ ਅਤੇ ਪੈਸੇ ਦੇ ਵਿੱਚ ਕੀ ਅੰਤਰ ਹੈ?

6. Differentiate between intention and competence. How do we come to confuse between the two?

इरादा और क्षमता के बीच क्या अंतर है? कैसे हम गलती करते हैं?

ਇਰਾਦਾ ਅਤੇ ਸਮਰੱਥਾ ਦੇ ਵਿੱਚ ਕੀ ਅੰਤਰ ਹੈ? ਕਿਵੇਂ ਅਸੀਂ ਗਲਤੀ ਕਰਦੇ ਹਾਂ?

SECTION-C

(5 × 6 = 30)

7. What are the broad holistic criteria for evaluation of technologies, management models and production systems?

ਪ੍ਰਾਇਓਗਿਕੀ, ਪ੍ਰਬੰਧਨ ਮਾਡਲ ਅਤੇ ਉਤਪਾਦਨ ਪ੍ਰਣਾਲੀਆਂ ਦੇ ਮੁਲਾਂਕਨ ਕੇ ਲਿਏ ਵਯਾਪਕ ਸਮਝ ਮਾਪਦੰਡ ਕਯਾ ਹੈਂ?

ਸਰਬਾਂਗੀ ਤਕਨੀਕੀ, ਪਰਬੰਧਨ ਮਾਡਲ ਅਤੇ ਉਤਪਾਦਨ ਪ੍ਰਣਾਲੀਆਂ ਦੇ ਲੇਖੇ ਜੋਖੇ ਲਈ ਵਿਆਪਕ ਮਾਪਦੰਡ ਕੀ ਹਨ?

8. What are the four orders in nature? Explain.

ਪ੍ਰਕ੍ਰਿਤਿ ਮੇਂ ਚਾਰ ਆਦੇਸ਼ ਕਯਾ ਹੈਂ? ਸਮਝਾਓ।

ਕੁਦਰਤ ਵਿੱਚ ਚਾਰ ਅਵਸਥਾਵਾਂ ਕੀ ਹਨ? ਸਮਝਾਓ।

9. What do you mean by universal human order? What could be your role in moving towards it?

ਆਪ ਸਾਰਵਭੌਮਿਕ ਮਾਨਵੀਯ ਆਦੇਸ਼ ਸੇ ਕਯਾ ਸਮਝਦੇ ਹੈਂ? ਇਸਮੇਂ ਅਪਨੀ ਭੂਮਿਕਾ ਕਯਾ ਹੋ ਸਕਦੀ ਹੈ?

ਤੁਸੀਂ ਸਾਰਵਭੌਮਿਕ ਮਾਨਵੀ ਆਦੇਸ਼ ਵਲੋਂ ਕੀ ਸਮਝਦੇ ਹੋ? ਇਸ ਵਿੱਚ ਆਪਣੀ ਭੂਮਿਕਾ ਕੀ ਹੋ ਸਕਦੀ ਹੈ।

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Information Technology) (2018 Batch) (Sem.-4)

OPERATING SYSTEMS

Subject Code : BTIT-402-18

M.Code : 77539

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1 Write briefly :

- a) Differentiate between hard real time and soft real time system.
- b) Explain in brief about Multiprogramming systems.
- c) What is meant by the state of the process?
- d) Explain the term Race Conditions in reference to Inter-process communication.
- e) What do you mean by Mutual Exclusion? Why mutual exclusion is required?
- f) Explain the difference between logical and physical addresses.
- g) Differentiate between internal and external fragmentation.
- h) What are the methods for handling deadlocks?
- i) Define Seek Time and Rotational Latency.
- j) How free-space is managed using bit vector implementation? List its advantages.

SECTION-B

- Q2 Explain in details about following types of OS :
- a) Time Sharing System (2.5)
 - b) Parallel System (2.5)
- Q3 Explain the following terms in detail in reference to process scheduling :
- a) Types of schedulers (2.5)
 - b) Multiprocessor scheduling (2.5)
- Q4 Define the term Deadlock. Explain deadlock prevention in detail. (5)
- Q5 Write a detailed note on Paging scheme of memory management. (5)
- Q6 Write a detailed note on Direct Memory Access. (5)

SECTION-C

- Q7 a) Write a brief note on threads. (5)
- b) Explain the Contiguous and Linked File allocation Methods in detail. (5)
- Q8 Explain the following terms related to Inter-Process Communication :
- a) Peterson's Solution (5)
 - b) Semaphores (5)
- Q9 What is the need of Page replacement? Consider the following reference string :
- 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
- Find the number of Page Faults with FIFO, Optimal Page replacement and LRU with three free frames which are empty initially. Which algorithm gives the minimum number of page faults? (10)

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Roll No.

Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (CSE/IT) (2018 Batch) (Sem.-4)

DISCRETE MATHEMATICS

Subject Code : BTCS-401-18

M.Code : 77626

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

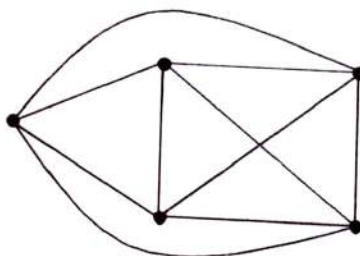
1. Find the Cartesian product $A \times A$ if $A = \{0, 1, 3\}$.
2. Construct the truth table of the compound proposition $(p \vee \neg q) \rightarrow (p \wedge q)$.
3. Define contrapositive of a conditional statement and find the same for of the following statement:
"If you do your homework, you will not be punished"
4. What is the power set of the empty set? What is the power set of the set $\{\phi\}$? Here ϕ is an empty set.
5. State pigeonhole principle.
6. Find the greatest common divisor of 414 and 662 using the Euclidean algorithm.
7. Draw a Complete graph with 5 vertices.
8. Does there exists a simple graph with six vertices of degrees 1,1,3, 4,6,7? Justify.
9. Define a permutation group.
10. For any a,b in a Boolean algebra prove that $(a+b)'=a'b'$.

SECTION-B

11. Show that $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences.
12. In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked product C only?
13. Let A be the set of integers and R be the relation defined on $A \times A$ by $(a,b)R(c,d)$ if $ad=bc$. Prove that R is an equivalence relation.
14. Explain the following with suitable examples :
 - a) Connected graph
 - b) Planar graph
 - c) Vertex colouring of a Graph
 - d) Rooted tree
15. Show that the set $G=\{1,2,3,4,5,6\}$ is a finite abelian group of order 6 w.r.t. multiplication modulo 7.

SECTION-C

16.
 - a) Prove that $\sqrt{2}$ is irrational by giving a proof by contradiction.
 - b) Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements
 - i) All the vowels always occur together.
 - ii) Vowels never occur together.
17.
 - a) Prove that a finite integral domain is a field.
 - b) Using Boolean algebra, show that :
$$abc+ab'c+abc'+a'bc=ab+bc+ca$$
18. a) Determine whether the following graph is :



- i) Hamiltonian, if yes, find the Hamiltonian cycle.
 - ii) Eulerian, if yes, find the Euler cycle.
- b) Use the well-ordering property to prove the division algorithm which states that if a is an integer and d is a positive integer, then there are unique integers q and r with $0 \leq r < d$ and $a = dq + r$.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2018 Batch) (Sem.-4)

COMPUTER ORGANIZATION AND ARCHITECTURE

Subject Code : BTES-401-18

M.Code : 77627

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Distinguish between auto increment and auto decrement mode.
2. Write a register transfer sequence to read a word from memory.
3. Mention some advantages of USB.
4. How many memory chips are needed to construct $2M \times 16$ memory system using $512K \times 8$ static memory chips?
5. Define and explain memory hierarchy.
6. What is a Micro Program Sequencer?
7. State the advantages of Virtual Memory.
8. Write the logic equations of binary half adder?
9. Under what situations the micro program counter is not incremented after a new instruction is fetched from micro program memory.
10. What are the disadvantages of increasing the number of stages in pipeline processing?

SECTION-B

11. Explain briefly Integer Addition and Subtraction Algorithm.
12. What is a Mapping Function? What are the ways cache can be mapped?
13. Explain the working of carry look ahead adder.
14. With examples explain the data transfer, Logic and Program control instructions.
15. Explain in detail about the Flynn's classification.

SECTION-C

16. What is Instruction Hazard? Explain the methods of dealing with instruction hazards.
17. Explain the basic organization of micro programmed control unit and generation of control signals using micro program.
18. Discuss about the various components of computer system.

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SECTION-B

11. Write a short note on greedy strategy to solve a problem.
12. Solve the following problem by using least cost branch and bound method :
Knapsack instance $n = 4$, $p(1:4) = \{1,1,12,18\}$ and
Weight $w(1:4) = (2,4,6,9)$ & max capacity $m = 15$
13. What is the relationship among P, NP and NP complete problems? Show with the help of a diagram.

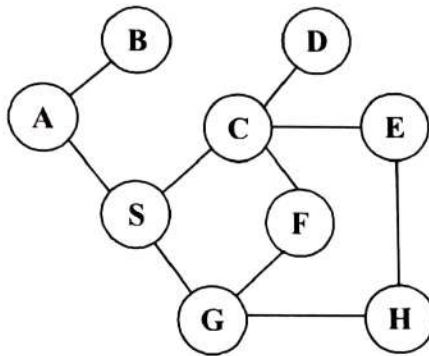


FIG.1

14. Traverse all the vertices of above figure using breadth first search.
15. Find the adjacency list and adjacency matrix of below figure.

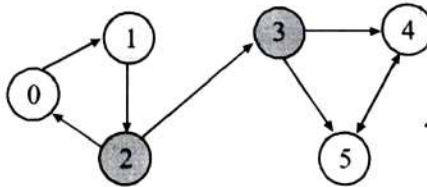


FIG.2

SECTION-C

16. Explain the advantages of using dynamic programming. Introduce travelling salesman problem. Explain the technique to solve travelling salesman problem using this technique.
17. Why do we perform topological sorts only on directed acyclic graph? Explain
18. Discuss 'Heuristics and its characteristic.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(IT) (2018 Batch) (Sem.-4)
DEVELOPMENT OF SOCIETIES
Subject Code : HSMC-101-18
M.Code : 77541

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Clan
2. Social system
3. Describe any two models of governing system
4. Social structure
5. Capitalism
6. Development in Pre-British Period
7. Barter
8. Budhist economics
9. Swaraj
10. Decentralization

SECTION-B

11. Discuss the origin of family in society.
12. Discuss any idea of political system in detail.
13. Distinguish between capitalism and socialism.
14. Write a note on concept of development in Post-British period in India.
15. Explain the idea of Marxism.

SECTION-C

16. Which model of governing system is most suitable for Indian society? Why?
17. Elaborate upon the relation between human being and society.
18. Discuss E.F. Schumacher's idea of development.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (2018 Batch) (Sem.-4)
DESIGN & ANALYSIS OF ALGORITHMS

Subject Code : BTCS-403-18

M.Code : 77629

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. "Asymptotic notation Ω is transitive". Justify.
2. Define P and NP class problem.
3. Give recurrence relation in general for computing complexity of divide and conquer algorithm.
4. Define live node and dead node.
5. Solve the recurrence equation $T(n) = 9T(n/3) + n$.
6. What is flow network?
7. What is time and space complexity?
8. Define dynamic programming approach.
9. Write any algorithm to find shortest path.
10. What is Cook's theorem?

