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18ME35A/18MEA305

Third Semester B.E. Degree Examination, July/August 2022
Metal Cutting and Forming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With neat sketch, explain briefly the working of a lathe machine. (08 Marks)
- b. Explain the concept of oblique and orthogonal cutting with neat sketch. (06 Marks)
- c. Draw a Merchant's circle diagram using usual notations and state the assumptions. (06 Marks)

OR

- 2 a. Briefly explain the different types of chips produced during metal cutting with neat sketches. (08 Marks)
- b. Explain, Knurling, Turning, Facing and Boring operations performed on lathe machine. (06 Marks)
- c. A bar of 90 mm diameter is reduced to 87.6 mm by cutting tool while cutting orthogonally. If the mean length of the cut chip is 88.2 mm, find the cutting ratio. If the rake angle is 15° , what is the shear angle? (06 Marks)

Module-2

- 3 a. With a neat sketch, explain briefly the working of a horizontal milling machine. (08 Marks)
- b. Explain following milling operations with relevant sketches:
(i) Form milling. (ii) Gang milling. (06 Marks)
- c. With a neat sketch, explain briefly the working of drilling machine. (06 Marks)

OR

- 4 a. With a neat sketch, explain the constructional features of a centreless grinding machine. (08 Marks)
- b. Difference between shaping and planing machine. (06 Marks)
- c. Differentiate up milling and down milling with sketch. (06 Marks)

Module-3

- 5 a. With neat sketch, explain crater wear and flank wear. (08 Marks)
- b. List the various types of cutting fluids used in metal cutting, briefly explain. (06 Marks)
- c. Define tool life. Explain the factors which affect the tool life. (06 Marks)

OR

- 6 a. A tool life of 80 minutes is obtained at a speed of 30 mpm and 8 minutes at 60 mpm. Determine the tool life equation and cutting speed for 4 minutes tool life. (08 Marks)
- b. What is machinability? List out the machinability criteria. (06 Marks)
- c. What do you understand by economics of machining? How do you evaluate machining cost? (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. With neat sketches, explain the classification of metal working processes on the basis of force applied. (08 Marks)
b. Distinguish between the hot working and cold working process. (06 Marks)
c. Explain different types of forging defects. (06 Marks)

OR

- 8 a. Explain the following rolling mills:
(i) Two high mill
(ii) Cluster mill
(iii) Tandem mill
(iv) Three high mill. (08 Marks)
b. Define extrusion process and explain hydrostatic extrusion process with a neat sketch. (06 Marks)
c. With a neat sketch, explain a tube drawing process. (06 Marks)

Module-5

- 9 a. Define, piercing, blanking, bending and stretch forming, process with a neat sketch. (08 Marks)
b. What are different types of bending dies? How to calculate bending force? (06 Marks)
c. Define Embossing, Coining and shearing in sheet metal working. (06 Marks)

OR

- 10 a. Explain with neat sketch,
(i) Progressive die. (10 Marks)
(ii) Compound die. (05 Marks)
b. Explain different types of defects in deep drawn products. (05 Marks)
c. Write a note on die and punch material in sheet metal forming. (05 Marks)

CBCS SCHEME

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18ME34

Third Semester B.E. Degree Examination, July/August 2022 Material Science

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Calculate ADF of BCC crystal structure. (06 Marks)
- b. Discuss briefly edge dislocation in crystals. (06 Marks)
- c. State and explain Fick's laws of diffusion. Also explain factors affecting diffusion. (08 Marks)

OR

- 2 a. Explain with the help of stress-strain diagram stiffness, yield strength, ductility and toughness. (08 Marks)
- b. Deduce the relation between true stress and engineering stress. (06 Marks)
- c. A tensile load of 500N applied on a carbon steel rod of 10mm diameter, the diameter after elongation reduces to 9mm. Find true stress, engineering stress, true strain and engineering strain. (06 Marks)

Module-2

- 3 a. Discuss ductile and brittle fracture with clear differences. (06 Marks)
- b. What is fatigue? Explain R.R. Moore fatigue testing method with S-N diagram. (07 Marks)
- c. What is creep? Explain three stages of creep with neat graph also explain why 2nd stage is very important. (07 Marks)

OR

- 4 a. Explain Hume-Rothery rules for the formation of substitutional solid-solution. (06 Marks)
- b. Draw the Iron-Carbon diagram and label all the phases, temperatures and invariant points on it. (07 Marks)
- c. Derive the expression for critical radius in homogeneous nucleation. (07 Marks)

Module-3

- 5 a. Superimpose CCT diagram on TTT diagram and explain the importance of both the diagrams. (07 Marks)
- b. Explain Annealing and Normalising with necessary figures. (06 Marks)
- c. Discuss Martempering and Austempering processes with neat figures. (07 Marks)

OR

- 6 a. With the help of Aluminium-Copper phase diagram discuss age hardening process. (07 Marks)
- b. Discuss Gray cast iron composition, properties and uses. (07 Marks)
- c. Discuss Induction hardening and Flame hardening with neat diagrams. (06 Marks)

Module-4

- 7 a. What is composite? Classify the composites. (06 Marks)
- b. State the advantages, disadvantages and applications of composites. (08 Marks)
- c. Explain any one process of manufacturing composites. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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OR

- 8 a. Deduce the expression for iso-stress and iso-strain conditions of composites of Young's modulus. (08 Marks)
b. Explain fultrusion process with neat sketch. (06 Marks)
c. Briefly explain metal matrix and ceramic matrix composites. (06 Marks)

Module-5

- 9 a. Explain properties and different types of ceramics. (06 Marks)
b. With the help of neat sketch explain injection moulding process. (06 Marks)
c. State the applications and advantages of ceramics and polymers. (08 Marks)

OR

- 10 a. What is shape memory alloy? Discuss the same. (07 Marks)
b. Discuss the optical and thermal materials. (06 Marks)
c. Discuss the fiber optics, piezo – electrics and smart materials. (07 Marks)

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18ME33

Third Semester B.E. Degree Examination, July/August 2022
Basic Thermodynamics

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Use of Thermodynamics data hand book permitted.*

Module-1

- 1 a. Define Thermodynamic system, differentiate between open, closed and isolated system. (08 Marks)
- b. Explain the following: i) State ii) Process iii) Cyclic process. (06 Marks)
- c. A temperature scale of a certain thermometer is given by the relation $t = a \ln p + b$, where a and b are constants and p is Thermometric property. If at ice point and steam point the properties are found to be 2.5 and 9.5 respectively, what will be the temperature corresponding to the thermometric property of 4.5 on Celsius scale. (06 Marks)

OR

- 2 a. Explain briefly Zeroth law of Thermo dynamics. (06 Marks)
- b. Explain the following:
 - i) Quasistatic process
 - ii) Adiabatic and dia thermal wall
 - iii) Reversible process. (06 Marks)
- c. Estimate the % variation in temperature from a thermocouple from a thermocouple having its test junction in gas and other reference junction at ice point. The temperature of gas using gas thermometer is found to be 50°C. Thermocouple is calibrated with emf varying linearly between ice point and steam point. When thermocouple's test junction is kept in gas t°C and reference junction at ice point, the emf produced in millivolts is $e = 0.18t - 5.2 \times 10^{-4}t^2$. (08 Marks)

Module-2

- 3 a. Compare heat and work. (06 Marks)
- b. Derive an expression for work in a polytropic process. (06 Marks)
- c. A fluid at a pressure of 3 bar, and with specific volume of 0.18m³/kg contained in a cylinder behind a piston expands reversibly to a pressure of 0.6bar, according to a Law $P = \frac{c}{V^2}$ where c is a constant. Calculate the workdone by the fluid on the piston. Show the process on p-v diagram. (08 Marks)

OR

- 4 a. State first law of thermodynamics and show that internal energy is property of a system. (08 Marks)
- b. What do you mean by "Perpetual Motion Machine of first kind, PMM-1"? (04 Marks)
- c. A stream of gases at 7.5 bar, 750°C and 140m/s is passed through a turbine of a jet engine. The gases comes out of the turbine at 2 bar, 550°C and 280m/s. The process may be assumed adiabatic. The enthalpies of gas at the entry and exit of the turbine are 950kJ/kg and 650kJ/kg of gas respectively. Determine the capacity of the turbine in KW if the gas flow rate is 5kg/s. (08 Marks)

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Module-3

- 5 a. Give the following statements of second law of thermodynamics:
 i) Clausius statement ii) Kelvin Plank statement. (06 Marks)
- b. Show that the efficiency of a Reversible heat engine is more than a Irreversible heat engine, both heat engines working between the same temperature limits. (06 Marks)
- c. A heat pump working on a reversed carnot cycle takes in energy from a reservoir, maintained at 5°C and delivers it to another reservoir where temperature is 77°C. The heat pump derives power for its operation from a reversible engine operating with in the higher and lower temperature of 1077°C and 77°C. For 100kJ/kg of energy supplied to reservoir at 77°C, estimate the energy taken from the reservoir at 1077°C. (08 Marks)

OR

- 6 a. State and prove Clausius Inequality. (08 Marks)
- b. Prove that entropy is a property of a system. (06 Marks)
- c. In an air turbine the air expands from 7 bar 460°C to 1.012 bar and 160°C. The heat loss from the turbine can be assumed to be negligible. Estimate the change in entropy. (06 Marks)

Module-4

- 7 a. Explain the concept of available and unavailable energy. When does the system becomes dead? (06 Marks)
- b. Explain the concept of second law efficiency. (06 Marks)
- c. A heat engine is working between 700°C and 30°C. The temperature of surroundings is 17°C. Engine receives heat at the rate of 2×10^4 kJ/min and the measured output of engine is 0.13MW. Determine the availability, rate of irreversibility and second law efficiency of engine. (08 Marks)

OR

- 8 a. Define the following: i) Triple point ii) Critical point iii) Enthalpy of wet steam
 iv) Dryness fraction. (08 Marks)
- b. Draw a neat sketch of throttling calorimeter and explain how dryness fraction is determined. (06 Marks)
- c. A throttling calorimeter is attached to the steam pipe carrying steam at 11 bar. The pressure and temperature of steam after throttling are 1.2 bar and 120°C. Find the dryness fraction of steam. Take $C_p = 2.1$ for super heated steam. What is the maximum dryness fraction that can be measured under above condition? (06 Marks)

Module-5

- 9 a. Define the terms partial pressure, massfraction and mole fraction. (06 Marks)
- b. Develop an expression to determine the gas constant and molecular weight of a mixture of ideal gases. (06 Marks)
- c. A mixture of gases has the following volumetric composition.
 $CO_2 = 12\%$, $O_2 = 4\%$, $N_2 = 82\%$, $CO = 2\%$.
 Calculate: i) The gravimetric composition ii) Molecular weight of mixture
 iii) R for mixture. (08 Marks)

OR

- 10 a. Explain the following: i) Compressibility factor ii) Reduced properties
 iii) Law of corresponding states. (06 Marks)
- b. Write a note on compressibility chart. (06 Marks)
- c. Determine the pressure of Nitrogen in a steel vessel having a volume of 15 litres and containing 3.4kg at 400°C by using i) Ideal gas equation ii) Vander Walls equation. (08 Marks)

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18ME32

Third Semester B.E. Degree Examination, July/August 2022
Mechanics of Materials

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define the following :
 - i) True stress ii) Resilience iii) Ductility iv) Toughness. (04 Marks)
- b. Derive the expression for the extension of uniformly tapering circular rod subjected to axial load. (08 Marks)
- c. A steel bar ABCD 4m long subjected to forces as shown in Fig. Q1(c). Find the elongation of bar. Take E for the steel as 200 GPa. (08 Marks)

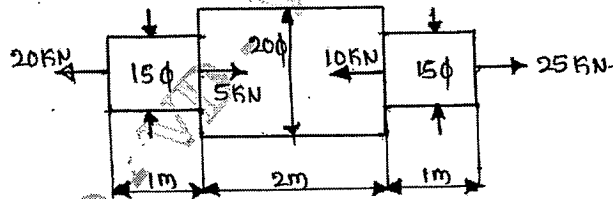


Fig. Q1(c)

OR

- 2 a. Define the following :
 - i) Poisson's Ratio ii) Young's Modulus
 - iii) Modulus of Rigidity iv) Bulk modulus. (04 Marks)
- b. A bar of 20mm diameter is tested in tension. It is observed that when a load of 37.7 kN is applied. The extension measured over a gauge length of 200mm is 0.12mm and contraction in diameter is 0.0036mm. Find Poisson's ratio and elastic constant E, G and K. (08 Marks)
- c. A composite bar is rigidly fitted at the supports A and B as shown in Fig. Q2(c). Determine the reactions at the supports when the temperature rises by 20°C. Take $E_a = 70 \text{ GN/m}^2$, $E_s = 200 \text{ GN/m}^2$, $\alpha_a = 11 \times 10^{-6}/^\circ\text{C}$ and $\alpha_s = 12 \times 10^{-6}/^\circ\text{C}$. (08 Marks)

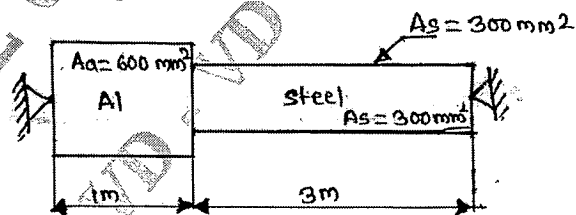


Fig. Q2(c)