SECTION-B

11. Explain the term Algorithm with its characteristics.
12. What is Knapsack problem? Justify that "All optimal solutions will fill the knapsack exactly".
13. Explain the general method of Branch and Bound.
14. Give a set $S = \{1, 4, 5, 6, 7, 3\}$ and $W = 12$. Obtain the sum of subset using backtracking approach.
15. Define flow network and write an iterative Ford-Fulkerson's method for solving Max-Flow problem.

SECTION-C

16. Explain Depth First Search and Breadth First Search method with example.
17. Explain Greedy method with suitable example.
18. Find the minimum spanning tree for the graph given below :

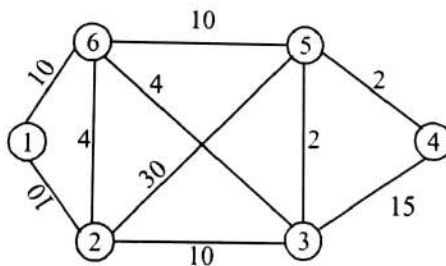


FIG.1

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Information Technology) (2018 Batch) (Sem.-4)

COMPUTER NETWORKS

Subject Code : BTIT-401-18

M.Code : 77538

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- Q1 What are protocols and standards?
- Q2 Differentiate between Wired LAN and Wireless LANs.
- Q3 Explain in brief about the term Block Coding.
- Q4 Define the term Flow Control.
- Q5 What is the function of DHCP?
- Q6 List various Unicast routing protocols.
- Q7 What is an IP address? What is the use of an IP address?
- Q8 Explain in brief about SCTP congestion control.
- Q9 Differentiate between TCP and UDP.
- Q10 Explain in brief about the term Bluetooth.

SECTION-B

- Q11 Write a detailed note on following transmission media :
- a) Twisted pair
 - b) Co-axial cable
- Q12 Write a detailed note on CSMA/CA.
- Q13 Explain in detail about ARP.
- Q14 Write a detailed note on User Datagram Protocol (UDP).
- Q15 Explain in brief about Telnet and File Transfer Protocol (FTP) in brief.

SECTION-C

- Q16 Write a detailed note on the OSI model. (10)
- Q17 Write a detailed note on Token Bucket Algorithm. (10)
- Q18 Explain in detail about the following terms in reference to application Layer.
- a) DDNS (3)
 - b) EMAIL (4)
 - c) HTTP (3)

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Dec 2020

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE)/(IT) (2012 to 2017) (Sem.-4)

OPERATING SYSTEMS

Subject Code : BTCS-401

M.Code : 56604

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Explain the need of an Operating System.
2. Explain the term PCB in brief.
3. Define the term deadlock with an example.
4. Define the term thrashing. What is the cause of thrashing? Explain.
5. Differentiate between Paging and Segmentation scheme of Memory Management.
6. What is meant by Disk Scheduling? Why Disk Scheduling is necessary?
7. What is the need of I/O traffic controller? Discuss.
8. Explain in brief about the Physical File system.
9. Differentiate between Protection and Security.
10. Write two advantages of Windows based Operating System.

(S2)-818

SECTION-B

11. Explain in brief about the functions of Kernel and shell.
12. Write a detailed note on Process Synchronization.
13. Write a brief note on Segmentation scheme of memory management.
14. Write a brief note on Logical File System.
15. Write a brief note on Windows based Operating Systems.

SECTION-C

16. Write a detailed note on operating system structures.
17.
 - a) Explain in detail about device management policies.
 - b) Write a detailed note on I/O system in reference to device management.
18.
 - a) Write a brief note on Layered Architecture in relation to file management
 - b) Explain in detail the following CPU scheduling algorithms :
 - (i) Shortest Job First
 - (ii) Multilevel feedback Queue scheduling

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE)/(IT) (2012 to 2017) (Sem.-4)

COMPUTER NETWORKS-I

Subject Code : BTCS-403

M.Code : 56606

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Answer briefly :

1. Differentiate between LAN, MAN and WAN.
2. Differentiate between broadcast and point-to-point networks.
3. Explain in brief the term Distortion in reference to transmission impairments.
4. What are the advantages of Twisted pair as a transmission media?
5. Explain the term hamming code in reference to error detecting codes.
6. Explain the term Framing in brief.
7. Compare pure and slotted ALOHA protocols.
8. Explain the term subnetting in brief.
9. Explain the term De-multiplexing in brief.
10. What do you mean by Domain Name System? Discuss.

SECTION-B

11. Explain the following in brief :
 - a) Frequency Division Multiplexing
 - b) Time Division Multiplexing
12.
 - a) Write a brief note on PPP protocol.
 - b) Explain in brief about any two Network topologies.
13. Write a detailed note on static and dynamic channel allocation.
14. Write a brief note on TCP and UDP protocols. Also compare TCP and UDP protocols.
15. Write a brief note on E-mail and FTP.

SECTION-C

16. Write a detailed note on the ISO-OSI reference model.
17. Explain the link state Routing Algorithm with an example.
18. Write a detailed note on Checksum and CRC in reference to Error detection and Correction codes.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE / IT) (2012 to 2017) (Sem.-4)

SYSTEM PROGRAMMING

Subject Code : BTCS-405

M.Code : 56608

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Give the difference between BALR and USING.
2. What are the three main data structures used by our macro processor?
3. What do you mean by Static Linking?
4. Which amongst the one pass and two pass assembler is better and why?
5. What is Bootstrap loader? Explain its characteristics with examples.
6. What are the differences between Passes and Phases of compiler?
7. How do we differentiate between open subroutine and closed subroutines?
8. What does an assembler perform when it encounters LTORG assembler directive?
9. What is interpreter?
10. What do you mean by ambiguity of grammar?

SECTION-B

11. Compare linking loader and linkage editor.
12. Explain in detail the lexical analysis phase of a compiler.
13. What is LEX used for? What is the difference between LEX and YACC?
14. What is debugging. Explain different approaches adopted by programmers for debugging?
15. Write short notes on :
 - a. Overlays
 - b. Scanning and parsing

SECTION-C

16. Explain the two-pass assembler in detail with block diagram.
17. State and explain the algorithm for one pass macro processor.
18. What do you mean by text Editor? What are its features and discuss any two text editors in detail?

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Roll No.

Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (CSE / IT) (2012 to 2017) (Sem.-4)

DISCRETE STRUCTURES

Subject Code : BTCS-402

M.Code : 71106

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Define Euler graph.
2. Define ring with example.
3. What is the minimum number of NOR gate required to construct AND gate? Also construct it.
4. Differentiate between graph and tree.
5. Give an example of a semi group without an identity element.
6. Give an example of Hamiltonian circuit.
7. What is the number of vertices in a tree with n edges?
8. State the principle of inclusion and exclusion.
9. What are partial order relation?
10. Define graph coloring.

SECTION-B

11. Consider the following five relations on the set $A = \{1, 2, 3\}$:

$$R = \{(1, 1), (1, 2), (1, 3), (3, 3)\},$$

$\emptyset =$ empty relation

$$S = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3)\},$$

$A \times A =$ universal relation

$$T = \{(1,1), (1,2), (2, 2), (2, 3)\}$$

Determine whether or not each of the above relations on A is : (a) reflexive; (b) symmetric; (c) transitive; (d) antisymmetric.

12. Consider all integers from 1 up to and including 100. Find the number of them that are:

a) Odd or the square of an integer;

b) Even or the cube of an integer.

13. Let a and b be integers. Find $Q(2, 7)$, $Q(5, 3)$, and $Q(15, 2)$, where $Q(a, b)$ is defined by:

$$Q(a, b) = \begin{cases} 5, & \text{if } a < b \\ Q(a - b, b + 2) + a, & \text{if } a \geq b \end{cases}$$

14. Let G be any (additive) abelian group. Define a multiplication in G by $a * b = 0$ for every $a, b \in G$. Show that this makes G into a ring.
15. Find the general solution for third-order homogeneous recurrence relation $a_n = 6a_{n-1} - 12a_{n-2} + 8a_{n-3}$

SECTION-C

16. Show that K_n has $H = (n - 1)! / 2$ Hamiltonian circuits. In particular, find the number of Hamiltonian circuits for the graph K_5 in Figure 1.

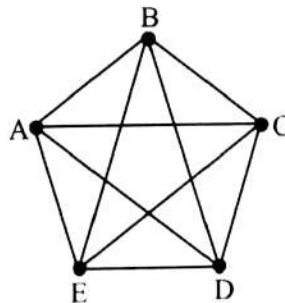


Fig.1

17. Suppose the preorder and inorder traversals of a binary tree T yield the following sequences of nodes :

Preorder : $G, B, Q, A, C, K, F, P, D, E, R, H$

Inorder : $Q, B, K, C, F, A, G, P, E, D, H, R$

- a) Draw the diagram of T .
 - b) Find depth d of T
18. State and prove Euler's theorem in graph theory.

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Roll No.

Total No. of Questions : 18

Total No. of Pages : 02

B.Tech. (CSE) (2012 to 2017) (Sem.-5)
COMPUTER PERIPHERALS & INTERFACES

Subject Code : BTCS-505

M.Code : 70538

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) Define Interrupt and its types.
- 2) What are IP Addressing conflicts?
- 3) Discuss ATA RAID features.
- 4) What is PCI Express card?
- 5) What is the difference between LCD and LED?
- 6) Discuss USB 961.
- 7) What are keyboard interface types?
- 8) Discuss the advantage of 3D technology.
- 9) What are DVI digital signals?
- 10) Write the significance of video RAM.

SECTION-B

- 11) Discuss the need of AGP Bus.
- 12) Compare SCSI and IDE Interfaces.
- 13) Write a short note on various Video adapter types.
- 14) Explain different methods for testing Serial and parallel ports.
- 15) How the troubleshooting is done for video cards and drivers?

SECTION-C

- 16) By taking some example illustrate steps for Designing and Integration of Peripheral device to a computer system.
- 17) Discuss some aspects of cost performance analysis while designing the system.
- 18) What are device drivers? Discuss the drivers for LINUX operating.

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Roll No. _____

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (2012 to 2017) (Sem.-5)

COMPUTER GRAPHICS

Subject Code : BTCS-504

M.Code : 70537

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) What is resolution in computer graphics?
- 2) Explain Raster Scan System.
- 3) Discuss matrix representation.
- 4) What is reflection transformation?
- 5) What is the role of computer graphics in virtual reality?
- 6) What is the concept of a vanishing point?
- 7) Write about windows and view port.
- 8) What is text clipping?
- 9) Discuss Ellipse generating algorithms.
- 10) Write a short note on Gourard Shading.

(52)-963

SECTION-B

- 11) Explain about different line drawing algorithms.
- 12) Write various area filling techniques. Explain any one in detail.
- 13) What is parallel projection and different types?
- 14) What are the advantages of Painter Algorithm in Computer Graphics?
- 15) Derive transformation matrix for 2-D viewing transformation.

SECTION-C

- 16) Give the syntax of drawing a circle in computer graphics using various algorithms.
- 17) What is z buffer technique? Discuss use of z buffer algorithm for hidden surface removal.
- 18) a. Give the introduction of ray tracing technique for generating an image by tracing the path.
b. Write the uses of anti aliasing software technique in Computer Graphics.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (IT) (2012 to 2017) (Sem.-5)
DATABASE MANAGEMENT SYSTEM

Subject Code : BTIT-503

M.Code : 70596

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is Physical and logical data Independence of DBMS?
2. What is SQL Dependency?
3. Compare hierarchical model with relational model?
4. Explain 2nd and 3rd normal forms?
5. What are report generators?
6. Give syntax of JDBC?
7. Write the use of XML?
8. What is XQuery?
9. What is the use of NoSQL database?
10. What is transaction management in SQL?

SECTION-B

11. Write a short note on distributed processing and client server architecture.
12. Define relational algebra. Explain the various operations of relational algebra.
13. What do you mean by Distributed databases? What are the policies used in distributed databases?
14. Give the introduction of relational query optimisation.
15. Explain the various schemas that can be used for the construction of data warehouse.

SECTION-C

16. What are logical data model and physical model? Discuss physical data Modeling Techniques?
17. What are nested elements in XML? What are the benefits of XML? Explain.
18. Discuss how Online Analytical Processing (OLAP) is used to organize large business databases?

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE/IT) (2012 to 2017) (Sem.-5)

COMPUTER NETWORKS-II

Subject Code : BTCS-501

M.Code : 70534

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Network Security
2. ESP
3. CDMA
4. WLL
5. Frequency reuse
6. IKE
7. IP
8. What is 2.5G?
9. What is Authentication header?
10. What is LMDS?

SECTION-B

11. What is IP sec Protocol? Explain its header.
12. Give the details of WLAN.
13. Write down a note on evolution of wireless communication system.
14. What is GPRS? Describe different security and handoff issues in GPRS?
15. Explain any one routing protocol with suitable example.

SECTION-C

16. Explain the security features of IPv6. (10)
17. What is System Capacity? What are different ways to improve coverage and capacity in cellular systems? (10)
18. Write short notes on :
 - a) WLANs 4
 - b) Bluetooth 3
 - c) Personal Area Network 3

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Dec 2020

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (IT) (2012 to 2017) (Sem.-5)

PROGRAMMING IN JAVA

Subject Code : BTIT-502

M.Code : 70595

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) Why Java is called platform independent language?
- 2) What is abstract class?
- 3) What is a reference variable in java?
- 4) What is the purpose of garbage collector in java?
- 5) What is the need of super keyword?
- 6) What is run time exception? Give example.
- 7) What is the difference between process and a thread in java?
- 8) What is JDBC?
- 9) Define server socket.
- 10) What are command line arguments in java?

SECTION-B

- 11) Write a program in java to print first five elements of a Fibonacci series using for loop.
- 12) What is multithreading? How java implements its thread model?
- 13) Write a program in java to copy the string from one file into another file.
- 14) Explain briefly about the access modifiers in java and their usage.
- 15) Write a program to demonstrate the different types of inheritance in java.

SECTION-C

- 16) What is exception handling? Discuss different types of exceptions and Write a java program to illustrate the use of try and multi-catch statement.
- 17) What are different types of operators used in java? Write a program in java to demonstrate the concept operator precedence.
- 18) a) Write a short note on :
 - a. Applet
 - b. Importing of package
 - c. "this" keyword
- b) Write a short note on :
 - a. Method overloading
 - b. Finalize method
 - c. Type casting

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SECTION-B

- 11) What is the relationship between the classes P and NP? Explain. (5)
- 12) Explain the Big -Oh computation for each of the following control structures : (5)
- | | | |
|-----------------|-----------------|---------------|
| a) Sequencing | b) If-then-else | c) "for" loop |
| c) "While" loop | e) Recursion | |
- 13) What do you analyze in an algorithm? What is the basis of analysis? Explain. (5)
- 14) Explain topological sort with an example. (5)
- 15) What are greedy algorithms? What are their characteristics? Explain any greedy algorithm with example. (5)

SECTION-C

- 16) Explain the KMP algorithm in detail with an illustrative example. (10)
- 17) Explain in detail quick sorting method. Provide a complete analysis of quick sort. (10)
- 18) Order the following functions by growth rate: N , $N^{1.5}$, N^2 , $N \log \log N$, $N \log^2 N$, $N \log(N^2)$, $2/N$, 2^N , $2^{N/2}$, 37 , $N^2 \log N$, N^3 Indicate which functions grow at the same rate. (10)

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Roll No.

Total No. of Questions : 18

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B.Tech. (IT) (2012 to 2017) (Sem.-5)

CYBER LAWS & IPR

Subject Code : BTIT-504

M.Code : 70597

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Explain briefly :

1. Differentiate Internet and Intranet.
2. How do we electronically sign a document?
3. Why do we need cyber law?
4. How Netizen is used by the online community of the Internet?
5. Define role of ISP.
6. Name Internet related crimes.
7. What is Taxation in E-commerce?
8. Which is latest IT Act?
9. What is role of certifying authority?
10. Write any two grey areas of IT Act 2000.

SECTION-B

11. Write the importance of Encryption techniques? Explain **any one** Encryption Algorithm.
12. Define copyright. Discuss the protection of software copyright.
13. What are the different types of issues to be considered in E-commerce?
14. Give the overview of Indian Law relating Intellectual Property Rights.
15. Write a short note on the scope of IT Act 2000.

SECTION-C

16. What do you mean by Cyber Crimes? Discuss the nature and types of Cyber Crimes?
17. Explain the documentation of cyber crimes offences and contraventions written in IT ACT 2000.
18. List some of the E-commerce models. Explain any one of them in detail? What are its legal aspects.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (2012 to 2017) (Sem.-5)

RELATIONAL DATABASE MANAGEMENT SYSTEM-I

Subject Code : BTCS-502

M.Code : 70535

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) Define Data Independence and its types.
- 2) Define and explain clustered index.
- 3) Define Referential Integrity constraints.
- 4) Explain Multi valued Functional Dependency.
- 5) What is Deadlock during concurrent processing?
- 6) Explain Variable Length Records and uses.
- 7) Explain different joins.
- 8) Explain two phase commit protocol.
- 9) What are ACID properties for transactions?
- 10) Explain digital signature.

SECTION-B

- 11) Compare file system and data base management systems.
- 12) Explain the different operations in Relational Algebra with the help of an example.
- 13) Why is the concurrency control needed? Discuss with examples.
- 14) What is the use of E-R model? Draw E-R diagram for student information system, student, subject, and course are three entities, consider suitable attributes, cardinalities, and degrees of the relationships in the E-R model.
- 15) Discuss how serializability is used to enforce concurrency control in a database system? Why is serializability considered too restrictive as a measure of correctness for schedules?

SECTION-C

- 16) Consider the following relational database :

employee(employee-name, street, city)

works(employee-name, company-name, salary)

company(company-name, city)

manages(employee-name, manager-name)

Give an expression in SQL for each of the following queries :

- a. Find the names, street address, and cities of residence for all employees who work for 'First Bank Corporation' and earn more than Rs.10,000.
 - b. Find the names of all employees in the database who live in the same cities as the companies for which they work.
 - c. Find the names of all employees in the database who live in the same cities and on the what different techniques are used for data encryption in Cloud Computing? Explain in detail.
- 17) Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with examples?
 - 18) What is the difference between discretionary and mandatory access control? Explain with an example.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(IT) (2012 to 2017) (Sem.-5)
SYSTEM ANALYSIS AND DESIGN
Subject Code : BTIT-501
M.Code : 70594

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) Automated System
- 2) System Analyst
- 3) Quality Control
- 4) System Testing
- 5) Disaster Recovery
- 6) User Interface
- 7) HIPO vs IPO
- 8) Dynamic Modeling
- 9) Static Design
- 10) Coupling vs Cohesion

SECTION-B

- 11) Write a note on CASE Tools.
- 12) What is system testing? Explain.
- 13) Differentiate between DFD and Decision Trees.
- 14) Describe Object Oriented Analysis.
- 15) Why we uses Normalization?

SECTION-C

- 16) Differentiate between threat and risk analysis in information system.
- 17) Explain various sources of information gathering.
- 18) Define Data Dictionary. How it is important in structured analysis?

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (2012 to 2017) (Sem.-6)

SIMULATION AND MODELING

Subject Code : BTCS-601

M.Code : 71107

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Answer briefly :

1. Name any four simulation software.
2. What is modeling?
3. Differentiate between analytical and numerical simulation.
4. What is hold and store block GPSS?
5. Write any two properties of pseudo random numbers.
6. How sample size is decided in simulation?
7. What do you mean by discrete system simulation?
8. Explain the concept of probability functions.
9. Give example of continuous system simulation.
10. What are the types of system models available?

SECTION-B

11. Explain Kolmogorov-Smirnov test with example.
12. What is the method for testing random number generation of no uniformly distributed random number?
13. Suppose that arrivals to a Bank occur at a rate of 2 per minute from 8 A.M. until 12 P.M., then drop to 1 every 2 minutes until the day ends at 4 P.M. What is the Probability distribution of the number of arrivals between 11 A.M. and 2 P.M.?
14. Explain empirical distribution with an example.
15. Explain various; simulation software features, characteristics and advantages.

SECTION-C

16. What are the major industries where the simulation is used? Explain macro dynamic models in detail.
17. What do you understand by model validation and verification? Explain.
18. Define Simulation Language. Give detailed overview of GPSS.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (IT) (2012 to 2017) (Sem.-6)

NETWORKING PROGRAMMING

Subject Code : BTIT-601

M.Code : 71171

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write short notes on :

1. Which are unreliable signals in networks?
2. Define Process.
3. Write the use of POSIX message queues.
4. What are pipes in Linux?
5. Give the definition of Systems Network Architecture (SNA).
6. What are the signals in Unix?
7. What is timeout in transmission?
8. How I/O multiplexing is used in network programming?
9. Why do we use IPv6?
10. Define TLL.

SECTION-B

11. Explain the need of semaphores. What are its types?
12. Write the use of NetBIOS for communicate in network programming.
13. How does a client server infrastructure work?
14. Write the need of network socket for sending or receiving data within a network.
15. What is Remote Procedure Call? Discuss its use in Inter process communication?

SECTION-C

16. What are the services of transport layer? How it provides logical communication between application processes running on different hosts?
17. Discuss the basics of shell programming. Write a shell script to reverse a number.
18. How does *mmap* works? Write its uses for mapping in network programming.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(IT) (2012 to 2017) (Sem.-6)

INFORMATION SECURITY AND RISK MANAGEMENT

Subject Code : BTIT-602

M.Code : 71172

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is role of cryptography?
2. What are worms in Information Security?
3. Discuss *SHA2* hash function.
4. What are digital signatures?
5. Give the role of Key management in cryptography.
6. Define message integrity.
7. What is the goal of a *DoS* attack?
8. Write the purpose of *MD4*.
9. What is threat assessment?
10. Write the syntax of RSA algorithm.

SECTION-B

11. How firewalls are used to prevent the threats in information security?
12. What is a DMZ and why would we use it?
13. What are the message authentication functions? What are its requirements?
14. How Pretty Good Privacy is used for sending secure encrypted messages in network?
15. Discuss the role of qualitative risk analysis in risk management.