Module-2

- 3 The state of stress in a two dimensionally stressed body is as shown in Fig. Q3. Determine the Principal planes, Principal stress, Maximum shear stress and their planes Analytically and Validate answer by graphically (using Mohr's circle). (20 Marks)

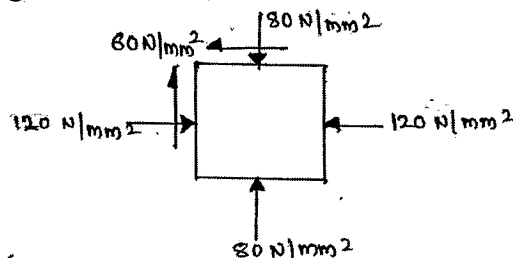


Fig. Q3

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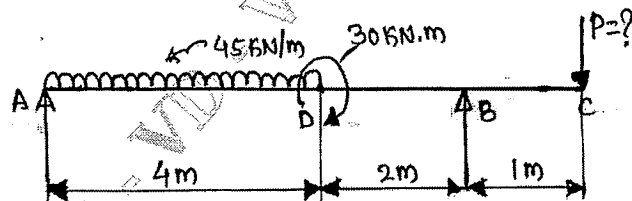
OR

- 4 a. Derive the expression for circumferential and radial stresses in the wall of thick cylinder [Lame's equation] with assumptions made. (10 Marks)
- b. A thin cylindrical vessel made of steel plates 4mm thick with plane ends, carries fluid under pressure of 3N/mm^2 . The diameter of cylinder is 25cms and the length is 75cms. Calculate the longitudinal and hoop stresses in the cylinder wall and determine the change in diameter, length and volume of the cylinder. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$ and $1/m = 0.286$. (10 Marks)

Module-3

- 5 a. Explain different types of loads in beams. (04 Marks)
- b. For the beam as shown in Fig. Q4(b). Determine the magnitude of load 'P' acting at point C, such that the reactions at supports A & B are equal. Draw shear force and bending moment diagram for the beam. Mark the silent points and their values on the diagram. Locate the point of contra flexure if any. (16 Marks)

Fig. Q4(b)



OR

- 6 a. Derive the relation $\frac{M}{I} = \frac{\sigma b}{Y} = \frac{E}{R}$ with usual notations and list the basic assumptions. (10 Marks)
- b. A rolled steel joint of I – Section used as simply supported beam has the following dimensions : Flange $(250 \times 25)\text{mm}$, Web – 15mm thick. Overall depth – 50mm . If this beam carries a UDL of 50kN/m on a span of 4m , calculate the maximum stress produced due to bending. (10 Marks)

Module-4

- 7 a. Explain i) Maximum principal stress theory ii) Maximum shear stress theory. (10 Marks)
- b. A shaft is required to transmic 245 KW power at 240 rpm. The maximum torque may be 1.5 times the mean torque. The shear stress in the shaft should not exceed 40N/mm^2 and the twist 1° per meter length. Determine the diameter required, if i) the shaft is solid ii) the shaft is hollow with external diameter twice the internal diameter. Take modulus of rigidity = 80KN/mm^2 . (10 Marks)

OR

- 8 a. List all assumptions and derive the torsional formula in standard form $\frac{T}{J} = \frac{\tau}{R} = \frac{G\theta}{L}$. (10 Marks)
- b. In a plate of C45 steel ($\sigma_{yt} = 353 \text{ Mpa}$) subjected to a system of loads, following stresses are induced at critical point : $\sigma_x = 150 \text{ N/mm}^2$, $\sigma_y = 100\text{N/mm}^2$ and $\tau_{xy} = 50\text{N/mm}^2$. Check wheather there is failure according to i) Maximum Principal Stress theory. ii) Maximum shear stress theory. If the material is safe, find the factor of safety as per both theories. (10 Marks)

Module-5

- 9 a. Derive the expression for strain energy due to shear. (07 Marks)
b. Define : i) Strain energy ii) Resilience iii) Proof Resilience (04 Marks)
iv) Modulus of Resilience.
c. A 2m long pin ended column of square cross section is to be made up of wood. Assuming $E = 12\text{GPa}$ and allowable stress being limited to 12MPa . Determine the size of the column to support the following load safely. i) 95 KN ii) 200 KN. Use factor of safety of 3 and Euler's crippling loads for buckling. (09 Marks)

OR

- 10 a. Derive an expression for critical load in a column subjected to compressive load, when one end is fixed and other end is free. (10 Marks)
b. Derive the expression for strain energy due to impact load for axial load applications. (10 Marks)

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18ME45A/18MEA405

Fourth Semester B.E. Degree Examination, July/August 2022
Metal Cutting & Forming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Distinguish between orthogonal and oblique cutting with a neat sketch. (06 Marks)
 b. List and explain different types of chips formed in metal cutting process and state the conditions for their formation. (08 Marks)
 c. In an orthogonal cutting process, the following data was recorded, cutting speed : 120m/min, uncut chip thickness : 0.127mm, chip thickness : 0.228mm, Rake angle : 10°, width of cut : 6.35mm, cutting force : 567N and Thrust force : 227N. Calculate :
 i) Shear angle ii) Friction angle iii) Power. (06 Marks)

OR

- 2 a. List and explain different types of cutting tool materials and state their specific applications. (06 Marks)
 b. Sketch and explain the working principle of turret lathe. (10 Marks)
 c. List and explain different types of lathe accessories. (04 Marks)

Module-2

- 3 a. Sketch and explain the principal parts of a vertical milling machine. (10 Marks)
 b. What is indexing and explain compound indexing with an example. (10 Marks)

OR

- 4 a. Differentiate between drilling, boring and reaming operations. (06 Marks)
 b. Give the comparisons between shaper and planer. (04 Marks)
 c. Sketch and explain the working principle of centerless grinding process. (10 Marks)

Module-3

- 5 a. Sketch and explain different types of tool wear mechanisms. (10 Marks)
 b. A tool life of 80 minutes is obtained for a cutting speed of 30m/min and 8 minutes for a speed of 60m/min. Determine the tool life equation and calculate the cutting speed for 4 minute tool life. (06 Marks)
 c. List the important requirements of cutting fluids. (04 Marks)

OR

- 6 a. Derive the expression for optimum cutting speed for minimum cost in turning operation. (10 Marks)
 b. In turning operation, it was observed that the tool life is 150min. While cutting at a speed of 20m/min. As the speed was increased to 25m/min and the tool life is reduced to 25.5min. If the time required to change the tool is 2 min and the cost of regrinding the tools is 10 times the cost of turning. Calculate the economic cutting speed and tool life for maximum production. (10 Marks)

Module-4

- 7 a. Give the broad classification of metal forming processors. (04 Marks)
b. Sketch and explain different types of forging hammers. (08 Marks)
c. List and explain any two types of rolling mills. (08 Marks)

OR

- 8 a. Briefly explain rolling defects. (04 Marks)
b. List and explain any one type of tube drawing process. (08 Marks)
c. Sketch and explain any two types of extrusion process. (08 Marks)

Module-5

- 9 a. With a simple sketch, explain different types of sheet metal operations. (06 Marks)
b. What is drawing process and explain the different factors to be considered in the design of drawing dies. (08 Marks)
c. Find the total pressure, dimensions of tools to produce a washer of 55mm outer diameter and 25mm inner diameter having a thickness of 4mm, shear strength of 350N/mm². (06 Marks)

OR

- 10 a. Explain different types of dies used in forming process. (06 Marks)
b. Sketch and explain progressive die used for producing a washer. (08 Marks)
c. A cup without flanges and height of 100mm and diameter 50mm is to be made from sheet metal of 2.5mm thick. Find the suitable number of draws required to produce a cup by assuming 45%, 25% and 20% reduction. (06 Marks)

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18ME46B/18MEB406

Fourth Semester B.E. Degree Examination, July/August 2022
Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain international prototype meter with a neat sketch. (06 Marks)
- b. Four length bars A, B, C and D each having a basic length 125 mm are to be calibrated using a calibrated length bar of 500 mm basic length. The 500 mm bar has an actual length of 499.9991 mm. Also, it was found that
- $$L_B = L_A + 0.0001 \text{ mm}$$
- $$L_C = L_A + 0.0005 \text{ mm}$$
- $$L_D = L_A - 0.0002 \text{ mm}$$
- and $L_A + L_B + L_C + L_D = L + 0.0003 \text{ mm}$
- Determine L_A, L_B, L_C and L_D (08 Marks)
- c. Define a standard. Write a note on wavelength standards. (06 Marks)

OR

- 2 a. Explain sine centre with a neat sketch. (06 Marks)
- b. Explain the principle and construction of Auto collimator with a neat diagram. (14 Marks)

Module-2

- 3 a. Define the terms :
- (i) Limits (ii) Fits (iii) Fundamental deviation (iv) Tolerance
 (v) Allowance (vi) Basic size (06 Marks)
- b. Determine the actual dimensions to be provided for a shaft and hole of 90 mm size for H₈C₉ type clearance fit. Given Diameter steps are 80 mm and 100 mm,
 $i = 0.45\sqrt[3]{D} + 0.001D$,
 Value of tolerances for IT8 = 25i and for IT9 = 40i
 and Fundamental Deviation for 'C' type shaft F.D = $-11D^{0.41}$
 and also design the GO and NOGO gauges, considering wear allowance. (14 Marks)

OR

- 4 a. Explain the construction and working of Sigma Comparator with a neat sketch. (10 Marks)
- b. Explain Solex Pneumatic Comparator with a neat sketch. (10 Marks)

Module-3

- 5 a. Explain Toolmaker's microscope with a neat sketch. (14 Marks)
- b. Define Best Size Wire. Derive an expression for the same. (06 Marks)

OR

- 6 a. Explain the measurement of gear tooth thickness using constant chord method. (10 Marks)
- b. Explain the Gear tooth Vernier Caliper with a neat sketch. (10 Marks)

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Module-4

- 7 a. Explain Generalized measurement system with a Block Diagram. (12 Marks)
b. Define : (i) Accuracy (ii) Precision (iii) Threshold (iv) Hysteresis (08 Marks)

OR

- 8 a. Define Transfer Efficiency. Explain Ionisation transducer with a neat sketch. (07 Marks)
b. Classify Transducers. Explain Resistive transducers with a neat sketch. (13 Marks)

Module-5

- 9 a. Explain Equal arm balance for force measurement. (12 Marks)
b. Explain Prony brake dynamometer with a neat sketch. (08 Marks)

OR

- 10 a. Explain McLeod gauge with a neat sketch. (10 Marks)
b. Define thermocouple. State the laws of thermocouple and explain. (06 Marks)
c. Explain the theory of strain gauges and define gauge factor. (04 Marks)

CBCS SCHEME

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18ME42

Fourth Semester B.E. Degree Examination, July/August 2022

Applied Thermodynamics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Thermodynamics data hand book is permitted.**

Module-1

- 1 a. Derive an expression of air standard efficiency of diesel cycle with neat PV and T-S diagrams. (10 Marks)
b. An engine with 200mm cylinder diameter and 300mm Stroke length works on diesel cycle. The initial pressure and temperature of air are 0.1 MPa and 27°C. The cutoff is 8% of Stroke volume and compression ratio is 15. Determine :
i) Pressure and temperature at all salient points ii) Air standard efficiency. (10 Marks)

OR

- 2 a. Explain any two methods of deeming frictional power. (08 Marks)
b. The following observations were made during one hour test on a single Stroke oil engine.
Bore = 300mm ; Stroke = 450mm ; mass of fuel used = 8.8Kg ;
Calorific value = 41800kJ/Kg ;
Average speed = 200rpm, Mean effective pressure = 5.8 bar, Brake load = 1860N, Mass of cooling water = 650Kg, Temperature rise = 22°C, Diameter of Brake drum = 1.22 m.
Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) Draw heat balance sheet on kJ/hr basis. (12 Marks)

Module-2

- 3 a. Derive an expression of optimum pressure ratio for maximum workout put in case of actual Brayton cycle. (10 Marks)
b. Air enters the compressor of a gas turbine plant operating on Brayton cycle at 101.325KPa, 27°C. The pressure ratio in the cycle is 6. Calculate the maximum temperature in the cycle and cycle efficiency. Assume $W_T = 2.5W_C$. Where W_T and W_C are the turbine and compressor work respectively. Take $r = 1.4$. (10 Marks)

OR

- 4 a. With a neat block diagram and T-S diagram, explain how 'regeneration' increases thermal efficiency of gas turbine plant. (08 Marks)
b. Air is drawn in a gas turbine unit at 15°C and 1.01bar and pressure ratio is 7. The compressor is driven by the high pressure turbine and low pressure turbine drives a separate shaft. The isentropic efficiencies of compressor and HP and LP turbines are 0.82, 0.85 and 0.85 respectively. If the maximum cycle temperature is 610°C, find :
i) The pressure and temperature of the gases entering the power turbine
ii) The net power developed by the unit per Kg/sec mass flow.
iii) Work ratio
iv) Thermal efficiency of the unit

Neglect the mass of the fuel and assume the following :

For compression process, $C_{pa} = 1.005 \text{ kJ/Kg.K}$ and $r = 1.4$.

For combustion and expansion process : $C_{pg} = 1.15 \text{ kJ/Kg.K}$ and $r = 1.33$.