SECTION-C

16. Explain the importance of DES algorithm using the block diagram. Discuss the modified mode AES.
17. Discuss the Web Security issues. Which are the key Web services security requirements?
18. What is risk management process? How would you identify, analysis and evaluate the risk?

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (IT) (2012 to 2017) (Sem.-6)

WEB TECHNOLOGIES

Subject Code : BTIT-603

M.Code : 71173

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Define the term WWW.
2. Explain in brief about HTTP.
3. List out the new features of HTML5.
4. What are the types of lists supported by HTML5?
5. Define JavaScript. List the advantages of JavaScript.
6. Explain in brief about cookies.
7. Explain in brief about HTTP request.
8. What are the technologies used by AJAX?
9. What is PHP?
10. Explain in brief about the term POJO.

SECTION-B

11. Write a detailed note on WEB Servers.
12. Explain in detail about HTML5 Lists.
13. Explain in detail about XML Http request.
14. Write a detailed note on JavaScript DOM.
15. Write a detailed note on J2EE.

SECTION-C

16. a) Explain in detail the concept of dialog boxes in JavaScript with a suitable JavaScript code. (5)
b) Write a detailed note on Cascading Style Sheets in HTML5. (5)
17. Explain different types of operators available in PHP. (10)
18. a) Explain in detail about tools for Website creation. (5)
b) Write a detailed note on JSP. (5)

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (2012 to 2017) (Sem.-6)

RDBMS-II

Subject Code : BTCS-602

M.Code : 71108

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Explain data Independence.
2. What are the components of query processor?
3. Explain role of Time Stamping in concurrency.
4. What are the advantages and disadvantages of DDBMS?
5. Define Views; can be used for updating database.
6. Write basic data mining process.
7. What is Shadow paging?
8. What is PJ/NF (5th Normal Form)?
9. Explain concept of Big Data.
10. Discuss different types of DDBMS.

SECTION-B

11. What are five level schemas in distributed database system? Give advantages and disadvantages of distributed database systems.
12. Explain concepts of 1NF, 2NF and 3NF for relational databases with the help of an example.
13. What is a transaction? What are various states of a transaction? Explain each state with the help of example.
14. Write short notes :
 - a) Multi valued Dependency.
 - b) Concurrency control.
15. What is rollback operation and why it is required?

SECTION-C

16.
 - a) Why 4NF is a normal form more desirable than BCNF? Why?
 - b) What is data mart? Which schema is suitable for data mart?
17.
 - a) Define Shadow Paging. What are the drawbacks of shadow-paging technique?
 - b) What is data allocation in DDBMS? Explain.
18. What are the steps involved in query processing? Explain. How would you estimate the cost of the query?

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SECTION-B

11. Explain the security architecture design framework.
12. Write a note on Virtual Machine Security.
13. A Company wants to build a test environment to test software updates and new solutions. The environment should mirror the production environment and be secure and inaccessible from outside the company network. The company does not want to invest in infrastructure that may be idle for a significant amount of time. Which cloud computing model will satisfy all these requirements? Explain.
14. A company is considering a cloud environment to improve the operating efficiency for their data and applications. The company is part of an industry where strict security and data privacy issues are of the highest importance. Which type of cloud would be a good choice and why do you think like that?
15. What are major areas of concern expressed by customers when proposing a multi-tenancy software solution compared to a single-tenancy solution?

SECTION-C

16. Explain the system models for distributed and cloud computing.
17. Compare: Public, Private and Hybrid clouds.
18. What is server virtualization? Explain parallel processing.

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Dec 2020

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (2012 to 2017 E-I) (Sem.-6)
WEB TECHNOLOGIES
Subject Code : BTCS-901
M.Code : 71110

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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SECTION-A

Explain the following :

1. WEB Browser
2. Class
3. Object
4. CSS
5. Cookies
6. E-mail
7. Inheritance
8. Session
9. Polymorphism
10. ISP

SECTION-B

11. Write a brief note on WWW.
12. What is a frame? How they are created? Explain.
13. How MySQL is connected with PHP? Give connection string.
14. What are various types of Internet connections? Explain.
15. Define Session. How it works and what are its advantages?

SECTION-C

16. What are various XML elements and attributes? Explain with help of example.
17. Write a note on DHTML and Style sheets.
18. What is exceptional handling? Explain.

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B. Tech ECE
P.T. 04/18
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B. Tech (ECE) Dec 2020

Roll No. _____

Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (ECE) (2018 Batch) (Sem.-3)

NETWORK THEORY

Subject Code : BTEC-304-18

M.Code : 76447

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. State reciprocity theorem and its applications.
2. Find convolution of $f_1(t)=2u(t)$ and $f_2(t)=e^{-3t} u(t)$, where $u(t)$ is a step function.
3. Define hybrid parameters with equations and application,
4. A series RL circuit has $R=1K \Omega$, $L=10mH$ and $C=2 \mu F$. Find the Transfer function of the circuit.
5. Define the necessary and sufficient conditions for a polynomial to be Hurwitz.
6. Z parameters are $Z_{11} = 10\Omega$, $Z_{22} = 20\Omega$, $Z_{12} = Z_{21} = 5\Omega$. Find equivalent T network.
7. Obtain the image impedance for a T-network for which the resistance of three arms are equal to 3Ω .
8. Give the difference in properties of RC, RL and LC circuit.
9. State the advantages of 3-phase supply over single phase.
10. For a series RC circuit excited by 10V ac voltage, with a time constant τ sec. Find the voltage across C at time t.

SECTION-B

11. For the given two port network calculate the hybrid parameters of Fig. 1.

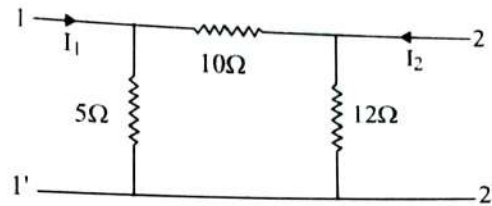


FIG.1

12. Find whether the given function is a positive real function?

$$F(s) = \frac{2s^2 + 5s + 1}{s^3 + 2s^2 + s + 2}$$

13. Find the Fourier transform of the pulse as shown in Fig. 2

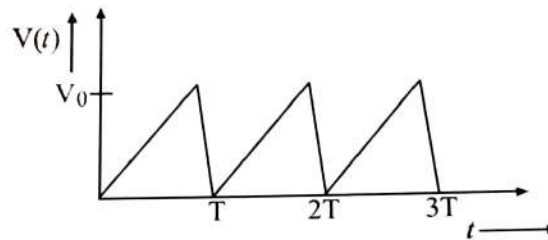


FIG.2

14. In the circuit shown, steady state is reached with switch open. Switch is closed at $t=0$. Determine $i(t)$ for $t > 0$. (Fig. 3)

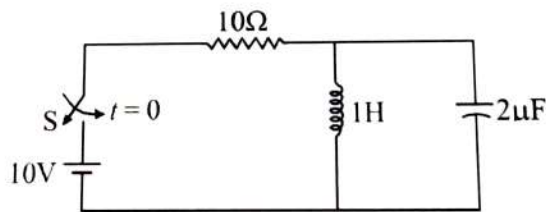


FIG.3

15. A delta connected three phase load has $10 \angle 0^\circ$, $5 \angle -90^\circ$ and $2 \angle 90^\circ$. The supply voltage is 400V, 50Hz. Calculate the line currents for RBY phase sequence.

SECTION-C

16. The driving point impedance is given by :

$$Z(s) = \frac{s(s^2 + 9)}{(s^2 + 5)(s^2 + 13)}$$

Obtain the Foster-I and Foster-II forms.

17. What do you mean by balanced and unbalanced loads? Explain Millman's theorem for unbalanced loads with diagram and equations.
18. Obtain the trigonometric form of Fourier series expansion of the rectified sine wave of Fig.4.

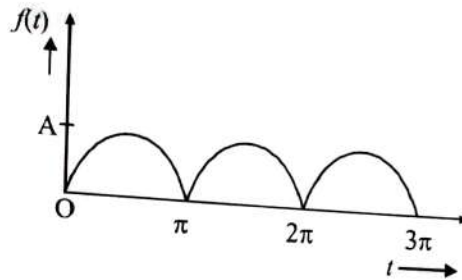


FIG.4

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(ECE) (2018 Batch) (Sem.-3)

MATHEMATICS III

Subject Code : BTAM-303-18

M.Code : 76448

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Find Laplace of $(\cos t) u_1(t)$
2. Find $L(e^t t^2)$
3. Find a_n if $f(x) = x^3$, where $x \in (-2, 2)$.
4. Discuss behavior of Fourier series near a point of discontinuity of

$$f(x) = \begin{cases} 1, & -\pi < x < 0 \\ -1, & 0 \leq x \leq \pi \end{cases}$$

5. Find $Z \{ \sin(n+1)\theta \}$
6. Find relationship between Laplace and Fourier Transform.
7. Two cards are drawn one after the other from a well shuffled deck of 52 cards. Find the probability that both are spade, if the first card is not replaced.
8. If X is Poisson variate satisfies $P(X=1) = 0.5 P(X=2)$, find mean and variance.
9. Define F-test
10. Discuss method to fit Parabola.

SECTION-B

11. State convolution theorem and find $L^{-1}\left(\frac{6s}{(s^2-16)^2}\right)$
12. Find the Fourier sine series of the function $f(x) = \sin 3x, 0 \leq x \leq \pi$.
13. Solve difference equation $y_{n+2} - 2y_{n+1} + y_n = n, y_0 = 1, y_1 = 1$.
14. In a distribution, 12% of the item are under 30 and 85% are under 60. Find the mean and standard deviation of the distribution.
15. Two independent sample have 28 and 19 pair of observations with correlation coefficient 0.55 and 0.75 respectively. Are these values consistent with the hypothesis that both the samples are drawn from the same population?

SECTION-C

16. Using Laplace transform to solve the initial value problem $u_{tt} = u_{xx}, 0 < x < 1, t > 0$, subject to $u(x, 0) = 0, u_t(x, 0) = \sin 3\pi x, u(0, t) = \sin t, u(1, t) = 0$.
17. Using convolution $F^{-1}\left(\frac{1}{6+5i\omega-\omega^2}\right)$.
18. Find correlation coefficient of the following bivariate frequency distribution data :

	59-62	63-66	67-70	71-74	75-78
90-109	2	1			
110-129	7	8	4	2	
130-149	5	15	22	7	1
150-169	2	122	63	19	5
170-189		7	28	32	12
190-209		2	10	20	7
210-229			1	4	2

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Total No. of Pages : 02

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B.Tech. (ECE) (2018 Batch) (Sem.-3)

DIGITAL SYSTEM DESIGN

Subject Code : BTEC-302-18

M.Code : 76445

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Define the term Entity.
2. What is an Array?
3. What is Combinational Circuits?
4. List out the elements present in the ASM chart.
5. Write down the features of FPGA.
6. Write the Verilog code for half adder using gate level modelling.
7. "PAL has reprogrammable AND array, whereas GAL has programmable AND array". Comment.
8. Define Speed Power Product. What is its significance?
9. Define fan-in, fan-out.
10. What is race around condition?