(12 Marks)

Module-3

- 5 a. Discuss the effect of i) Boiler pressure ii) Condenser pressure iii) Super heat on the performance of a Rankine cycle. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- b. Steam at 1 bar and 350°C is expanded in a steam turbine to 0.08bar. It then enters the condenser, where it is condensed to saturated liquid water. Assume the turbine and feed pump efficiencies as 80% and 90% respectively. Determine per Kg of steam the network, the heat transferred to the working fluid and Rankine efficiency. (10 Marks)

OR

- 6 a. Sketch and explain the flow diagram and corresponding T-S diagram of practical regenerative Rankine cycle. (10 Marks)
- b. A reheat cycle has the first stage supply conditions of 70bar and 500°C. The reheat is at 3 bar and to the same temperature.
- Given that the efficiency of the first stage turbine is 80%, how much energy is added per kg of steam in the reheat coils?
 - Assume that the same expansion efficiency exists in the second turbine. What is the thermal efficiency, if the condenser pressure is 0.03 bars? (10 Marks)

Module-4

- 7 a. Explain the effect of super heating and under cooling the refrigerant on the performance of vapour compression refrigeration cycle. (06 Marks)
- b. What are the properties of refrigerants? (04 Marks)
- c. A vapour compression refrigerator uses methyl Chloride (R – 40) and operates between the temperature limits of -10°C and 45°C. At the entry to the compressor the refrigerant is dry saturated and after the compression it acquires a temperature of 60°C. Find COP of the refrigerator. The relevant properties of R – 40 are as follows :

Saturation temperature	Enthalpy		Entropy	
	Liquid	Vapour	Liquid	Vapour
-10°C	45.4	460.7	0.183	1.637
45°C	133	483.6	0.485	1.587

Also find mass of methyl chloride and power required for a capacity of 15 TOR. (10 Marks)

OR

- 8 a. Define : i) Wet bulb temperature ii) Dew point temperature iii) Relative humidity iv) Specific humidity v) Degree of saturation. (10 Marks)
- b. Air is to be conditioned from 40° C (DBT) and 50% RH to a final temperature of 20°C (DBT) and 40% RH, by de-humidification process, followed by a reheat process. Assuming that the entire process is at constant pressure of 101.325 KPa, determine :
- The amount of water to be removed from air
 - The temperature of air leaving the dehumidifier
 - Refrigeration in tons for air flow rate of 0.47m³/sec
 - Heating required in kW. (10 Marks)

Module-5

- 9 a. Derive an expression for minimum work input by two stage compressor with intercooler. (10 Marks)
- b. A single stage single acting reciprocating air compressor has a bore of 200mm and Stroke of 300mm. It receives air at 1 bar and 20°C and delivers it at 5.5 bar. If the compression follows the law $PV^{1.3} = C$ and clearance volume is 5% of the Stroke volume, determine :
- Mean effective pressure
 - Power required to drive the compressor if it runs at 500rpm. (10 Marks)

OR

- 10 a. Derive an expression of critical pressure ratio which gives maximum discharge through the nozzle. (10 Marks)
- b. Steam at 15bar and 250°C is expanded in a nozzle to 1 bar. For a discharge of 0.5kg/sec find throat and exit diameter for maximum discharge conditions. Assume the nozzle efficiency as 90%. (10 Marks)

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18ME42

Fourth Semester B.E. Degree Examination, July/August 2022

Applied Thermodynamics

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Use of Thermodynamics data hand book is permitted.

Module-1

- 1 a. Derive an expression of air standard efficiency of diesel cycle with neat PV and T-S diagrams. (10 Marks)
 b. An engine with 200mm cylinder diameter and 300mm Stroke length works on diesel cycle. The initial pressure and temperature of air are 0.1 MPa and 27°C. The cutoff is 8% of Stroke volume and compression ratio is 15. Determine :
 i) Pressure and temperature at all salient points ii) Air standard efficiency. (10 Marks)

OR

- 2 a. Explain any two methods of deeming frictional power. (08 Marks)
 b. The following observations were made during one hour test on a single Stroke oil engine.
 Bore = 300mm ; Stroke = 450mm ; mass of fuel used = 8.8Kg ;
 Calorific value = 41800kJ/Kg ;
 Average speed = 200rpm, Mean effective pressure = 5.8 bar, Brake load = 1860N, Mass of cooling water = 650Kg, Temperature rise = 22°C, Diameter of Brake drum = 1.22 m.
 Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) Draw heat balance sheet on kJ/hr basis. (12 Marks)

Module-2

- 3 a. Derive an expression of optimum pressure ratio for maximum workout put in case of actual Brayton cycle. (10 Marks)
 b. Air enters the compressor of a gas turbine plant operating on Brayton cycle at 101.325KPa, 27°C. The pressure ratio in the cycle is 6. Calculate the maximum temperature in the cycle and cycle efficiency. Assume $W_T = 2.5W_C$. Where W_T and W_C are the turbine and compressor work respectively. Take $r = 1.4$. (10 Marks)

OR

- 4 a. With a neat block diagram and T-S diagram, explain how 'regeneration' increases thermal efficiency of gas turbine plant. (08 Marks)
 b. Air is drawn in a gas turbine unit at 15°C and 1.01bar and pressure ratio is 7. The compressor is driven by the high pressure turbine and low pressure turbine drives a separate shaft. The isentropic efficiencies of compressor and HP and LP turbines are 0.82, 0.85 and 0.85 respectively. If the maximum cycle temperature is 610°C, find :
 i) The pressure and temperature of the gases entering the power turbine
 ii) The net power developed by the unit per Kg/sec mass flow.
 iii) Work ratio
 iv) Thermal efficiency of the unit

Neglect the mass of the fuel and assume the following :

For compression process, $C_{p_a} = 1.005 \text{ kJ/Kg.K}$ and $r = 1.4$.

For combustion and expansion process : $C_{p_g} = 1.15 \text{ kJ/Kg.K}$ and $r = 1.33$. (12 Marks)

Module-3

- 5 a. Discuss the effect of i) Boiler pressure ii) Condenser pressure iii) Super heat on the performance of a Rankine cycle. (10 Marks)

- b. Steam at 1 bar and 350°C is expanded in a steam turbine to 0.08bar. It then enters the condenser, where it is condensed to saturated liquid water. Assume the turbine and feed pump efficiencies as 80% and 90% respectively. Determine per Kg of steam the network, the heat transferred to the working fluid and Rankine efficiency. (10 Marks)

OR

- 6 a. Sketch and explain the flow diagram and corresponding T-S diagram of practical regenerative Rankine cycle. (10 Marks)
- b. A reheat cycle has the first stage supply conditions of 70bar and 500°C. The reheat is at 3 bar and to the same temperature.
- Given that the efficiency of the first stage turbine is 80%, how much energy is added per kg of steam in the reheat coils?
 - Assume that the same expansion efficiency exists in the second turbine. What is the thermal efficiency, if the condenser pressure is 0.03 bars? (10 Marks)

Module-4

- 7 a. Explain the effect of super heating and under cooling the refrigerant on the performance of vapour compression refrigeration cycle. (06 Marks)
- b. What are the properties of refrigerants? (04 Marks)
- c. A vapour compression refrigerator uses methyl Chloride (R – 40) and operates between the temperature limits of -10°C and 45°C. At the entry to the compressor the refrigerant is dry saturated and after the compression it acquires a temperature of 60°C. Find COP of the refrigerator. The relevant properties of R – 40 are as follows :

Saturation temperature	Enthalpy		Entropy	
	Liquid	Vapour	Liquid	Vapour
-10°C	45.4	460.7	0.183	1.637
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Also find mass of methyl chloride and power required for a capacity of 15 TOR. (10 Marks)

OR

- 8 a. Define : i) Wet bulb temperature ii) Dew point temperature iii) Relative humidity iv) Specific humidity v) Degree of saturation. (10 Marks)
- b. Air is to be conditioned from 40° C (DBT) and 50% RH to a final temperature of 20°C (DBT) and 40% RH, by de-humidification process, followed by a reheat process. Assuming that the entire process is at constant pressure of 101.325 KPa, determine :
- The amount of water to be removed from air
 - The temperature of air leaving the dehumidifier
 - Refrigeration in tons for air flow rate of 0.47m³/sec
 - Heating required in kW. (10 Marks)

Module-5

- 9 a. Derive an expression for minimum work input by two stage compressor with intercooler. (10 Marks)
- b. A single stage single acting reciprocating air compressor has a bore of 200mm and Stroke of 300mm. It receives air at 1 bar and 20°C and delivers it at 5.5 bar. If the compression follows the law $PV^{1.3} = C$ and clearance volume is 5% of the Stroke volume, determine :
- Mean effective pressure
 - Power required to drive the compressor if it runs at 500rpm. (10 Marks)

OR

- 10 a. Derive an expression of critical pressure ratio which gives maximum discharge through the nozzle. (10 Marks)
- b. Steam at 15bar and 250°C is expanded in a nozzle to 1 bar. For a discharge of 0.5kg/sec find throat and exit diameter for maximum discharge conditions. Assume the nozzle efficiency as 90%. (10 Marks)

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18ME42

Fourth Semester B.E. Degree Examination, July/August 2022
Applied Thermodynamics

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Use of Thermodynamics data hand book is permitted.

Module-1

- 1 a. Derive an expression of air standard efficiency of diesel cycle with neat PV and T-S diagrams. (10 Marks)
- b. An engine with 200mm cylinder diameter and 300mm Stroke length works on diesel cycle. The initial pressure and temperature of air are 0.1 MPa and 27°C. The cutoff is 8% of Stroke volume and compression ratio is 15. Determine :
 - i) Pressure and temperature at all salient points
 - ii) Air standard efficiency. (10 Marks)

OR

- 2 a. Explain any two methods of deeming frictional power. (08 Marks)
- b. The following observations were made during one hour test on a single Stroke oil engine.
 Bore = 300mm ; Stroke = 450mm ; mass of fuel used = 8.8Kg ;
 Calorific value = 41800kJ/Kg ;
 Average speed = 200rpm, Mean effective pressure = 5.8 bar, Brake load = 1860N, Mass of cooling water = 650Kg, Temperature rise = 22°C, Diameter of Brake drum = 1.22 m.
 Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) Draw heat balance sheet on kJ/hr basis. (12 Marks)

Module-2

- 3 a. Derive an expression of optimum pressure ratio for maximum workout put in case of actual Brayton cycle. (10 Marks)
- b. Air enters the compressor of a gas turbine plant operating on Brayton cycle at 101.325KPa, 27°C. The pressure ratio in the cycle is 6. Calculate the maximum temperature in the cycle and cycle efficiency. Assume $W_T = 2.5W_C$. Where W_T and W_C are the turbine and compressor work respectively. Take $r = 1.4$. (10 Marks)

OR

- 4 a. With a neat block diagram and T-S diagram, explain how 'regeneration' increases thermal efficiency of gas turbine plant. (08 Marks)
- b. Air is drawn in a gas turbine unit at 15°C and 1.01bar and pressure ratio is 7. The compressor is driven by the high pressure turbine and low pressure turbine drives a separate shaft. The isentropic efficiencies of compressor and HP and LP turbines are 0.82, 0.85 and 0.85 respectively. If the maximum cycle temperature is 610°C, find :
 - i) The pressure and temperature of the gases entering the power turbine
 - ii) The net power developed by the unit per Kg/sec mass flow.
 - iii) Work ratio
 - iv) Thermal efficiency of the unit

Neglect the mass of the fuel and assume the following :

For compression process, $C_{Pa} = 1.005 \text{ kJ/Kg.K}$ and $r = 1.4$.