SECTION-B

11. Design and summarize the internal 3 sections of LS-TTL NAND gate and analyze the circuit with the help of function table.
12. Design 1-bit comparator using 2-4 decoder giving three output G, E and L.
13. Applying a 4-bit shift register, design a 4-bit twisted ring counter.
14. Explain various data types available in VHDL.
15. Implement a T-FF with active low asynchronous inputs and clock inputs in VHDL.

SECTION-C

16. Design a serial adder Moore type FSM.
17. List out the steps to be consider for PLA folding algorithm.
18. How a sequential circuit can be designed using FPGA?

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (2018 Batch) (Sem.-3)

ELECTROMAGNETIC WAVES

Subject Code : BTEC-303-18

M.Code : 76446

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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SECTION-A

Write briefly :

1. Compare magnetic scalar potential and magnetic vector potential.
2. Define Reflection Coefficient.
3. Mention the practical importance of smith chart.
4. Define Gradient. What does it indicate?
5. Define Phase Velocity.
6. What is Intrinsic Impedance?
7. For a symmetrical network, define propagation constant and characteristics impedance.
8. Find out the skin depth in copper, whose conductivity is 5.8×10^7 S/m and relative permeability is 1 at 10GHz.
9. State electrostatic boundary conditions.
10. State the properties of uniform plane wave.

SECTION-B

11. Deduce the wave equation for conducting medium.
12. Deduce the point form of Ampere's circuital law.
13. Derive Poynting vector and state its significance.
14. A distortionless transmission line has attenuation constant (α) of 1.15×10^{-3} Np/m and capacitance of 0.1×10^{-9} Farad per meter. The characteristic resistance = 50Ω . Find the resistance, inductance and conductance per meter of the line.
15. Describe Plane Wave Reflection.

SECTION-C

16. A rectangular air-filled copper waveguide with dimension 0.9 inch \times 0.4 inch cross section and 12 inch length is operated at 9.2 GHz with a dominant mode. Find its cutoff frequency, guide wavelength, phase velocity and characteristic impedance.
17. Clearly bring out the distinction between a standing wave and a propagating wave. What difference does it mean, in terms of power flow given by pointing vector in both these kinds of waves? Is standing wave finding an application anywhere? Why?
18. Discuss in detail surface currents on the waveguide walls.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (2018 Batch) (Sem.-3)

ELECTRONIC DEVICES

Subject Code : BTEC-301-18

M.Code : 76444

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- Q1. Describe the behaviour of p-n junction diode under forward and reverse biased conditions.
- Q2. Define the terms Knee voltage (V_C) and Breakdown voltage (V_B).
- Q3. Compare and contrast between P-N junction diode and Zener diode.
- Q4. Derive the relation between α and β with respect to BJT.
- Q5. Mention any two advantages of MOSFET over JFET.
- Q6. Give reasons why common emitter (CE) configuration is widely used in amplifier circuits?
- Q7. What is reverse saturation current?
- Q8. What is ripple factor?
- Q9. In a bipolar transistor which region is wider and which region is thinner? Why?
- Q10. How implant damage is repaired by annealing?

SECTION-B

- Q11. Illustrate and explain the energy bands of gallium arsenide and silicon semiconductors.
- Q12. What is P-N junction diode? How potential barrier is formed in a P-N junction diode?
- Q13. What is the difference between centre-tapped full-wave rectifier and bridge full-wave rectifier?
- Q14. Draw Ebers-Moll model and hence explain transistor action.
- Q15. What do you mean by oxidation process? Explain in detail. Also give characteristics of different oxide films.

SECTION-C

- Q16. In a CE configuration, the collector supply voltage is 10 V. When a resistor $R_C = 1 \text{ k}\Omega$ is connected in the collector circuit, the voltage drop across it is 0.5 V. For $\alpha = 0.98$, determine the collector-emitter voltage and the base current.
- Q17. Explain the operation of a tunnel diode. Draw its V-I characteristics and list the possible applications of the device.
- Q18. How doping is done using Ion implantation? Draw and explain the working of ion implanter.

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Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (ECE/Electronics Engg/Electronics & Computer Engg)
(2012 to 2017) (Sem.-3)

NETWORK ANALYSIS AND SYNTHESIS

Subject Code : BTEC-303

M.Code : 57585

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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SECTION-A

Answer briefly :

- Q1. State various properties of LC networks.
- Q2. Find convolution between $u(t)$ and $e^{-t}u(t)$.
- Q3. Find $F(t)$ if $F(s) = \frac{s+1}{s^2(s+5)}$.
- Q4. What is the relation between transfer function of a system and impulse response.
- Q5. Check the positive realness of $F(s) = \frac{(s+2)(s+4)}{(s+1)(s+3)}$.
- Q6. Differentiate between Network Analysis and Network Synthesis. Name the methods to solve them.
- Q7. Give the reason: why a system is stable if poles are on left hand side of s-plane?
- Q8. Explain the relation between step, ramp and impulse function.
- Q9. Define all parameters of the characteristic output of a pass band filter.
- Q10. Find condition for a 2-port network using Z and Y-Parameters to be reciprocal

SECTION-B

Q11. In the given circuit find current in all resistors using nodal analysis in Fig. 1.

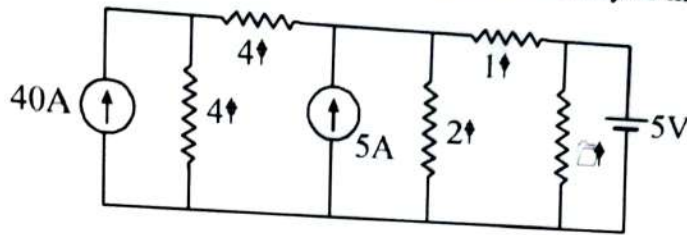


FIG.1

Q12. Find h-parameters of the network of Fig. 2.

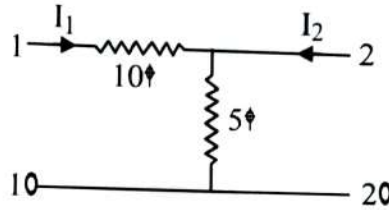


FIG.2

Q13. Find driving point admittance and transfer admittance for bridged T-network shown in Fig. 3 with a 2Ω load resistor connected across port 2.

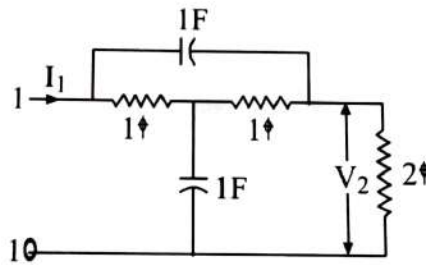


FIG.3

Q14. Determine the current produced by each battery in the circuit of Fig. 4.

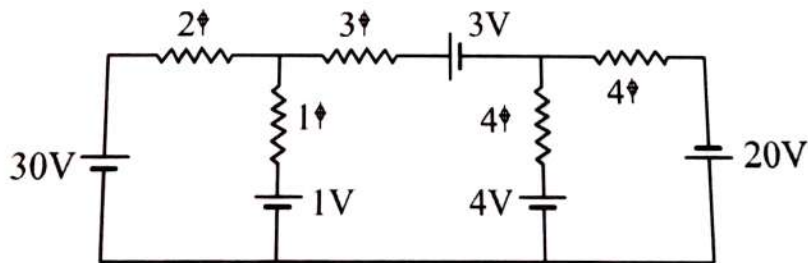


FIG.4

Q15. Classify filters and analyze any one type of filter in detail.

Roll No.

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Total No. of Questions : 18

B.Tech. (CE)/(ECE)/(Electrical Engineering & Industrial Control)/
(Electronics & Computer Engg)/(Electronics & Electrical) (2012 to 2017)/
(Electrical & Electronics) (2011 Onwards)/(EE) (2012 Onwards)
(Sem.-3)

ENGINEERING MATHEMATICS – III

Subject Code : BTAM-301

M.Code : 56071

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Solve the following :

1. Find Laplace transform $t e^{-4t} \sin 3t$.
2. Find inverse Laplace transform of $\frac{3s+2}{(s+3)^3}$.
3. Find inverse Laplace transform of $\frac{e^{-3s}}{s+2}$.
4. Using the value of $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$, show that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$.
5. Express $3x^2 + 5x - 6$ in terms of Legendre polynomials.
6. Derive a PDE by eliminating the arbitrary constants a and b from the equation $x^2 + y^2 + (z - b)^2 = a^2$.
7. Solve PDE $(D^2 + DD' - 2D'^2)z = 0$.
8. Show that the function $f(z) = \bar{z}$ does not have derivative at any point.
9. If $f(z)$ is an analytic function with constant modulus then $f(z)$ is constant.
10. State Cauchy's Integral Formula.

SECTION-B

11. Find the Fourier series expansion of the function $f(x) = x + \pi$, $-\pi < x < \pi$. Hence show that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$
12. Find the solution of the initial value problem using the Laplace transform $y'' + 6y' + 13y = e^{-t}$, $y(0) = 0$, $y'(0) = 4$.
13. Find two linearly independent solutions of the differential equation $2x^2 y'' + x y' - (x^2 + 1)y = 0$, using Frobenius method.
14. Find the general solution of the partial differential equation $(y + z)p + (x + z)q = x + y$.
15. Evaluate $\oint_C \frac{(z+1)}{z(z-2)(z-4)^3} dz$, $C : |z-3| = 2$.

SECTION-C

16. a) Write the Fourier cosine series of $f(x) = \begin{cases} -1, & 0 \leq x \leq 1 \\ 1, & 1 < x \leq 2 \end{cases}$
- b) Let $f(t)$ be a piecewise continuous function on $[0, \infty]$, be of exponential order and periodic with period T . Then $L[f(t)] = \frac{1}{1-e^{-sT}} \int_0^T e^{-st} f(t) dt$.
17. a) State and Prove Rodrigue's Formula.
- b) Using the method of separation of variables, solve

$$\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial y} + u, \quad u(x, 0) = 6e^{-3x}$$

18. Find all Taylor and Laurent series expansions of $f(z) = \frac{1}{(z+1)(z+2)^2}$ about the point $z = 1$.

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Dec 2020

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Dec 20

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (2012 to 2017) (Sem.-4)
PULSE WAVE SHAPING AND SWITCHING

Subject Code : BTEC-405

M.Code : 57597

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Any missing data can be assumed appropriately.

SECTION-A

Answer briefly :

1. Differentiate between low pass and high pass wave-shaping circuits.
2. Draw the response of high pass RC circuit to ramp wave input voltage.
3. List the applications of clamper circuits.
4. How does a Schottky Diode can be used for reducing Storage time?
5. The voltage ($V_m \sin \omega t$) applied to a pure inductor, write the output voltage expression and draw input and output waveform.
6. What do you mean by a stable multivibrator?
7. Define resolution time in multivibrator.
8. If the diode is made from germanium, how it will work as ideal switch?
9. Name the semiconductor devices that can be used as switch.
10. What is the application of triggering input at the base of ON transistor?

SECTION-B

11. The figure shows double Clipper circuit. Determine its output waveform. Assume diode drop of 0.7 V with sinusoidal input with ± 20 V. Also V_{B1} and V_{B2} are 10V and 8V respectively.

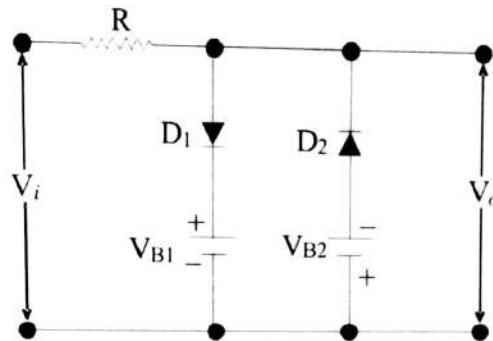


FIG.1

12. Derive the output equations and draw the output waveforms of a RC high pass circuit for the pulse wave signals as input.
13. Draw the circuit of bi-stable multivibrator with symmetrical collector triggering and explain it.
14. Explain the operation of Schmitt trigger with neat sketches, and derive the expressions for UTP and LTP.
15. What is the response of RL circuit for AC voltage?

SECTION-C

16. What is monostable multivibrator? Explain with the help of neat circuit diagram the principle of operation of monostable multivibrator, and derive the expression for pulse width. Draw the waveforms at collector and base of the both transistors.
17. What is diode comparator and describe the application of comparator.
18. Explain **any two** with necessary diagrams;
- Operation of a transistor as switch with its switching characteristics.
 - How a low pass circuit acts as an integrator?
 - Series and shunt Clipper

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Roll No. _____

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE/Electronics Engg) (2012 to 2017) (Sem.-4)

ANALOG COMMUNICATION SYSTEMS

Subject Code : BTEC-401

M.Code : 57593

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Derive the formula of total Current in AM system.
2. Draw Frequency spectrum of AM modulated wave and label it properly.
3. Define the term Frequency Deviation and percent modulation in FM wave.
4. What is FM capture effect?
5. Write the basic difference between high level and low level AM modulation.
6. What is vestigial side band modulation?
7. What do you mean by tracking and alignment in superheterodyne receiver?
8. What is pulse position modulation?
9. What is the need of pre-emphasis and de-emphasis circuits in FM?
10. Define Energy and power of a signal.

SECTION-B

11. Define the terms Noise figure and Noise equivalent temperature and determine the receiver noise figure in dB and its equivalent noise temperature. Receiver is connected to antenna whose resistance is 50Ω . The equivalent noise resistance of the receiver is 30Ω .
12. Explain Armstrong method of FM generation.
13. Draw basic circuit of square law diode detector and explain it with characteristics.
14. Give comparison of SSB transmission and conventional AM.
15. How PWM and PPM signals are generated in pulse modulation transmission.

SECTION-C

16. Give comparison of PAM, PPM and PWM pulse modulation techniques.
17. How many side bands are there in FM, draw its spectrum? If FM wave is given by the equation $s(t) = 20\sin(6 * 1010^8 t + 7\sin 1250t)$, determine carrier frequency, modulating frequency, modulation index, maximum deviation and power dissipated by this FM wave in 100Ω resistor.
18. Explain the following :
 - a. Filter method of single side band generation.
 - b. Image frequency rejection.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE/Electronics Engg) (2012 to 2017)
(Sem.-4)

ELECTROMAGNETICS AND ANTENNAS

Subject Code : BTEC-403

M.Code : 57595

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) Calculate the radiation resistance of $\lambda/10$ wire dipole in free space?
- 2) Define Antenna beam width.
- 3) What are the disadvantages of ground wave propagation?
- 4) What is retarded potential?
- 5) State field equivalence principle.
- 6) Define Surface Impedance.
- 7) Differentiate between TE, TM and TEM mode.
- 8) What is Distortion Less line?
- 9) Define Polarization.
- 10) What are smith charts? Briefly explain.

SECTION-B

- 11) What is aperture antenna? Explain its different types.
- 12) Explain the working of parabolic reflector antenna.
- 13) Explain Duct Propagation in detail.
- 14) A rectangular waveguide with dimensions $4\text{cm} \times 2\text{cm}$ operates at 10 GHz . Find f_c and λ_c of TE_{10} mode.
- 15) Discuss the wave propagation characteristics in good dielectric.

SECTION-C

- 16) Explain the concept of radiation in single wire, two wire and dipole antenna.
- 17) For an array of n isotropic point sources radiating in end fire array, derive and obtain the maxima and minima direction for major and minor lobes. Sketch the pattern.
- 18) Give the transmission line analogy for waveguides. Also draw the equivalent transmission line circuit representation for TE and TM waves.

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Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (Electronics Engg/ECE/Electronics & Electrical Engg/Electrical Engineering & Industrial Control/Electronics & Computer Engg)
(2012 to 2017)/B.Tech.(EE/Electrical & Electronics Engg.)

(2012 Onwards) (Sem.-4)

LINEAR CONTROL SYSTEMS

Subject Code : BTEE-402

M.Code : 57105

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

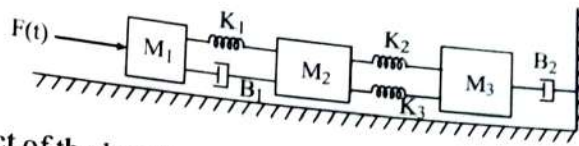
1. Explain the importance and need of compensation.
2. Find the restriction of K so that closed loop system given by the following characteristic equation is absolutely stable.

$$s^3 + 2Ks^2 + (K+2)s + 4 = 0$$

3. Define Nyquist criterion.
4. Explain the effect of ξ on the output response of any system.
5. Differentiate between break away and break in points.
6. Describe the output response of type-I and type-II systems for ramp input.
7. Derive the mathematical model of a series RLC circuit.
8. Evaluate the static error coefficients for unit step input for the system having :

$$G(s) = \frac{20}{s(s+2)(s^2+2s+20)}$$

9. Give the F-V and F-I analogy for the following system :



10. Explain the effect of the location of poles on the stability of any system.

SECTION-B

11. Derive the frequency domain specifications M_r and ω_r for a second order system and correlate them with their time domain specifications.

12. For the system represented by the given equations find C/R using SFG technique only.

$$X_2 = G_1 X_1 - H_1 X_3 - H_2 X_4 - H_3 X_5$$

$$X_3 = G_2 X_2 - H_4 X_5$$

$$X_4 = G_3 X_3 + G_5 X_4$$

$$X_5 = G_4 X_3 + G_6 X_4$$

13. A unity feedback system having open loop transfer function as :

$$G(s) = \frac{K(s+1)}{s^3 + as^2 + 2s + 1}$$

System oscillates with frequency ω . Determine the values of 'K' and 'a' so that the system oscillates at a frequency of 2 rad/sec.

14. The open loop transfer function of a unity feedback control system is :

$$G(s) = \frac{K}{s(1+sT)}$$

By what factor the amplifier gain K should be reduced so that M_p of unit step response of the system is reduced from 80% to 30%?

15. Write a short note on working of synchros as error detector.

SECTION-C

16. Construct the bode plot for the system whose open loop transfer function is given below and determine (a) gain margin (b) phase margin (c) closed loop stability.

$$G(s)H(s) = \frac{512(s+3)}{s(s^2+16s+256)}$$

17. Sketch the root locus for the open-loop transfer function of a unity feedback control system given below and find : (a) value of K for marginal stability (b) frequency of oscillations.

$$G(s) = \frac{K}{s(s^2+4s+8)}$$

18. State the necessity of compensation. Derive the transfer function of phase lead and phase lag compensator along with the circuit diagrams and state the advantages and limitations.

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Total No. of Pages : 02

Total No. of Questions : 18

**B.Tech. (ECE/Electronics Engg/Electronics & Computer Engg)
(2012 to 2017) (Sem.-4)**

SIGNALS AND SYSTEMS

Subject Code : BTEC-402

M.Code : 57594

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

Answer briefly :

- Q1 What are the classifications of continuous time signals?
- Q2 Compare energy and power signal.
- Q3 Define Fourier transform and Z-transform.
- Q4 Define Ensemble.
- Q5 What is the condition of LTI system to be stable?
- Q6 What do you mean by impulse response of any system?
- Q7 What is the significance of difference equations?
- Q8 State Bayes theorem.
- Q9 Define Central Limit Theorem.
- Q10 What are the steps to perform convolution?

SECTION-B

- Q11 Determine the Fourier series representation for $x(t) = 2 \sin(2\pi t - 3) + \sin(6\pi t)$.
- Q12 Prove that for BIBO stable discrete time LTI system the ROC of the system function includes unit circle.
- Q13 Find Fourier transform of unit step function.
- Q14 State and prove sampling theorem for low pass signals.
- Q15 Derive the relation between correlation and convolution between two sequences.

SECTION-C

- Q16 A continuous time LTI system is described by the difference equation:

$$d/dt y(t) + 5 y(t) = x(t)$$

Determine, the response of the system to the input $x(t) = e^{-2t} u(t)$ using Fourier Transform.

- Q17 A discrete time LTI system is given by $y(n) - \frac{1}{2} y(n-1) = x(n) + x(n-1)$, Determine, frequency response and impulse response of the system.
- Q18 Compute Z- transform and ROC of the signal $(1/2)^n u(n)$, plot Pole-Zero pattern.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Electronics & Communication Engineering) (2018 Batch)
(Sem.-4)

SIGNALS AND SYSTEMS

Subject Code : BTEC-403-18

M.Code : 77568

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

Write briefly :

- Q1 What is time inversion property of signal?
- Q2 What is Central Limit Theorem?
- Q3 What is Ergodic Process?
- Q4 Define Power Signal.
- Q5 Write down Dirichlet's condition of Fourier series.
- Q6 What do you mean by Stable System?
- Q7 Differentiate between auto correlation and cross correlation function.
- Q8 State the significance of difference equations.
- Q9 What is the difference between recursive and non-recursive systems?
- Q10 What do you mean by Forced Response?

SECTION-B

Q11 State and prove sampling theorem for low pass signals.

Q12 Decompose the signal into even and odd parts:

a) $3t^2 + 2t + 1$

b) $\{1,1,1\}$
 ↑

Q13 Define Z-transform. State and prove any three properties of Z-transform.

Q14 Prove that for BIBO stable discrete time LTI system, the ROC of the system function includes unit circle.

Q15 State and prove Parseval's Theorem.

SECTION-C

Q16 An LTI system is described by following input-output relation :

$$y(n) - 9/4 y(n-1) + 1/2 y(n-2) = x(n) - 3 x(n-1)$$

Determine the impulse response of the system with specified ROC's of $H(Z)$ for the conditions :

a) System is Stable.

b) System is Causal.

Q17 Find the CTFT of the signal $x(t) = t e^{-at} u(t)$ using appropriate property. State and prove the properties used.

Q18 Show that spectrum of the sampled signal is the infinite sum of shifted replicas of the spectrum of original signal.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(ECE) (2018 Batch) (Sem.-4)
DATA STRUCTURES AND ALGORITHMS
Subject Code : BTCS-301-18
M.Code : 77567

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) What is a circular queue and its use?
- 2) List out the different types of Hashing Functions.
- 3) What is a top pointer of stack?
- 4) Define the term Priority queue.
- 5) Describe Big O Notation used in algorithms.
- 6) Write briefly on AVL Tree.
- 7) State Data structure versus data types.
- 8) What is the complexity of insertion sort?
- 9) What is Breadth First Search?
- 10) Write short note on Hashing.