For combustion and expansion process : $C_{pg} = 1.15 \text{ kJ/Kg.K}$ and $r = 1.33$. (12 Marks)

Module-3

- 5 a. Discuss the effect of i) Boiler pressure ii) Condenser pressure iii) Super heat on the performance of a Rankine cycle. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Steam at 1 bar and 350°C is expanded in a steam turbine to 0.08bar. It then enters the condenser, where it is condensed to saturated liquid water. Assume the turbine and feed pump efficiencies as 80% and 90% respectively. Determine per Kg of steam the network, the heat transferred to the working fluid and Rankine efficiency. (10 Marks)

OR

- 6 a. Sketch and explain the flow diagram and corresponding T-S diagram of practical regenerative Rankine cycle. (10 Marks)
- b. A reheat cycle has the first stage supply conditions of 70bar and 500°C. The reheat is at 3 bar and to the same temperature.
- Given that the efficiency of the first stage turbine is 80%, how much energy is added per kg of steam in the reheat coils?
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Module-4

- 7 a. Explain the effect of super heating and under cooling the refrigerant on the performance of vapour compression refrigeration cycle. (06 Marks)
- b. What are the properties of refrigerants? (04 Marks)
- c. A vapour compression refrigerator uses methyl Chloride (R – 40) and operates between the temperature limits of -10°C and 45°C. At the entry to the compressor the refrigerant is dry saturated and after the compression it acquires a temperature of 60°C. Find COP of the refrigerator. The relevant properties of R – 40 are as follows :

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Also find mass of methyl chloride and power required for a capacity of 15 TOR. (10 Marks)

OR

- 8 a. Define : i) Wet bulb temperature ii) Dew point temperature iii) Relative humidity iv) Specific humidity v) Degree of saturation. (10 Marks)
- b. Air is to be conditioned from 40° C (DBT) and 50% RH to a final temperature of 20°C (DBT) and 40% RH, by de-humidification process, followed by a reheat process. Assuming that the entire process is at constant pressure of 101.325 KPa, determine :
- The amount of water to be removed from air
 - The temperature of air leaving the dehumidifier
 - Refrigeration in tons for air flow rate of 0.47m³/sec
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Module-5

- 9 a. Derive an expression for minimum work input by two stage compressor with intercooler. (10 Marks)
- b. A single stage single acting reciprocating air compressor has a bore of 200mm and Stroke of 300mm. It receives air at 1 bar and 20°C and delivers it at 5.5 bar. If the compression follows the law $PV^{1.3} = C$ and clearance volume is 5% of the Stroke volume, determine :
- Mean effective pressure
 - Power required to drive the compressor if it runs at 500rpm. (10 Marks)

OR

- 10 a. Derive an expression of critical pressure ratio which gives maximum discharge through the nozzle. (10 Marks)
- b. Steam at 15bar and 250°C is expanded in a nozzle to 1 bar. For a discharge of 0.5kg/sec find throat and exit diameter for maximum discharge conditions. Assume the nozzle efficiency as 90%. (10 Marks)

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18ME42

Fourth Semester B.E. Degree Examination, July/August 2022

Applied Thermodynamics

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Thermodynamics data hand book is permitted.**

Module-1

- 1 a. Derive an expression of air standard efficiency of diesel cycle with neat PV and T-S diagrams. (10 Marks)
- b. An engine with 200mm cylinder diameter and 300mm Stroke length works on diesel cycle. The initial pressure and temperature of air are 0.1 MPa and 27°C. The cutoff is 8% of Stroke volume and compression ratio is 15. Determine :
 - i) Pressure and temperature at all salient points
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OR

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- b. The following observations were made during one hour test on a single Stroke oil engine.
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 Average speed = 200rpm, Mean effective pressure = 5.8 bar, Brake load = 1860N, Mass of cooling water = 650Kg, Temperature rise = 22°C, Diameter of Brake drum = 1.22 m.
 Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) Draw heat balance sheet on kJ/hr basis. (12 Marks)

Module-2

- 3 a. Derive an expression of optimum pressure ratio for maximum workout put in case of actual Brayton cycle. (10 Marks)
- b. Air enters the compressor of a gas turbine plant operating on Brayton cycle at 101.325KPa, 27°C. The pressure ratio in the cycle is 6. Calculate the maximum temperature in the cycle and cycle efficiency. Assume $W_T = 2.5W_C$. Where W_T and W_C are the turbine and compressor work respectively. Take $r = 1.4$. (10 Marks)

OR

- 4 a. With a neat block diagram and T-S diagram, explain how 'regeneration' increases thermal efficiency of gas turbine plant. (08 Marks)
- b. Air is drawn in a gas turbine unit at 15°C and 1.01bar and pressure ratio is 7. The compressor is driven by the high pressure turbine and low pressure turbine drives a separate shaft. The isentropic efficiencies of compressor and HP and LP turbines are 0.82, 0.85 and 0.85 respectively. If the maximum cycle temperature is 610°C, find :
 - i) The pressure and temperature of the gases entering the power turbine
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 Neglect the mass of the fuel and assume the following :
 For compression process, $C_{Pa} = 1.005 \text{ kJ/Kg.K}$ and $r = 1.4$.
 For combustion and expansion process : $C_{Pg} = 1.15 \text{ kJ/Kg.K}$ and $r = 1.33$. (12 Marks)

Module-3

- 5 a. Discuss the effect of i) Boiler pressure ii) Condenser pressure iii) Super heat on the performance of a Rankine cycle. (10 Marks)

- b. Steam at 1 bar and 350°C is expanded in a steam turbine to 0.08bar. It then enters the condenser, where it is condensed to saturated liquid water. Assume the turbine and feed pump efficiencies as 80% and 90% respectively. Determine per Kg of steam the network, the heat transferred to the working fluid and Rankine efficiency. (10 Marks)

OR

- 6 a. Sketch and explain the flow diagram and corresponding T-S diagram of practical regenerative Rankine cycle. (10 Marks)
- b. A reheat cycle has the first stage supply conditions of 70bar and 500°C. The reheat is at 3 bar and to the same temperature.
- Given that the efficiency of the first stage turbine is 80%, how much energy is added per kg of steam in the reheat coils?
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Module-4

- 7 a. Explain the effect of super heating and under cooling the refrigerant on the performance of vapour compression refrigeration cycle. (06 Marks)
- b. What are the properties of refrigerants? (04 Marks)
- c. A vapour compression refrigerator uses methyl Chloride (R – 40) and operates between the temperature limits of -10°C and 45°C. At the entry to the compressor the refrigerant is dry saturated and after the compression it acquires a temperature of 60°C. Find COP of the refrigerator. The relevant properties of R – 40 are as follows :

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Also find mass of methyl chloride and power required for a capacity of 15 TOR. (10 Marks)

OR

- 8 a. Define : i) Wet bulb temperature ii) Dew point temperature iii) Relative humidity iv) Specific humidity v) Degree of saturation. (10 Marks)
- b. Air is to be conditioned from 40° C (DBT) and 50% RH to a final temperature of 20°C (DBT) and 40% RH, by de-humidification process, followed by a reheat process. Assuming that the entire process is at constant pressure of 101.325 KPa, determine :
- The amount of water to be removed from air
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 - Refrigeration in tons for air flow rate of 0.47m³/sec
 - Heating required in kW. (10 Marks)

Module-5

- 9 a. Derive an expression for minimum work input by two stage compressor with intercooler. (10 Marks)
- b. A single stage single acting reciprocating air compressor has a bore of 200mm and Stroke of 300mm. It receives air at 1 bar and 20°C and delivers it at 5.5 bar. If the compression follows the law $PV^{1.3} = C$ and clearance volume is 5% of the Stroke volume, determine :
- Mean effective pressure
 - Power required to drive the compressor if it runs at 500rpm. (10 Marks)

OR

- 10 a. Derive an expression of critical pressure ratio which gives maximum discharge through the nozzle. (10 Marks)
- b. Steam at 15bar and 250°C is expanded in a nozzle to 1 bar. For a discharge of 0.5kg/sec find throat and exit diameter for maximum discharge conditions. Assume the nozzle efficiency as 90%. (10 Marks)

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18MAT31

Third Semester B.E. Degree Examination, Feb./Mar. 2022 Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Evaluate (i) $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$ (ii) $L(t^2 e^{-3t} \sin 2t)$ (06 Marks)
- b. If $f(t) = \begin{cases} t, & 0 \leq t \leq a \\ 2a - t, & a \leq t \leq 2a \end{cases}$, $f(t + 2a) = f(t)$ then show that $L(f(t)) = \frac{1}{s^2} \tanh\left(\frac{as}{2}\right)$ (07 Marks)
- c. Solve by using Laplace Transforms $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$, $y(0) = 0$, $y'(0) = 0$ (07 Marks)

OR

- 2 a. Evaluate $L^{-1}\left(\frac{4s+5}{(s+1)^2(s+2)}\right)$ (06 Marks)
- b. Find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$ by using convolution theorem. (07 Marks)
- c. Express $f(t) = \begin{cases} \sin t, & 0 \leq t < \pi \\ \sin 2t, & \pi \leq t < 2\pi \\ \sin 3t, & t \geq 2\pi \end{cases}$ in terms of unit step function and hence find its Laplace Transform. (07 Marks)

Module-2

- 3 a. Obtain fourier series for the function $f(x) = |x|$ in $(-\pi, \pi)$ (06 Marks)
- b. Expand $f(x) = \frac{(\pi-x)^2}{4}$ as a Fourier series in the interval $(0, 2\pi)$ and hence deduce that $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ (07 Marks)
- c. Express y as a Fourier series upto the second harmonic given :

x:	0	60	120	180	240	300
y:	4	3	2	4	5	6

(07 Marks)

OR

- 4 a. Find the Half-Range sine series of $\pi x - x^2$ in the interval $(0, \pi)$ (06 Marks)
- b. Obtain fourier expansion of the function $f(x) = 2x - x^2$ in the interval $(0, 3)$. (07 Marks)

- c. Obtain the Fourier expansion of y upto the first harmonic given :

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(07 Marks)

Module-3

- 5 a. If $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$, find the Fourier transform of $f(x)$ and hence find the value of $\int_0^{\infty} \frac{\sin x}{x} dx$ (06 Marks)

- b. Find the infinite Fourier cosine transform of e^{-ax} . (07 Marks)

- c. Solve using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0, y_1 = 2$ (07 Marks)

OR

- 6 a. Find the fourier sine transform of $f(x) = e^{-|x|}$ and hence evaluate $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx$; $m > 0$. (06 Marks)

- b. Obtain the z-transform of $\cos n\theta$ and $\sin n\theta$. (07 Marks)

- c. Find the inverse z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$ (07 Marks)

Module-4

- 7 a. Solve $\frac{dy}{dx} = x^3 + y$, $y(1) = 1$ using Taylor's series method considering up to fourth degree terms and find $y(1.1)$. (06 Marks)

- b. Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ compute $y(0.2)$ by taking $h = 0.2$ using Runge - Kutta method of fourth order. (07 Marks)

- c. If $\frac{dy}{dx} = 2e^x - y$, $y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040$ and $y(0.3) = 2.090$, find $y(0.4)$ correct to 4 decimal places using Adams-Bashforth method. (07 Marks)

OR

- 8 a. Use fourth order Runge-Kutta method, to find $y(0.8)$ with $h = 0.4$, given $\frac{dy}{dx} = \sqrt{x+y}$, $y(0.4) = 0.41$ (06 Marks)

- b. Use modified Euler's method to compute $y(20.2)$ and $y(20.4)$ given that $\frac{dy}{dx} = \log_{10}\left(\frac{x}{y}\right)$ with $y(20) = 5$ Taking $h = 0.2$. (07 Marks)

- c. Apply Milne's predictor-corrector formulae to compute $y(2.0)$ given $\frac{dy}{dx} = \frac{x+y}{2}$ with

x	0.0	0.5	1.0	1.5
y	2.000	2.6360	3.5950	4.9680

(07 Marks)

Module-5

- 9 a. Using Runge-Kutta method, solve

$$\frac{d^2y}{dx^2} = x \left(\frac{dy}{dx} \right)^2 - y^2, \text{ for } x = 0.2, \text{ correct to four decimal places, using initial conditions } y(0) = 1, y'(0) = 0$$

(07 Marks)

- b. Derive Euler's equation in the standard form viz,
- $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$

(07 Marks)

- c. Find the extremal of the functional
- $\int_{x_1}^{x_2} (y^2 + y'^2 + 2ye^x) dx$

(06 Marks)

OR

- 10 a. Given the differential equation
- $2 \frac{d^2y}{dx^2} = 4x + \frac{dy}{dx}$
- and the following table of initial values:

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514
y'	2	2.3178	2.6725	2.0657

Compute y(1.4) by applying Milne's Predictor-corrector formula.

(07 Marks)

- b. Prove that geodesics of a plane surface are straight lines.

(07 Marks)

- c. On what curves can the functional
- $\int_0^1 (y'^2 + 12xy) dx$
- with
- $y(0) = 0, y(1) = 1$
- can be extremized?

(06 Marks)

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18MATDIP31

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the modulus and amplitude of the complex number : $\frac{(2-3i)(2+i)^2}{1+i}$. (07 Marks)
- b. Prove that $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^n = \cos n\theta + i\sin n\theta$. (06 Marks)
- c. Show that the vectors $\vec{a}-2\vec{b}+3\vec{c}$, $-2\vec{a}+3\vec{b}-4\vec{c}$, $-\vec{b}+2\vec{c}$ are coplanar. (07 Marks)

OR

- 2 a. Given $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$. Find : i) $\vec{a} \cdot \vec{b}$ ii) $\vec{a} \times \vec{b}$ iii) $|\vec{a} \times \vec{b}|$. (07 Marks)
- b. Determine the value of λ , so that $\vec{a} = 2\hat{i} + \lambda\hat{j} - \hat{k}$, and $\vec{b} = 4\hat{i} - 2\hat{j} - 2\hat{k}$, are perpendicular. (06 Marks)
- c. Express $1 - i\sqrt{3}$ in the polar form and hence find its modulus and amplitude. (07 Marks)

Module-2

- 3 a. Using Euler's theorem, prove that $xu_x + yu_y = -3\cot u$ where $u = \sin^{-1}\left(\frac{x^2y^2}{x+y}\right)$. (07 Marks)
- b. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{24} + \dots$. (06 Marks)
- c. If $u = x + 3y^2$, $v = 4x^2yz$, $w = 2z^2 - xy$, evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at the point $(1, -1, 0)$. (07 Marks)

OR

- 4 a. Obtain Maclaurin's series expansion for the function e^x upto x^4 . (07 Marks)
- b. If $u = \sin^{-1}\left[\frac{x^3+y^3}{x+y}\right]$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2 \tan u$. (06 Marks)
- c. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$. (07 Marks)

Module-3

- 5 a. A particle moves along the curve $x = (1-t^3)$, $y = (1+t^2)$, $z = (2t-5)$ determine its velocity and acceleration at $t = 1$ sec. (07 Marks)
- b. If $\vec{F} = 2x^2\hat{i} - 3yz\hat{j} + xz^2\hat{k}$, and $\phi = 2z - x^3y$, find $\vec{F} \cdot (\nabla\phi)$ and $\vec{F} \times (\nabla\phi)$ at $(1, -1, 1)$. (06 Marks)
- c. Find the constants a, b, c so that $\vec{f} = (x+2y+az)\hat{i} + (bx-3y-z)\hat{j} + (4x+cy+2z)\hat{k}$ is irrotational. (07 Marks)

OR

- 6 a. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $(1, -2, -1)$ along $\vec{a} = 2\hat{i} - \hat{j} - 2\hat{k}$ (07 Marks)
- b. Find curl \vec{f} given that $\vec{f} = xyz^2\hat{i} + xy^2z\hat{j} + x^2yz\hat{k}$. (06 Marks)
- c. If $\vec{f} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ and $\vec{g} = yz\hat{i} + zx\hat{j} + xy\hat{k}$. Show that $\vec{f} \times \vec{g}$ is a solenoidal vector. (07 Marks)

Module-4

- 7 a. Obtain the reduction formula, $I_n = \int \cos^n x dx$, where n is a positive integer. (07 Marks)
- b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z) dx dy dz$. (07 Marks)

OR

- 8 a. Evaluate : $\int_0^{\pi/6} \sin^6(3x) dx$. (07 Marks)
- b. Evaluate : $\int_0^{\pi} x \sin^4 x \cos^6 x dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^y xyz dx dy dz$. (07 Marks)

Module-5

- 9 a. Solve : $(2x + y + 1) dx + (x + 2y + 1) dy = 0$. (07 Marks)
- b. Solve : $(4xy + 3y^2 - x) dx + (x^2 + 2xy) dy = 0$. (06 Marks)
- c. Solve : $y(2xy + e^x) dx - e^x dy = 0$. (07 Marks)

OR

- 10 a. Solve : $(5x^4 + 3x^2y^2 - 2xy^3) dx + (2x^3y - 3x^2y^2 - 5y^4) dy = 0$. (07 Marks)
- b. Solve : $y(2xy + 1) dx - x dy = 0$. (06 Marks)
- c. Solve : $\frac{dy}{dx} + y \cot x = \cos x$. (07 Marks)

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CBCS SCHEME

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18ME32

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Mechanics of Materials

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define i) Poisson's ratio ii) Stress iii) Percentage Reduction in area iv) Toughness. (04 Marks)
- b. Derive the relationship between Modulus of Rigidity and Modulus of elasticity. (06 Marks)
- c. A stepped bar is subjected to an external loading as shown in Fig. Q1(c). Calculate the change in the length of bar. Take $E = 200\text{GPa}$ for steel, $E = 70\text{GPa}$ for Aluminum and $E = 100\text{GPa}$ for copper. (10 Marks)

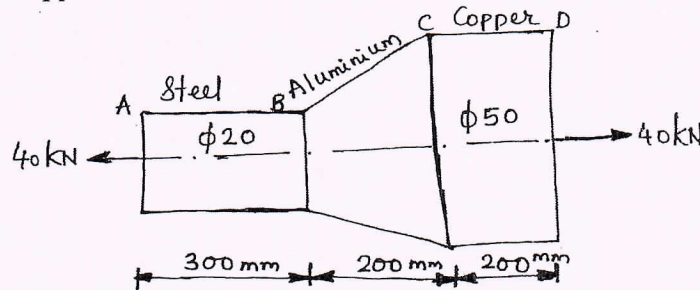


Fig. Q1(c)

OR

- 2 a. Draw Stress – Strain diagram for mild steel subjected to tension and indicate salient points on the diagram. (06 Marks)
- b. A composite section comprises of a steel tube 10cm internal diameter and 12cm external diameter fitted inside a brass tube of 14cm internal diameter and 16cm external diameter. The assembly is subjected to a compressive load of 500kN. Find the load carried by each tube and change in the length of tubes. The length of tube is 150cm. Take $E_s = 200\text{GPa}$ and $E_b = 100\text{GPa}$. (08 Marks)
- c. The bronze bar 3m long with 320mm^2 cross sectional area is placed between two rigid walls. At -20°C there is a gap $\Delta = 2.5\text{mm}$ as shown in Fig. Q2(c). Find the magnitude and the type of stress induced in the bar when it is heated to a temperature 60°C . Take $E = 80\text{GPa}$ and $\alpha_B = 18 \times 10^{-6}/^\circ\text{C}$. (06 Marks)

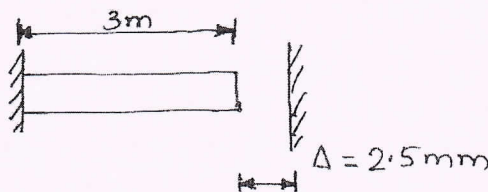


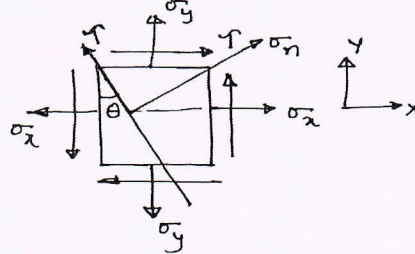
Fig. Q2(c)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-2

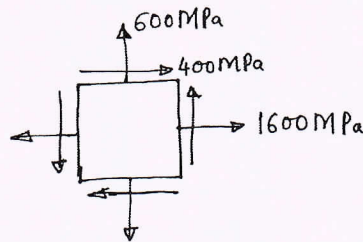
- 3 a. Derive the expression for normal stress and tangential stress on a plane inclined at θ° to the vertical axis in a biaxial stress system with shear stress as shown in Fig.Q3(a). Also find Resultant stress and Angle of Obliquity. **(10 Marks)**

Fig. Q3(a)



- b. The state of stress at a point in a strained material as shown in Fig. Q3(b). Determine
- The principal stresses and principal planes.
 - Maximum shear stress and plane on which it is acting. Also find the normal stress on the maximum shear plane.
 - Sketch the element aligned with planes of principal stresses and planes of maximum shear.
- (10 Marks)**

Fig. Q3(b)



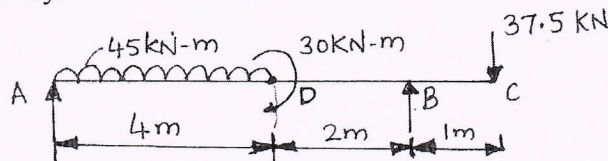
OR

- 4 a. A thin cylinder of 75mm internal diameter and 250mm long has 2.5mm thick walls. The cylinder is subjected to an internal pressure of 7MN/m^2 . Determine the change in internal diameter and change in length and change in volume of cylinder. Also compute the Hoop stress and Longitudinal stress and maximum shear stress. Take $E = 200\text{GPa}$ and $\mu = 0.3$. **(10 Marks)**
- b. A thick cylinder with internal diameter 80mm and external diameter 120mm is subjected to an external pressure of 40kN/m^2 , when the internal pressure is 120kN/m^2 . Calculate the circumferential stress at external and internal surfaces of the cylinder. Plot the variation of circumferential stress and radial pressure on the thickness of the cylinder. **(10 Marks)**

Module-3

- 5 Draw Shear force and Bending moment diagrams for the beam shown in Fig. Q5. Locate the point of contra flexure if any. **(20 Marks)**

Fig. Q5

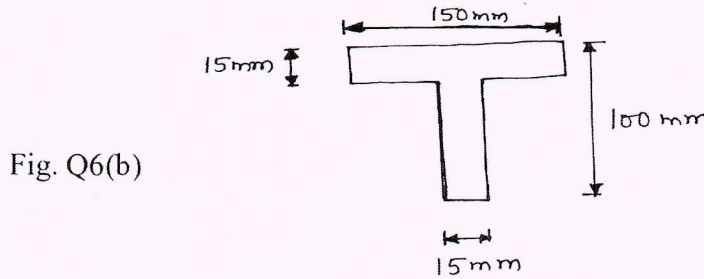


OR

- 6 a. A simply supported of beam span 5m has a cross section of $150\text{mm} \times 250\text{mm}$. If the permissible stress is 20N/mm^2 . Find
- Maximum intensity of uniformly distributed load it can carry.
 - Maximum concentrated load P applied at 2m from one end it can carry.
- (10 Marks)**

18ME32

- b. The cross section of a beam is a T section (Fig. Q6(b)) 150mm × 100mm × 15mm with 150mm horizontal. Find the maximum intensity of shear stress and sketch the shear stress distribution across the section if it has to resist a shear force of 90kN. (10 Marks)



Module-4

- 7 a. Derive the torsional equation for a circular shaft with usual notations. State the assumptions made. (10 Marks)
 b. A solid circular shaft is subjected to a bending moment of 10kN-m and a torque of 15kN-m. The yield stress of the material in simple tension is 250MPa and $E = 200\text{GPa}$. If factor of safety is 3. Determine the maximum diameter of the shaft using Maximum Principal Stress theory and Maximum Shear Stress theory. (10 Marks)

OR

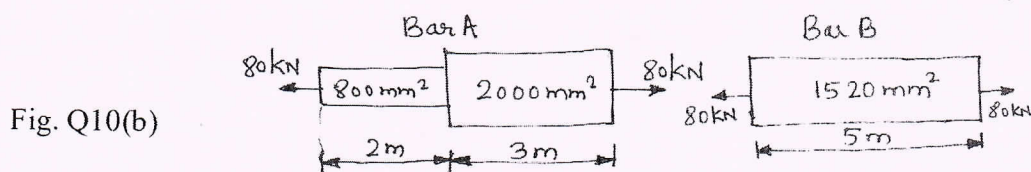
- 8 a. Write a note on :
 i) Maximum Principal Stress theory ii) Maximum Shear Stress theory. (08 Marks)
 b. A solid circular shaft is required to transmit 300kW at 120 rpm. The shear stress in the material is not to exceed 80N/mm^2 . Find the diameter required. If the shaft is replaced by a hollow one whose internal diameter is 0.6 times its external diameter. The length material and maximum shear stress being same. Calculate the percentage saving in weight, that could be obtained. (12 Marks)

Module-5

- 9 a. Explain Castigliano's theorem I with its applications and Castigliano's theorem II. (10 Marks)
 b. A hollow cast iron column whose outside diameter is 200mm and thickness of 20mm is 4.5m long and is fixed at both ends. Calculate the safe load by Rankine formula using factor of safety 2.5. Find the ratio of Euler's to Rankine's loads. Take $E = 1 \times 10^5\text{N/mm}^2$ and Rankine constant = $\frac{1}{1600}$ for both ends fixed and $\sigma_c = 550\text{N/mm}^2$. (10 Marks)

OR

- 10 a. Derive an expression for a critical load in a column subjected to compressive load. When one end is fixed and other end is free. (10 Marks)
 b. Calculate the strain energy stored in a bar shown in Fig. Q10(b), subjected to a gradually applied axial load of 80kN. Compare this value with what obtained in uniform bar of same length and having the same volume, when subjected to the same load. $E = 2 \times 10^5\text{N/mm}^2$. (10 Marks)



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18ME33

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Basic Thermodynamics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Use of thermodynamics charts and tables are permitted.*

Module-1

- 1 a. Distinguish between:
 (i) Macroscopic and microscopic approaches (10 Marks)
 (ii) Intensive and extensive properties
- b. Define the following terms:
 (i) System (ii) State (iii) Property
 (iv) Quasi-static process (v) Thermodynamic cycle (10 Marks)

OR

- 2 a. Define Thermodynamic Equilibrium. Also explain Mechanical, Chemical and Thermal equilibrium. (10 Marks)
 b. A constant volume gas thermometer containing helium gives readings of gas pressure 'P' as 1000 and 1366 mm of mercury at ice point and steam point respectively. Assuming a linear relationship of the form $t = a + bP$, express the gas thermometer celsius temperature 't' in terms of gas pressure P. What is the temperature recorded by the thermometer, when it registers a pressure of 1074 mm of mercury? (10 Marks)

Module-2

- 3 a. Compare work and heat. (10 Marks)
 b. A fluid contained in a horizontal cylinder fitted with a frictionless leak proof piston is continuously agitated by a stirrer passing through the cylinder cover. The diameter of the cylinder is 40 cm and piston is held against the fluid due to atmospheric pressure equal to 100 kPa. The stirrer turns 7000 revolutions with an average torque of 1 Nm. If the piston slowly moves outwards by 50 cm determine the network transfer to the system. (10 Marks)

OR

- 4 a. With a neat diagram, explain Joule's experiments. Also state the first law of thermodynamics. (10 Marks)
 b. A centrifugal compressor delivers 20 kg/min of air. Air enters the compressor of 5 m/s, 100 kPa and leaves at 9 m/s, 600 kPa. Heat lost to the surroundings during this process is 10 kJ/s. If the increase in enthalpy of the fluid is 180 kJ/kg and inlet and outlet specific volume of air are $0.5 \text{ m}^3/\text{kg}$ and $0.16 \text{ m}^3/\text{kg}$ respectively, determine the power of the motor to drive the compressor. Also calculate the ratio of inlet pipe diameter to the outlet pipe diameter. Assume zero elevation difference. (10 Marks)

Module-3

- 5 a. Describe the limitations of first law of thermodynamics. Also explain Kelvin-Planck and Clausius statements of second law of thermodynamics with representative diagrams. (10 Marks)

- b. Two Carnot engines A and B are connected in series between two thermal reservoirs maintained at 1000 K and 100 K respectively. Engine A receives 1680 kJ of heat from high temperature reservoir and rejects heat to the Carnot engine B. Engine B takes in heat rejected by engine A and reject heat to the low temperature reservoir. If engines A and B have equal thermal efficiencies, determine:
- The heat rejected by engine B.
 - Temperature at which heat is rejected by engine A.
 - Work done by engine A and B.
- (10 Marks)