SECTION-B

- 11) Explain the linked representation of a circular queue and operations to be performed on it with help of suitable example.
- 12) Discuss some of the common operations that can be performed on data structures by taking suitable example.
- 13) Define B-trees and their applications. Explain various operations used for balancing a binary tree with the help of a suitable example.
- 14) Consider the following numbers are stored in an array A: 32, 51, 27, 85, 66, 23, 13, 57. Apply Bubble sort algorithm to the array A and show each pass separately.
- 15) What are the various operations possible in stack? Explain the algorithm each of them.

SECTION-C

- 16) a) Write an Algorithm to insert new node at the middle of a Singly Linked List.
b) Write an algorithm to implement Quick sort. Write the steps to sort the following elements by quick sort method: 17, 28, 6, 87, 46.
- 17) a) What is a Hash Table? Discuss the concept of collision resolution in hash table with the help of suitable example.
b) What is Graph? Describe in brief the various methods used to represent Graphs in memory.
- 18) Let there be two Polynomials A and B of your Choice. How the addition of those two polynomials will take place? Show it diagrammatically and write an algorithm for the same.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Electronics & Communication Engineering) (2018 Batch)
(Sem.-4)

MICROPROCESSORS AND MICROCONTROLLERS

Subject Code : BTEC-402-18

M.Code : 77566

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. What is the need of interrupts' in microprocessor?
2. How microcontroller is different from microprocessor?
3. Differentiate RISC and CISC architectures.
4. Give memory organization of 8051 microcontrollers.
5. Give logical instructions with examples.
6. Give significance of program counter.
7. What is bit addressability?
8. For a time delay of 25ms, what value do you need to load into the timer registers? (Assume XTAL = 11.0592 MHz)
9. Discuss the different flags of 8085 microprocessor.
10. Discuss the steps of SUBB instruction with the help of example.

SECTION-B

11. Write a program to generate 2 KHz square wave on pin P1.0 of 8051 by using timer 1 in mode 1. Assume XTAL = 20 MHz.
12. Discuss RAM organization for 8051.
13. Describe PSW and TMOD registers of 8051 microcontrollers.
14. What is addressing mode? Explain the different addressing modes with suitable examples for 8085 microprocessor.
15. Draw and explain the 8085 architecture.

SECTION-C

16. Draw and explain the interfacing of LCD with microcontroller.
17. Discuss various sources of interrupt in 8051. Also discuss various SFR's associated with interrupts.
18. Draw and explain pin configuration of 8085 microprocessor.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Electronics & Communication Engineering) (2018 Batch)
(Sem.-4)

ANALOG CIRCUITS
Subject Code : BTEC-401-18
M.Code : 77565

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- Q1. Define trans-conductance and drain resistance with respect to JFET.
- Q2. Derive the relation between α and β with respect to BJT.
- Q3. Draw hybrid small signal model for a transistor in CE configuration.
- Q4. Draw the block diagram of Voltage Series feedback and Current Series feedback diagram.
- Q5. The voltage gain of an amplifier without feedback is 3000. Calculate the voltage gain of the amplifier if negative voltage feedback is introduced in the circuit. Given that feedback fraction $m_v = 0.01$.
- Q6. What is the difference between amplifier and oscillator?
- Q7. Write Barkhausen criterion for oscillators.
- Q8. Why power amplifiers are called large signal amplifiers?
- Q9. Explain the loading effect in amplifiers.
- Q10. What are the different coupling schemes used in multistage amplifiers?

SECTION-B

- Q11. Draw the high frequency model of a CE transistor and explain each component of it.
- Q12. Why does gain of amplifier falls off at low and high frequencies? Explain with an appropriate diagram.
- Q13. Describe the effect of feedback on gain and bandwidth.
- Q14. Explain the working of RC phase shift oscillator and derive for its frequency of Oscillation.
- Q15. What is harmonics distortion in power amplifier? Discuss the operation of a class B power amplifier and derive its maximum power conversion efficiency.

SECTION-C

- Q16. Draw and explain input and output characteristics of CB amplifier. Write any practical application of CB amplifier.
- Q17. Draw the circuit for Voltage shunt amplifier and justify the type of feedback. Derive the expressions for A_v , β , R_i and R_o for the circuit.
- Q18. Write short notes on the following :
- Clapp Oscillators
 - Cascade Amplifiers

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Total No. of Pages : 02

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B.Tech. (ECE/Electronics Engg/Electronics & Computer Engg) (2012 to 2017)
(Sem.-4)

ELECTRONIC MEASUREMENT & INSTRUMENTATION

Subject Code : BTEC-404

M.Code : 57596

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- Q1. What do you mean by primary, secondary and tertiary measurements?
- Q2. Define Accuracy and Precision.
- Q3. What is reproducibility and dead zone?
- Q4. What are static errors?
- Q5. What is the working principle of C type bourdon tube?
- Q6. What is the necessity of recorders?
- Q7. Explain working of Hey's bridge.
- Q8. Differentiate between sensor and transducer.
- Q9. Elaborate data acquisition system.
- Q10. How sine wave and square waves are generated with AF generator?

SECTION-B

- Q11. With a neat diagram explain in detail the construction of PMMC instrument.
- Q12. Explain the fourteen segment display Nixie tube in detail and list its various applications.
- Q13. Explain transducer and describe different modes of operations of thermocouple transducer and its uses.
- Q14. Explain position telemetering system with neat and clean diagram.
- Q15. Sketch and explain the working of moving-coil instrument

SECTION-C

- Q16. a) How is the voltmeter calibrated with DC potentiometer?
b) What is the use of LVDT? Discuss its basic principle of operation.
- Q17. Draw the block diagram of an electronic voltmeter and explain its operation.
- Q18. Write short notes on :
- a) Maxwell Wien bridge
 - b) Digital frequency meter

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B.Tech. (ECE) / B.Tech. (Electronics & Comm. Engg.) (2012 to 2017)
(Sem.-5)

LINEAR INTEGRATED CIRCUITS

Subject Code : BTEC-503

M.Code : 70547

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Differentiate between cascade and cascode amplifiers.
2. What is thermal drift? How does it affect the performance of op-amp circuit?
3. What is voltage limiting and why is it needed?
4. What are the characteristics of an ideal op-amp?
5. Define Input Bias Current and SVRR.
6. List the advantages of active filters over passive ones.
7. Explain the concept of virtual ground.
8. Explain the working principle of PLL.
9. Write the applications of monostable multivibrator.
10. In an astable multivibrator $R_A = 10 \text{ k}\Omega$, $R_B = 100 \text{ k}\Omega$ and $C = 0.1 \text{ }\mu\text{F}$. Calculate frequency of oscillation.

SECTION-B

11. What is level translator circuit? Why is it used with cascaded differential amplifier?
12. Compare inverting and non-inverting amplifiers.
13. a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 kHz.
b) Determine the output of above differentiator if a sine wave of 1V peak at 1kHz is applied to its input.
14. What is the name of the circuit that is used to detect the peak value of the nonsinusoidal input waveform? Explain its operation.
15. Explain with the help of circuit diagram operation of instrumentation amplifier using three op-amps.

SECTION-C

16. Write a note on :
 - a) Sample and hold circuit
 - b) V to F converter
17. Explain in detail about voltage regulator and its types.
18. a) Explain the operation of 555 timer as monostable multivibrator.
b) What are the different types of linear IC packages and what are the criteria of selecting an IC package?

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (2012 to 2017) (Sem.-5)

DIGITAL SIGNAL PROCESSING

Subject Code : BTEC-502

M.Code : 70546

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Write briefly :

1. Verify whether the given system is linear or non-linear $y(n) = \cos x(n)$.
2. What is the difference between convolution and correlation?
3. Give the significance of ROC in Z-transform.
4. What do you mean by truncation and rounding errors?
5. What do you mean by circular shift of a sequence?
6. What do you mean 'Twiddle Factor' of DFT & show how it is cyclic?
7. Differentiate between FIR and IIR filter.
8. What is frequency warping effect?
9. What is the significance of barrel shifter?
10. Write any two features of DSP processor.

SECTION-B

11. Explain different types of discrete time systems with examples.
12. Compute the linear convolution of the given sequences :

$$x(n) = [1, 2, 4]$$

$$h(n) = \begin{cases} 1 & \text{for } -1 \leq n \leq 1 \\ 2 & \text{for } n = 2 \end{cases}$$

13. Obtain inverse Z-transform of

$$X(Z) = \frac{1 - \frac{1}{2}z^{-1}}{1 - \frac{1}{4}z^{-2}} \quad |z| > \frac{1}{2}$$

14. Determine the Z-transform and sketch the ROC of :

$$x(n) = \cos(\omega_0 n) u(n)$$

15. Determine the direct form-I and direct form-II structure for the system described by the system function

$$H(z) = \frac{1 - 0.8z^{-1} + 0.15z^{-2}}{1 + 0.1z^{-1} - 0.7z^{-2}}$$

SECTION-C

16. With the help of $N = 8$, explain radix-2 decimation-in-time (DIT) FFT algorithm for computation of DFT.
17. Explain in detail design methodologies impulse invariance and bilinear transformation for the design of IIR filter.
18. The desired frequency response of a symmetric FIR filter is

$$H_d(\omega) = \begin{cases} 0, & -\pi/6 \leq \omega \leq \pi/6 \\ e^{-j7\omega}, & \pi/6 < |\omega| \leq \pi \end{cases}$$

Stopband attenuation is > 40 dB

Determine the frequency response $H(e^{j\omega})$ using window method.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (2012 to 2017) (Sem.-5)
DIGITAL COMMUNICATION SYSTEMS

Subject Code : BTEC-501

M.Code : 70545

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Write briefly :

- Q1. List advantages of digital communication system.
- Q2. What is Aperture effect?
- Q3. Write the basic difference between Bandpass transmission and Passband transmission.
- Q4. Why do we use the Line coding formats?
- Q5. How Slope over load distortion and Granular noise are avoided in ADM?
- Q6. Draw the power spectrum of QPSK, MSK and BFSK each on same scale.
- Q7. What do you mean by Non-linear quantization?
- Q8. What is the relation between BER and SYMBOL error rate?
- Q9. What do you mean by imperfect bit synchronization?
- Q10. What is CDMA?

SECTION-B

- Q11. Why MSK is called shaped QPSK? For MSK, explain its expression and wave forms for the signal 11000111.
- Q12. What are the draw backs of DM? How are these overcome by ADM?
- Q13. Write a note on probability of error for PSK and Draw wave forms of PSK for the bit stream 101110001111.
- Q14. Explain coherent and non-coherent ASK detector in detail.
- Q15. The probabilities of the five possible outcomes of an experiment are $p_1 = \frac{1}{2}, p_2 = \frac{1}{4}, p_3 = \frac{1}{8}, p_4 = p_5 = \frac{1}{16}$. Find the entropy and information rate if there are 16 outcomes per second.