OR

- 6 a. Define entropy and explain the principle of increase of entropy. (10 Marks)
- b. A closed system contains air at pressure 1 bar, temperature 290 K and volume 0.02 m^3 . This system undergoes a thermodynamic cycle consisting of the following three process:
Process 1-2: Constant volume heat addition till pressure becomes 4 bar.
Process 2-3: constant pressure cooling.
Process 3-1: Isothermal heating to initial state. Evaluate the change in entropy for each process. Take $C_v = 0.718 \text{ kJ/kgK}$, $R = 287 \text{ J/kgK}$. Also represent the cycle on T-S and P-V plot. (10 Marks)

Module-4

- 7 a. Explain the concept of availability and unavailable energy by deducing suitable relevant equation. (10 Marks)
- b. Superheated steam at 40 bar and 300°C expands to 4 bar and 0.97 dry in a turbine. Determine: (i) Availability (ii) Actual work done (iii) Loss in availability. Assume $t_0 = 28^\circ\text{C}$. (10 Marks)

OR

- 8 a. Draw and explain the salient features of P-T diagram with water as an example. (08 Marks)
- b. The following data were obtained with a separating and throttling calorimeter pressure in steam main = 15 bar, mass of water drained from the separator = 0.55 kg. Mass of steam condensed after passing through the throttle valve = 4.20 kg. Pressure and temperature after throttling is 1 bar and 120°C . Evaluate the dryness fraction of steam in the main. (12 Marks)

Module-5

- 9 a. Define and explain Dalton's law of partial pressures and Amagat's law of additive volumes. (10 Marks)
- b. It is required to evacuate hydrogen gas from a 8 m^3 capacity tank form atmospheric pressure of 101.325 kPa to a pressure of 98.125 kPa vacuum at 400 K. Determine the mass of Hydrogen pumped out and pressure in kPa if the temperature of hydrogen left in the tank falls to 290 K. (10 Marks)

OR

- 10 a. Define and explain: (i) Dew Point temperature (ii) Relative humidity (iii) Humidity ratio (iv) Wet Bulb temperature (v) Degree of saturation (10 Marks)
- b. One kg of carbon monoxide has a volume of 2 m^3 at 80°C . Determine its pressure using: (i) Ideal gas equation (ii) Vander Waal's equation
Constants for Vander Waal's equations:
 $a = 147.90 \text{ kN-m}^4/(\text{kgmol})^2$ and $b = 0.0393 \text{ m}^3/\text{kgmol}$. (10 Marks)

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CBCS SCHEME

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18ME34

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Material Science

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. State and explain Fick's laws of diffusion. (08 Marks)
 b. Sketch and explain Edge dislocations. (04 Marks)
 c. Distinguish between SC, BCC, FCC and HCP with respect to structure, number of atoms, Lattice constant, coordination number and APF. (08 Marks)

OR

- 2 a. Draw stress-strain diagram of Ductile material and explain plastic properties. (08 Marks)
 b. Derive expressions showing relationship between True Stress versus Engineering Stress and True Strain versus Engineering Strain. (08 Marks)
 c. Sketch and explain plastic deformation by Twinning. (04 Marks)

Module-2

- 3 a. What is fatigue? Sketch and explain R.R. MOORE fatigue testing showing S-N curves. (08 Marks)
 b. What is Creep? Explain the stages of creep using creep curve. (08 Marks)
 c. Explain the application of Gibb's phase rule using binary phase diagram. (04 Marks)

OR

- 4 a. Draw Iron-Cementite diagram. Indicate phases, critical temperatures and explain invariant reactions. (12 Marks)
 b. Briefly explain the effect of alloying elements on Iron-Carbon diagram. (04 Marks)
 c. What is Solidification? Explain the mechanism of Solidification. (04 Marks)

Module-3

- 5 a. What is heat treatment? Mention the classification. (06 Marks)
 b. Sketch and explain TTT diagram. (06 Marks)
 c. Differentiate between hardness and hardenability. Sketch and explain 'JOMINY END QUENCH' test to determine hardenability. (08 Marks)

OR

- 6 a. Sketch and explain Annealing heat treatment process. (06 Marks)
 b. What is Age hardening? Explain the Age hardening of Al-Cu alloys using phase diagram. (06 Marks)
 c. Explain the composition, properties and applications of Gray Cast Iron, White Cast Iron, Malleable iron and S.G. Iron. (08 Marks)

Module-4

- 7 a. What are composites? How do you classify them? (06 Marks)
 b. Sketch and explain the fabrication of MMC's using stir casting process. (08 Marks)
 c. Explain the functions of matrix and reinforcement. (06 Marks)

OR

- 8** a. Derive an expression for Elastic modulus of the composite under iso-strain condition. (06 Marks)
b. List advantages, disadvantages and applications of composite materials. (08 Marks)
c. Sketch and explain the fabrication of CMC's using "slurry infiltration process". (06 Marks)

Module-5

- 9** a. Briefly explain Thermoplastics, Thermosets and Elastomers. (06 Marks)
b. Sketch and explain the processing of plastics by "injection molding". (08 Marks)
c. What are ceramics? Mention the classification. (06 Marks)

OR

- 10** a. Briefly explain optical and thermal materials. (06 Marks)
b. What are smart materials? Explain briefly the types of smart materials. (08 Marks)
c. Write a brief note on Non-Destructive methods used for residual life assessment. (06 Marks)

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CBCS SCHEME

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18ME35A/18MEA305

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Metal Cutting and Forming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are the difference between orthogonal cutting and oblique cutting? (06 Marks)
- b. Briefly explain the mechanism and types of chip formation. (08 Marks)
- c. Draw Mechant's circle diagram and state the assumptions made in establishing the relationship among the various forces. (06 Marks)

OR

- 2 a. Differentiate between Capston and Turret lattice. (06 Marks)
- b. Draw the tool layout for producing a hexagonal headed bolt or a caster lathe from a hexagonal bar stock. Assume the dimensions. (08 Marks)
- c. List and explain the various operations carried out on lattice machine. (06 Marks)

Module-2

- 3 a. Define Milling. Explain with a neat sketch vertical milling machine. (10 Marks)
- b. Define Drilling. With a neat sketch explain a radial drilling machine. (10 Marks)

OR

- 4 a. Sketch and explain the fundamental parts of a horizontal shaping machine. (10 Marks)
- b. With a neat sketch, explain the centerless grinding machine. (10 Marks)

Module-3

- 5 a. Define load wear. Explain creator wear and flank wear. (06 Marks)
- b. Write a note on functions and types of cutting fluids used in metal cutting. (06 Marks)
- c. Define tool life and explain the factors which affect the tool of life. (08 Marks)

OR

- 6 a. Which are the different forms of wear on the cutting edge of a tool? With suitable sketch explain. (08 Marks)
- b. Explain the choice of cutting speed a feed. (06 Marks)
- c. Explain the critical cutting parameters which affect the tool life. (06 Marks)

Module-4

- 7 a. What is forging? Explain working of board hammer with sketch. (10 Marks)
- b. With a neat sketch explain the classification of metal working process on the basis of force applied. (10 Marks)

OR

- 8 a. With a neat sketch, explain different types of rolling mill arrangement. (10 Marks)
- b. With a neat sketch, explain the wire drawing process. (10 Marks)

Module-5

- 9 a. How sheet metal operations are classified? Explain with a neat sketch. (10 Marks)
- b. What do you mean by dies? Write a note on : i) Progressive dies ii) Combination dies. (10 Marks)

OR

- 10 a. With a neat sketch, explain V-bending and edge bending operations. (10 Marks)
- b. With a neat sketch, explain the parts of open back inclinable press. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

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18ME36B/18MEB306

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define metrology and explain its significance in engineering. (06 Marks)
 b. Explain with neat sketches:
 i) Imperial standard yard
 ii) International prototype meter. (10 Marks)
 c. State the differences between line standards and end standards. (04 Marks)

OR

- 2 a. Describe with a neat sketch wringing phenomena of slip gauges. (06 Marks)
 b. Build up a length of 35.4875 using M112 set, using two protector slips of 2.5mm each. (08 Marks)
 c. Explain the principle of autocollimator with a neat diagram. (06 Marks)

Module-2

- 3 a. Briefly explain limits, fits and tolerances. (06 Marks)
 b. Differentiate between :
 i) Interchangeability
 ii) Selective assembly (04 Marks)
 c. Determine the tolerances on the hole and the shaft for a precision running fit designated by 50H7/96. Given:
 i) 50mm lies between 30-50mm
 ii) $i = 0.45 \sqrt[3]{D} + 0.001D$
 iii) Fundamental deviation for shaft = $-2.5D^{0.34}$
 iv) $IT7 = 16i$ and $IT6 = 10i$
 State the actual maximum and minimum sizes of the hole and shaft and maximum and minimum clearance. (10 Marks)

OR

- 4 a. Explain with a neat sketch the construction and working of Johnson Mikrokator comparator. (10 Marks)
 b. Explain with a neat sketch the construction and working of solex pneumatic comparator. (10 Marks)

Module-3

- 5 a. Derive an expression for the effective diameter of a screw thread by 3-wire method. (10 Marks)
 b. Explain with a neat sketch the measurement of major diameter and minor diameter of an Internal thread. (10 Marks)

OR

- 6 a. With a neat sketch, explain the construction of a tool maker's microscope. What are its applications? (10 Marks)
b. Describe a gear tooth vernier calipers and show how this is used for checking gears. (10 Marks)

Module-4

- 7 a. Describe the 3 stages of measurements with an example. (10 Marks)
b. Elaborate the significance of the following terms used with reference to measurement:
i) Accuracy ii) Precision iii) Repeatability iv) Hysteresis v) Threshold (10 Marks)

OR

- 8 a. Distinguish between:
i) Primary and secondary transducer
ii) Active and passive transducer. (06 Marks)
b. With a block diagram explain telemetry. (06 Marks)
c. With a neat sketch, explain the construction and parts of a cathode ray oscilloscope. (08 Marks)

Module-5

- 9 a. Sketch and explain the analytical balance (Equal arm balance). (10 Marks)
b. Explain how the torque is measured using prony brake dynamometer. (10 Marks)

OR

- 10 a. Explain the construction and working of optical pyrometer. (10 Marks)
b. What is thermocouple? State the laws of thermocouple. (10 Marks)

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USN

Question Paper Version : D

Third/Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Constitution of India, Professional Ethics and Cyber Law

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners on the OMR sheets** are strictly prohibited.

1. Who of the following acted as the Constitutional Advisor of the Constituent Assembly
 - a) Dr. B.R. Ambedkar
 - b) Dr. Babu Rajendra Prasad
 - c) B.N. Rao
 - d) Dr. Sachidanand Sinha
2. Which one of the following provisions of the Constitution came into force soon after its adoption on 26th November 1949?
 - a) Provision relating to Citizenship
 - b) Elections
 - c) Provisional Parliament
 - d) All the above
3. The three types of Justice referred in our Preamble are
 - a) Social, Economic and Social
 - b) Economic, International and Political
 - c) Economic, Religious and Social
 - d) Religious, Social and Political
4. What was the exact Constitutional status of the Indian Republic on January 26, 1950, when the Constitution was inaugurated?
 - a) A Democratic Republic
 - b) Sovereign Democratic Republic
 - c) A Sovereign Secular Democratic Republic
 - d) A Sovereign Socialist Secular Democratic Republic.
5. Right to against Exploitation seeks to protect the weaker sections of Society by
 - a) Giving equal pay for equal work for men and women.
 - b) Prohibiting human trafficking and beggar
 - c) Providing compulsory education for children below the age of 14 years
 - d) Forcing a person to work against his will without payment
6. Which one of the following Directive principles can be described as Gandhian in nature?
 - a) Providing equal pay for equal work for both Men and Women
 - b) Workers Participation in Management
 - c) Organization of Village Panchayats as units of self-Government
 - d) Separation of Judiciary from the Executive.
7. Who has been vested with the power to decide whether the restrictions imposed on the Fundamental Rights of Indian Citizen are reasonable or not
 - a) The Parliament
 - b) The President
 - c) The Courts
 - d) None of the above
8. Which one of the following rights conferred by the Constitution is also available to Noncitizens.
 - a) Freedom of speech assembly and association
 - b) Freedom to move, reside and settle in any part of the territory of India
 - c) Freedom to acquire property or to carry on any occupation, trade or business
 - d) Right to Constitutional remedies.
9. Which one of the following has been wrongly listed as a special feature of Fundamental Rights in India
 - a) Fundamental Rights are more sacrosanct than rights granted by ordinary laws
 - b) Fundamental Rights are subject to reasonable restrictions
 - c) Fundamental Rights are Justifiable and can be enforced through the Supreme Court
 - d) None of these.
10. The main objective of the Cultural and Educational Rights granted to the Citizen is
 - a) To preserve the rich culture heritage of India.
 - b) To evolve a single integrated India culture.
 - c) To help the minorities to conserve their culture.
 - d) All the above.
11. The Chief Election Commissioner can be removed from his office before the expiry of term by the
 - a) Chief Justice of India
 - b) Prime Minister on the recommendation of Cabinet
 - c) President on the recommendation of Parliament after the impeachment
 - d) President on the advice of Chief Justice of India.
12. The quorum of minimum number of members required to hold the meetings of either Houses of Parliament is
 - a) One - tenth
 - b) One - fifth
 - c) One - third
 - d) 72 hours
13. The Advice of the Supreme Court is
 - a) Binding of the President
 - b) Binding on the President if it is rendered unanimously
 - c) Not binding on the President
 - d) Binding in certain cases and not binding in other cases
14. The Governor reserves the right to issue ordinances
 - a) When the State Legislature is not in session and he feels that there is an immediate need of action
 - b) Whenever the State is under President's Rule
 - c) Whenever he likes
 - d) None of these
15. The Writ of Certiorari is issued by a Superior Court
 - a) To an Inferior Court to stop further proceedings in a particular case
 - b) To an Inferior Court to transfer the record of proceedings in a case for its review
 - c) To an Office to show his right to hold a particular Office
 - d) To a Public authority to produce a person detained by it before the Court within 24 hours.

16. Which one of the following was wrongly listed as a duty of Indian Citizens
- To uphold and protect the Sovereign unity and integrity of the Country
 - To promote harmony and the spirit of common brotherhood among the people of India
 - To protect and preserve the natural Environment
 - To practice Family planning and control population.
17. The Directive Principles Ann at
- Ensuring Individual liberty
 - Ensuring strengthening of the Country's Independence
 - Providing a social and economic base for a genuine democracy in the Country.
 - Achieving all the above objectives.
18. The Directive Principles are the
- Positive instructions to the Government to refrain from encroaching on the freedom of the people
 - Negative injunctions to the Government to refrain from encroaching on the freedom of the people
 - Directive to the State to enhance the International prestige of the Country
 - Directives to the Government to pursue a policy of non alignment.
19. Which one of the following has been wrongly listed as Directive Principle based on 'Liberal Principles'?
- Separation of Judiciary and Executive
 - Provision of a Uniform Civil code for the Country
 - Protection of monuments and places of artistic or Historical importance
 - None of the above has been wrongly listed.
20. The Constitution has vested the Executive power of the Union Government in
- The President of India
 - The Prime Minister
 - The Council of Minister
 - All the above
21. Impeachment proceedings can be initiated against the President in either House of Parliament only if a resolution signed by members of the house is moved.
- 10 percent of total
 - 25 percent of total
 - 20 percent of total
 - 15 percent of total
22. Which one of the following functions of Prime – Minister has been wrongly listed?
- He presides over the meeting of the Cabinet
 - He prepares the agenda for the meeting of the Cabinet.
 - He coordinates the working of various department
 - He chairs the meeting of the various standing and ad-hoc committees of Parliament.
23. A motion of no – confidence against the Council Ministers can be moved in the Lok – Sabha, if it is supported by atleast
- 50 members
 - 55 members
 - 100 members.
 - One – third of the total members of Lok - Sabha
24. The President can call a Joint session of the two Houses of Parliament
- If a bill passed by one house is rejected by the other
 - If the amendment proposed to the bill by one house is not acceptable to the other house.
 - If the house does not take any action for six months on a bill remitted by the other house.
 - Under all the above conditions.

25. The Members of the Rajya – Sabha except the nominated ones are
- Directly elected by the people
 - Elected by local Self – Governing bodies
 - Elected by the Legislative Assemblies of the States.
 - Elected partially by Legislative Assemblies and partially by the Local Self Governing bodies.
26. The President who is the head of the State under the Parliamentary system prevailing in India
- Enjoys absolute powers
 - Enjoys limited but real powers
 - Enjoys only nominal powers
 - Enjoys no powers
27. The Vice – President is the Ex – Office Chairman of
- The Rajya Sabha
 - The National Development Council
 - The Planning Commission
 - None of the above
28. The Speaker of the Lok – Sabha is:
- Appointed by the President.
 - Appointed by the President on the recommendations of the P.M.
 - Elected by the members of the two houses at a joint sitting.
 - Elected by the members of the Lok – Sabha.
29. The Rajya – Sabha is a permanent House but
- One – third of its members retire every two years
 - One – half of its members retire every three years
 - One – fifth of its members retire every year
 - One – half of its member retire every two years.
30. The power to control the Expenditure of the Government of India rests exclusively with
- The Parliament
 - The President
 - The Comptroller and Auditor General
 - The Union Finance Minister
31. Cooking Means
- Boiling under pressure
 - Retaining results which fit theory.
 - Making deceptive statements
 - Misleading the Public about quality of the product.
32. Which one is not a Trade Secret?
- Theorem
 - Equipment
 - Formulae
 - Patent
33. The codes of Ethics can be taken as guidelines by the Engineers to
- Resolve the conflicts
 - Formulate problems
 - Overcome the work pressure
 - Escape from the responsibility
34. A Fault tree is used to
- Assess the risk involved
 - Claim compensation
 - Take free consent
 - Improve safety
35. Risk of harm equal to probability of producing benefit is
- Inevitable Risk
 - Acceptable Risk
 - Risk which cannot be avoided
 - None of these

36. One of the Aims of studying Engineering Ethics is to
 a) Inspire Engineers to acquire in depth knowledge in their field
 b) Acquire new skills in Engineering testing.
 c) Stimulate moral imaginations
 d) Make Engineers self – confident in discharging their duties.
37. Which one is not an impediment to responsibility?
 a) Group think
 b) Microscopic vision
 c) Trademark
 d) Egocentric tendencies
38. Being safe or blaming others is type of attitude of responsibility of Engineers
 a) Minimalist
 b) Reasonable care
 c) Good works
 d) None of these
39. To overcome an impediment 'Uncritical Acceptance', what step an Engineer has to take?
 a) Accept and Analyse
 b) Analyse and Accept
 c) Always say Yes Boss
 d) None of these
40. Engineering Ethics .
 a) Stimulates the moral imagination
 b) Provides up – to – date knowledge in the field of Engineering.
 c) Stimulates to Conduct Research
 d) Stresses on Time Management.
41. For hacking a database or accessing and manipulating data which of the following language the hacker must know?
 a) SQL
 b) HTML
 c) TCL
 d) F#
42. _____ are piece of programs or scripts that allow hackers to take control over any system.
 a) Exploits
 b) Antivirus
 c) Firewall bypassers
 d) Worms
43. The process of finding vulnerabilities and exploiting them using exploitable scripts or programs are known as
 a) Infiltrating
 b) Exploitation
 c) Cracking
 d) Hacking
44. How many types of exploits are there based on their nature from hackers perspective?
 a) 04
 b) 03
 c) 02
 d) 05
45. A _____ is a set of changes done to any program or its associated data designed for updating fixing or improving it.
 a) Scratch
 b) Patch
 c) Fixer
 d) Resolver
46. Fixing of security vulnerabilities in a system by additional programs is known as
 a) Hacking patches
 b) Database
 c) Server
 d) Security
47. _____ are some very frequent updates that come for every antivirus.
 a) Patch update
 b) Data update
 c) Code update
 d) Definition update
48. Cyber – Crime can be categorized into _____ types.
 a) 04
 b) 03
 c) 02
 d) 06
49. Which of the following is not a type of peer to peer cyber – crime.
 a) Phishing
 b) Injecting Trojans to a target victim
 c) MITM
 d) Credit card details leak in deep web
50. In which year India's IT Act came into existence?
 a) 2000
 b) 2001
 c) 2002
 d) 2003
51. The Constitution of India was enacted by a Constituent Assembly set up
 a) Under the Cabinet Mission Plan 1946
 b) Under the Indian Independence Act 1947
 c) Under a resolution of the Provisional Government.
 d) By the Indian National Congress.
52. The Members of the Constituent Assembly are
 a) Directly elected by the people
 b) Nominated by various Political Parties
 c) Nominated by rulers of the Indian States
 d) Elected by the Provincial Assemblies
53. The Federal feature of the Indian Constitution provides for
 a) Distribution of Legislative powers between the Union Government and the State Government.
 b) Division of powers between the Executive and Judiciary.
 c) Distribution of powers between the P.M and Cabinet.
 d) None of these
54. The Governor of State is
 a) Directly elected by the people
 b) Elected by the State Legislature
 c) Appointed by the President
 d) Nominated by the Parliament.
55. The source of Authority of the Indian Constitution is
 a) The Government of India
 b) The People of India
 c) The President
 d) The Parliament
56. The Preamble was Amended by
 a) 24th Amendment
 b) 42nd Amendment
 c) 39th Amendment
 d) None of the above
57. Fraternity means
 a) Spirit of brotherhood
 b) Fatherly treatment
 c) Unity and integrity
 d) Elimination of Economic Justice
58. In the final form of the Constitution adopted by the Constituent Assembly, how many Articles and Schedules were there?
 a) 397 Articles and 7 Schedules
 b) 395 Articles and 4 Schedules
 c) 400 Articles and 10 Schedules
 d) 395 Articles and 8 Schedules
59. The Preamble of the Indian Constitution does not contain concept of
 a) Democratic
 b) Adult Franchise
 c) Sovereignty
 d) Fraternity
60. The strength of the Constituent Assembly, after the withdrawal of the Muslim League, was reduced to
 a) 299 members
 b) 329 member
 c) 331 members
 d) 359 members
61. The Fundamental Rights of a Citizen can be suspended
 a) By the Parliament through a Law enacted by two – third majority
 b) By the President during a National emergency
 c) By the Supreme Court
 d) None of these

62. Which authority can a Citizen approach for securing right of Personal freedom
 a) The Parliament
 b) The President
 c) Supreme Court alone
 d) Both Supreme Court and High Court
63. The main objective of the Fundamental Rights is to
 a) Ensure Independence of Judiciary
 b) Promote a Socialist Pattern of Society
 c) Ensure Individual liberty
 d) Ensure all the above
64. Under which section of II Act, stealing any digital asset or information is written a cyber crime
 a) 65
 b) 65 - D
 c) 67
 d) 70
65. Fundamental duties of the Indian Citizen, were
 a) Enshrined in the original Constitution
 b) Added to the Constitution by the 42nd Amendment
 c) Added to the Constitution by the 44th Amendment
 d) Added to the Constitution in the wake the Supreme Court Judgment Kesavananda Bharti case with consent of all the Political parties.
66. Which one of the following Fundamental Right has been subject of maximum litigation since the inauguration of the Constitution?
 a) Right to Freedom of speech
 b) Right to Constitutional remedies
 c) Right to property
 d) Right against exploitation
67. The Fundamental Rights of Citizens were
 a) Incorporated in the original Constitution
 b) Outlined in an Act of Parliament in 1952
 c) Incorporated by the 42nd Amendment
 d) Incorporated by the 44th Amendment
68. The Fundamental Rights of Indian Citizen have been criticized on the ground that
 a) They are hemmed in by too many restrictions.
 b) They are couched in language beyond the comprehension of ordinary citizen
 c) They are absolute
 d) Both (a) and (b).
69. Respite means
 a) Death due to drowning
 b) Awarding lesser punishment
 c) Death due to strangulation
 d) Painless death
70. The Governor recommends the imposition of President's rule in the State
 a) On the recommendation of the State Legislature
 b) On the recommendation of the C.M.
 c) On the recommendation of Council of Minister
 d) If he is satisfied that the State Government cannot be carried on his accordance with the provision of the Constitution.
71. Which one of the following does not take part in the Election of the President?
 a) Elected members of Lok - Sabha
 b) Elected members of Rajya - Sabha
 c) Members of the Legislative Council
 d) None of these
72. The President can be removed by impeachment procedure on the ground of violating the Constitution by
 a) The Supreme Court
 b) The Lok - Sabha only
 c) Both Houses of Parliament
 d) The High Court

73. The Vice - President of India is elected by the
 a) People
 b) Members of State - Legislative Assembly
 c) Members of the Rajya - Sabha
 d) Members of both the Houses of Parliament at Joint sitting.
74. Who discharges the duties of the President in the event of President and Vice - President being not available?
 a) The Prime Minister
 b) The Chief Justice of India
 c) The Speaker of Lok - Sabha
 d) The Attorney General of India
75. Which one of the following can the President of India declare?
 a) Emergency due to threat of War, external aggression or armed rebellion
 b) Emergency due to breakdown of constitutional machinery in the State
 c) Financial emergency on account of threat to the financial credit of India
 d) All the above.
76. Which budget is placed first in the Parliament House
 a) Railway
 b) General budget
 c) Financial
 d) Vote of credit
77. The President can make Laws through ordinances
 a) During the recess of the Parliament
 b) On certain subjects even when Parliament is in session
 c) Only on subjects contained in the concurrent list
 d) Under no circumstances.
78. The President can grant pardon in
 a) All cases of punishment by Court martial
 b) All offences against laws in the Union and Concurrent list
 c) All cases involving death sentence
 d) All the above cases
79. If State fails to comply with the directives of the Central Government, the President can
 a) Declare break - down of Constitutional machinery in the State and assume responsibility for its governance
 b) Send reserve police force to secure compliance with directions
 c) Dissolve the State legislature and order fresh elections
 d) Can do either (a) or (b)
80. Which one of the following has been wrongly listed as Judicial power of the President of India?
 a) He appoints the Chief Justice and other Judges of the Supreme Court
 b) He can grant pardon, reprieve and respite to a person awarded punishment
 c) He can consult the Supreme Court on any question of law or fact.
 d) He can remove the Judges of Supreme - Court on ground of misconduct.
81. Who decides disputes regarding disqualification of Members of Parliament?
 a) The President
 b) The Concerned house
 c) The Election Commission.
 d) The President in consultation with the Election Commission.