SECTION-C

- Q16. Apply the Shannon-Fano algorithm to the source with $M = 8$ emitting messages
- $[X] = [A, B, C, D, E, F, G, H]$ having probabilities $[P] = [1/2, 3/20, 3/20, 2/25, 2/25, 1/50, 1/100, 1/100]$
- Q17. Give comparison of DPCM and DM with standard PCM.
- Q18. Write note on **any two** of following :
- QPSK Receiver
 - FDMA and TDMA
 - Lampel-Ziv source coding algorithm with example

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B.Tech. (ECE) (2012 to 2017)
B.Tech. (Automation & Robotics) (2012 & Onwards)
(Sem.-5)

MICROPROCESSORS & MICROCONTROLLERS

Subject Code : BTEC-504

M.Code : 70480

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. List few applications of microprocessor-based system.
2. What is meant by interrupt? List various interrupts of 8051.
3. Explain LDA, STA and DAA instructions.
4. What is the function of IO/M signal in the 8085?
5. What is the time period of the machine cycle of an 11.0592 MHz 8051 system?
6. Differentiate between SJMP and LJMP instructions.
7. Which registers are allowed to be used for register indirect addressing mode if the data is in on chip RAM?
8. What do you mean by data types and directives in 8051?
9. What is the function of TMOD register?
10. Show the status of the CY, AC and P flags after the addition of 9CH and 64H in the following instruction: MOV A, #9CH; ADD A, #64H.

SECTION-B

11. Interface a temperature sensor to an 8051 through an ADC and write a program to read and display the temperature from the sensor.
12. Write a program to add two 16-bit numbers. Place the sum in R7 and R6, R6 should have the lower byte.
13. Explain the memory mapped I/O addressing scheme.
14. List out the five categories of the 8085 instructions. Give examples of the instructions for each group.
15. Differentiate between microprocessor 8085 and microcontroller 8051.

SECTION-C

16. What are the functions of RS, RW and E pins in LCD interfacing? Show interfacing diagram of LCD with 8051. Also write assembly language program to support this interfacing.
17. a) With the help of a functional block diagram, explain the architecture of 8051 microcontroller.
b) Write a program to add 10 BCD numbers stored at 51H-60H and save the result in RAM memory locations starting at 70H.
18. What is the significance of addressing modes? Discuss various addressing modes for 8085 microprocessor with suitable examples for each mode.

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B.Tech. (ECE) (2012 to 2017) (Sem.-5)

DATA STRUCTURES

Subject Code : BTCS-304

M.Code : 70544

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Define ADT.
2. How do you push and pop elements in a linked stack?
3. Prove that the number of odd degree vertices in a connected graph should be even.
4. Define NP hard and NP complete.
5. Define Binary Search Tree.
6. List out and define the performance measures of an algorithm.
7. What is Recursion? Explain with an example.
8. List out the various techniques of hashing.
9. What is the worst case complexity of Quick sort?
10. State the algorithmic technique used in merge sort.

SECTION-B

11. Give a function that uses a stack in order to reverse the elements of a circular queue which is stored in an array.
12. Write an algorithm/program to count the number of nodes in a given singly linked list.
13. Give the best case and worst case analysis of the binary search.
14. Write insertion algorithm for AVL tree. Write suitable rotation algorithms.
15. Explain external sorting. Give relevant example.

SECTION-C

16. Assume we have a priority queue split into several queues. To access these queues we have vectors of pointers to the front and rear of each queue and one to indicate the length of each. Thus to access the front of the queue representing priority 2, one merely starts at `PRIORITY_F[2]`. This representation allows each queue to be of different length. Given this representation, devise algorithms to insert and delete from a priority queue.
17. Write an algorithm/program to delete a node from a binary search tree.
18. Write an algorithm/program to implement radix sort.

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B.Tech. (ECE) (2012 to 2017)
(Sem.-6)

MICROWAVE AND RADAR ENGINEERING

Subject Code : BTEC-601

M.Code : 71121

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is the need of isolator in microwave bench?
2. Why is PIN diode used in microwave engineering?
3. Which klystron is used as an amplifier only and not as an oscillator?
4. What do you mean by transit time?
5. What is the function of slow wave structure in TWT?
6. What is the use of bends and corners in microwave?
7. Define BWO.
8. What is tunneling effect?
9. Name the various scanning techniques.
10. What is SWR?

SECTION-B

11. Explain the slotted line method of VSWR measurement with basic experimental set-up for high VSWR ($S > 20$).
12. What do you understand by moving target detector? Explain.
13. How power can be measured using calorimeters?
14. A two cavity klystron amplifier has the following characteristics
Voltage gain = 15 dB
Input power = 5 mW
 R_{sh} of input cavity = 30 k Ω
 R_{sh} of output cavity = 40 k Ω
Load impedance = 40 k Ω
Determine :
 - a. The input rms voltage
 - b. The output rms voltage
15. Explain the working of phase shifter in detail.

SECTION-C

16. Explain working and construction of directional coupler and solve the s-matrix for the same.
17.
 - a. What is Gunn Effect? Explain Gunn domain in detail.
 - b. What is velocity modulation? What are the benefits obtained from velocity modulation?
18. Define the following terms of magnetron :
 - a. favoured electrons
 - b. back heating effect
 - c. π -mode oscillations
 - d. frequency pushing and frequency pulling
 - e. mode jumping

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B.Tech. (ECE) (2012 to 2017) (Sem.-6)

OPERATING SYSTEMS

Subject Code : BTCS-401

M.Code : 71120

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) What is dual mode operation?
- 2) What is spooling?
- 3) Why page size is always power of 2?
- 4) Differentiate between kernel and shell.
- 5) What are semaphores?
- 6) Define Safe State.
- 7) Draw resource allocation graph.
- 8) What do you mean by best fit and first fit?
- 9) What is directory?
- 10) What are multiprocessor systems?

SECTION-B

- 11) What is file system? What are the various attributes of files?
- 12) How paging and segmentation are associated?
- 13) Discuss the effect of time quantum on the performance of Round robin scheme.
- 14) Write short notes on Pipes?
- 15) Differentiate between internal and external fragmentation? Which one occurs in paging system?

SECTION-C

- 16) What are the recent trends in operating system?
- 17) What is a process? Explain different states of a process with diagram. Also explain in detail the contents of PCB of a process.
- 18) What do you mean by Page Replacement? Explain various Page Replacement algorithms with example of each.

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B.Tech. (ECE) (2012 to 2017) (Sem.-6)
WIRELESS COMMUNICATION SYSTEM
Subject Code : BTEC-602
M.Code : 71122

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What do you mean by forward and reverse channel?
2. What is foot print?
3. What is frequency selective fading?
4. What are IMSI and TMSI?
5. Differentiate hard and soft hand off.
6. What are frequencies used in forward and reverse link in IS-95?
7. What is Bluetooth?
8. Write some third generation wireless standards.
9. What is near-far effect in wireless network?
10. What is adjacent channel interference?

SECTION-B

11. Compare FDMA, TDMA & CDMA.
12. Describe in detail about the history of development of Paging and the future Trends of paging systems.
13. Explain in detail about GSM architecture with suitable diagram.
14. Explain about types of small scale fading.
15. Write short notes on cordless telephone systems.

SECTION-C

16. Explain about IS-95 with a neat diagram.
17. Explain the diversity techniques in detail.
18. Explain Spread-spectrum Technology.

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Total No. of Pages : 02

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B.Tech. (ECE) (2012 to 2017) (Sem.-6)
ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT
Subject Code : BTEC-603
M.Code : 71123

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. How Engineering Economics and manufacturing industry related?
2. What do you mean by minimum cost analysis?
3. Discuss Uniform Annual Cost Method using example.
4. What do you mean by economic life of a project?
5. Give difference between cost estimation and cost accounting.
6. Explain the concept of Industrial Management.
7. Discuss Taylor's Scientific Management approach.
8. What is the role of delegation of authority in an organization?
9. What do you mean by Industrial Ownership?
10. Explain the duties of purchase manager.

SECTION-B

11. How to calculate estimation of cost for various manufacturing operations?
12. Discuss various factors to be considered in replacement studies.
13. Discuss the concept of depreciation and explain its types.
14. Explain the Herzberg's two-factor theory of Motivation.
15. What do you mean by productivity index and explain types of production system?

SECTION-C

16. Discuss the concept and importance of designing different types of organizational structures.
17. Discuss the objectives and functions of material management department in an industry.
18. Discuss the effect of taxation on economic studies.

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B.Tech. (ECE) (E-I 2012 to 2017) (Sem.-6)

INFORMATION THEORY AND CODING

Subject Code : BTEC-907

M.Code : 71236

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is meant by stop-and-wait ARQ? Explain.
2. An alphabet set contains 3 letters A, B, C transmitted with probabilities of $1/3$, $1/4$, $1/4$. Find entropy.
3. What is meant by linear code?
4. Write Lempel Ziv source coding algorithm.
5. Why cyclic codes are extremely well suited for error detection?
6. Define the terms Coding Efficiency and Redundancy.
7. State two properties of mutual information.
8. What is Source Coding? Define code length & code efficiency. Give the relation between it.
9. Define Channel Capacity of the discrete memoryless channel.
10. What is meant by Cyclic Code?

SECTION-B

11. Explain briefly the syndrome calculation circuit for (n,k) cyclic code.
12. Briefly describe the steps of Viterbi algorithm.
13. Give the relation between channel capacity C, bandwidth W and signal to noise ratio S/N of AWGN channel. Explain the trade-off between them.
14. Verify the following expression :
$$H(X,Y) = H(X|Y) + H(Y)$$
15. State Hartley-Shannon Law.

SECTION-C

16. A DMS has five equally likely symbols.
 - a) Construct a Shannon- Fano code for X, and calculate the efficiency of the code.
 - b) Construct another Shannon- Fano code and compare the results.
 - c) Repeat the Huffman code and compare the results.
17. Explain the maximum likelihood decoding and viterbi decoding algorithms of a convolution encoder.
18. For a systematic linear block code, the three parity check digits, C_4 , C_5 and C_6 are given by :

$$C_4 = m_1 \oplus m_2 \oplus m_3$$

$$C_5 = m_1 \oplus m_2$$

$$C_6 = m_1 \oplus m_3$$

- a) Construct generator matrix.
- b) Construct code generated by this matrix.
- c) Determine error detecting probability.
- d) Prepare decoding table.
- e) Decode the received word 101100 and 000110.

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B.Tech. (ECE) (2012 to 2017) (Sem.-6)

VLSI DESIGN

Subject Code : BTEC-604

M.Code : 71124

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is difference between latch and flip flop?
2. What is difference between constant current and constant voltage scaling?
3. What is full form of VHDL? Discuss its advantages?
4. Write template for assignment statement?
5. What do you mean by proximity effect?
6. Write expression for threshold voltage in NMOS & PMOS?
7. Name the different libraries in VHDL.
8. What do you mean by resolution function?
9. Calculate the RC time constant for a 1cm long doped polysilicon interconnection runner on 1 micro meter thick SiO₂, the polysilicon has thickness of 5000Å and resistivity of 1000μΩ-cm.
10. Discuss in brief about Moore's law on technology scaling.

SECTION-B

11. Discuss CMOS inverter delay.
12. Discuss transfer characteristics of CMOS.
13. Discuss various classes and data types in VHDL.
14. What do you mean by constant voltage scaling? Discuss different scaling factors.
15. Discuss pull up and pull down ratio of NMOS transistor.

SECTION-C

16. What are the various steps used for NMOS IC technology?
17. Discuss sequential circuit design with example.
18. What is the stored charge and the number of electrons on an MOS capacitor with an area of $4\mu\text{m}^2$, a dielectric of 200 \AA thick SiO_2 and an applied voltage of 5V ?

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