82. Who presides over the Lok – Sabha if neither the Speaker nor the Deputy Speaker is not available?
 a) A member nominated by the President.
 b) A member chosen by the Council of Minister.
 c) A member of the panel of Chairman announced by the Speaker.
 d) The Senior most member of the Lok – Sabha.
83. Lok – Sabha is superior to the Rajya – Sabha because
 a) It is directly elected
 b) It alone controls the Finances
 c) It can oust the Council of Minister through a Vote of no – Confidence
 d) of all the above reasons.
84. The Supreme Court of India was setup
 a) By the Constitution
 b) Under the Indian Independence Act 1947
 c) Through an Act of Parliament in 1950
 d) Under the Government of India Act 1935
85. The Judges of the Supreme Court are
 a) Elected by the Parliament.
 b) Appointed by the President on the advice of the Parliament.
 c) Appointed by the President on the advice of the P.M.
 d) Appointed by the President on the advice of the Chief Justice of India.
86. The Judges of the Supreme Court after retirement are not permitted to carry on practice before
 a) The Supreme Court
 b) The High Courts
 c) The District and Session Courts
 d) Any of the above
87. Which of the following Jurisdiction of the Supreme Court of India has been wrongly listed
 a) Original Jurisdiction
 b) Appellate Jurisdiction
 c) Advisory Jurisdiction
 d) None of the above
88. Generally, the Governor belongs to
 a) The State where he is posted
 b) Some other State
 c) The Indian Administrative Service
 d) None of the above
89. Which of the following Legislative Powers is employed by the Governor of a State?
 a) He can summon or prorogue the State Legislature
 b) He can appoint one sixth of the members of the Legislative Council.
 c) He can nominate certain member of the Anglo Indian Community to the Legislative Assembly.
 d) All of above powers.
90. Engineering Ethics is a
 a) Preventive Ethics
 b) Developing
 c) Natural Ethics
 d) Scientifically developed Ethics.
91. Professional Ethics is
 a) Set of Rules relating to personal character of Professionals
 b) Traditional Rules observed since a long time.
 c) Set of Rules passed by Professional bodies.
 d) Set of standards adopted by Professionals.
92. Tight couple means
 a) Binding two beams tightly
 b) Erecting two pillars side by side
 c) Process tightly coupled
 d) Strong adhesive material
93. An Engineer may not be held legally liable or causing harm. When the harm is caused
 a) Intentionally
 b) Ignorantly
 c) Negligently
 d) Recklessly
94. A compound measure of the probability and magnitude of the adverse effect is known as.
 a) Risk
 b) Benefit
 c) Compensation
 d) Both (b) and (c)
95. Engineers shall issue public statements only
 a) In subjective manner
 b) In objective manner
 c) On their personal responsibility
 d) Based on the reports sent by higher Officers.
96. Attackers commonly target _____ for fetching IP address of a target or victim user.
 a) Website
 b) Web pages
 c) IP tracker
 d) Emails
97. _____ is the first phase of Ethical hacking
 a) DNS Poisoning
 b) Foot printing
 c) ARP – Poisoning
 d) Enumeration
98. Which of the following do not comes under the intangible skills of hackers?
 a) Creative thinking
 b) Problem solving capability
 c) Persistence
 d) Smart attacking potential
99. Why programming language is important for ethical hackers and security professionals?
 a) Only to write malware.
 b) For solving problems and building tool and programs
 c) To teach programming
 d) To develop program to harm others.
100. Understanding of _____ is also important for gaining access to a system through networks.
 a) OS
 b) Email servers
 c) Networking
 d) Hardware

CBCS SCHEME

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18MAT31

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Transform Calculus, Fourier Series and Numerical
Techniques

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Evaluate (i) $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$ (ii) $L(t^2 e^{-3t} \sin 2t)$ (06 Marks)
- b. If $f(t) = \begin{cases} t, & 0 \leq t \leq a \\ 2a - t, & a \leq t \leq 2a \end{cases}$, $f(t + 2a) = f(t)$ then show that $L(f(t)) = \frac{1}{s^2} \tanh\left(\frac{as}{2}\right)$ (07 Marks)
- c. Solve by using Laplace Transforms
 $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$, $y(0) = 0$, $y'(0) = 0$ (07 Marks)

OR

- 2 a. Evaluate $L^{-1}\left(\frac{4s+5}{(s+1)^2(s+2)}\right)$ (06 Marks)
- b. Find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$ by using convolution theorem. (07 Marks)
- c. Express $f(t) = \begin{cases} \sin t, & 0 \leq t < \pi \\ \sin 2t, & \pi \leq t < 2\pi \\ \sin 3t, & t \geq 2\pi \end{cases}$
 in terms of unit step function and hence find its Laplace Transform. (07 Marks)

Module-2

- 3 a. Obtain fourier series for the function $f(x) = |x|$ in $(-\pi, \pi)$ (06 Marks)
- b. Expand $f(x) = \frac{(\pi-x)^2}{4}$ as a Fourier series in the interval $(0, 2\pi)$ and hence deduce that
 $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ (07 Marks)
- c. Express y as a Fourier series upto the second harmonic given :

x:	0	60	120	180	240	300
y:	4	3	2	4	5	6

(07 Marks)

OR

- 4 a. Find the Half-Range sine series of $\pi x - x^2$ in the interval $(0, \pi)$ (06 Marks)
- b. Obtain fourier expansion of the function $f(x) = 2x - x^2$ in the interval $(0, 3)$. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- c. Obtain the Fourier expansion of y upto the first harmonic given :

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(07 Marks)

Module-3

- 5 a. If $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$, find the Fourier transform of $f(x)$ and hence find the value of $\int_0^{\infty} \frac{\sin x}{x} dx$ (06 Marks)

- b. Find the infinite Fourier cosine transform of e^{-ax} . (07 Marks)

- c. Solve using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0, y_1 = 2$ (07 Marks)

OR

- 6 a. Find the fourier sine transform of $f(x) = e^{-|x|}$ and hence evaluate $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx ; m > 0$. (06 Marks)

- b. Obtain the z-transform of $\cos n\theta$ and $\sin n\theta$. (07 Marks)

- c. Find the inverse z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$ (07 Marks)

Module-4

- 7 a. Solve $\frac{dy}{dx} = x^3 + y$, $y(1) = 1$ using Taylor's series method considering up to fourth degree terms and find $y(1.1)$. (06 Marks)

- b. Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ compute $y(0.2)$ by taking $h = 0.2$ using Runge - Kutta method of fourth order. (07 Marks)

- c. If $\frac{dy}{dx} = 2e^x - y$, $y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040$ and $y(0.3) = 2.090$, find $y(0.4)$ correct to 4 decimal places using Adams-Bashforth method. (07 Marks)

OR

- 8 a. Use fourth order Runge-Kutta method, to find $y(0.8)$ with $h = 0.4$, given $\frac{dy}{dx} = \sqrt{x+y}$, $y(0.4) = 0.41$ (06 Marks)

- b. Use modified Euler's method to compute $y(20.2)$ and $y(20.4)$ given that $\frac{dy}{dx} = \log_{10} \left(\frac{x}{y} \right)$ with $y(20) = 5$ Taking $h = 0.2$. (07 Marks)

- c. Apply Milne's predictor-corrector formulae to compute $y(2.0)$ given $\frac{dy}{dx} = \frac{x+y}{2}$ with

x	0.0	0.5	1.0	1.5
y	2.000	2.6360	3.5950	4.9680

(07 Marks)

Module-5

- 9 a. Using Runge-Kutta method, solve

$$\frac{d^2y}{dx^2} = x \left(\frac{dy}{dx} \right)^2 - y^2, \text{ for } x = 0.2, \text{ correct to four decimal places, using initial conditions } y(0) = 1, y'(0) = 0$$

(07 Marks)

- b. Derive Euler's equation in the standard form viz,
- $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$

(07 Marks)

- c. Find the extremal of the functional
- $\int_{x_1}^{x_2} (y^2 + y'^2 + 2ye^x) dx$

(06 Marks)

OR

- 10 a. Given the differential equation
- $2 \frac{d^2y}{dx^2} = 4x + \frac{dy}{dx}$
- and the following table of initial values:

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514
y'	2	2.3178	2.6725	2.0657

Compute y(1.4) by applying Milne's Predictor-corrector formula.

(07 Marks)

- b. Prove that geodesics of a plane surface are straight lines.

(07 Marks)

- c. On what curves can the functional
- $\int_0^1 (y'^2 + 12xy) dx$
- with
- $y(0) = 0, y(1) = 1$
- can be extremized?

(06 Marks)

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CBCS SCHEME

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18MATDIP31

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the modulus and amplitude of the complex number : $\frac{(2-3i)(2+i)^2}{1+i}$. (07 Marks)
- b. Prove that $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^n = \cos n\theta + i\sin n\theta$. (06 Marks)
- c. Show that the vectors $\vec{a}-2\vec{b}+3\vec{c}$, $-2\vec{a}+3\vec{b}-4\vec{c}$, $-\vec{b}+2\vec{c}$ are coplanar. (07 Marks)

OR

- 2 a. Given $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$. Find : i) $\vec{a} \cdot \vec{b}$ ii) $\vec{a} \times \vec{b}$ iii) $|\vec{a} \times \vec{b}|$. (07 Marks)
- b. Determine the value of λ , so that $\vec{a} = 2\hat{i} + \lambda\hat{j} - \hat{k}$, and $\vec{b} = 4\hat{i} - 2\hat{j} - 2\hat{k}$, are perpendicular. (06 Marks)
- c. Express $1 - i\sqrt{3}$ in the polar form and hence find its modulus and amplitude. (07 Marks)

Module-2

- 3 a. Using Euler's theorem, prove that $xu_x + yu_y = -3\cot u$ where $u = \sin^{-1}\left(\frac{x^2y^2}{x+y}\right)$. (07 Marks)
- b. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{24} + \dots$. (06 Marks)
- c. If $u = x + 3y^2$, $v = 4x^2yz$, $w = 2z^2 - xy$, evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at the point $(1, -1, 0)$. (07 Marks)

OR

- 4 a. Obtain Maclaurin's series expansion for the function e^x upto x^4 . (07 Marks)
- b. If $u = \sin^{-1}\left[\frac{x^3+y^3}{x+y}\right]$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2 \tan u$. (06 Marks)
- c. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$. (07 Marks)

Module-3

- 5 a. A particle moves along the curve $x = (1-t^3)$, $y = (1+t^2)$, $z = (2t-5)$ determine its velocity and acceleration at $t = 1$ sec. (07 Marks)
- b. If $\vec{F} = 2x^2\hat{i} - 3yz\hat{j} + xz^2\hat{k}$, and $\phi = 2z - x^3y$, find $\vec{F} \cdot (\nabla\phi)$ and $\vec{F} \times (\nabla\phi)$ at $(1, -1, 1)$. (06 Marks)
- c. Find the constants a, b, c so that $\vec{f} = (x+2y+az)\hat{i} + (bx-3y-z)\hat{j} + (4x+cy+2z)\hat{k}$ is irrotational. (07 Marks)

OR

- 6 a. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $(1, -2, -1)$ along $\vec{a} = 2\hat{i} - \hat{j} - 2\hat{k}$ (07 Marks)
- b. Find curl \vec{f} given that $\vec{f} = xyz^2\hat{i} + xy^2z\hat{j} + x^2yz\hat{k}$. (06 Marks)
- c. If $\vec{f} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ and $\vec{g} = yz\hat{i} + zx\hat{j} + xy\hat{k}$. Show that $\vec{f} \times \vec{g}$ is a solenoidal vector. (07 Marks)

Module-4

- 7 a. Obtain the reduction formula, $I_n = \int \cos^n x dx$, where n is a positive integer. (07 Marks)
- b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z) dx dy dz$. (07 Marks)

OR

- 8 a. Evaluate : $\int_0^{\pi/6} \sin^6(3x) dx$. (07 Marks)
- b. Evaluate : $\int_0^{\pi} x \sin^4 x \cos^6 x dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^y xyz dx dy dz$. (07 Marks)

Module-5

- 9 a. Solve : $(2x + y + 1) dx + (x + 2y + 1) dy = 0$. (07 Marks)
- b. Solve : $(4xy + 3y^2 - x) dx + (x^2 + 2xy) dy = 0$. (06 Marks)
- c. Solve : $y(2xy + e^x) dx - e^x dy = 0$. (07 Marks)

OR

- 10 a. Solve : $(5x^4 + 3x^2y^2 - 2xy^3) dx + (2x^3y - 3x^2y^2 - 5y^4) dy = 0$. (07 Marks)
- b. Solve : $y(2xy + 1) dx - x dy = 0$. (06 Marks)
- c. Solve : $\frac{dy}{dx} + y \cot x = \cos x$. (07 Marks)

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CBCS SCHEME

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18ME32

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Mechanics of Materials

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define i) Poisson's ratio ii) Stress iii) Percentage Reduction in area iv) Toughness. (04 Marks)
- b. Derive the relationship between Modulus of Rigidity and Modulus of elasticity. (06 Marks)
- c. A stepped bar is subjected to an external loading as shown in Fig. Q1(c). Calculate the change in the length of bar. Take $E = 200\text{GPa}$ for steel, $E = 70\text{GPa}$ for Aluminum and $E = 100\text{GPa}$ for copper. (10 Marks)

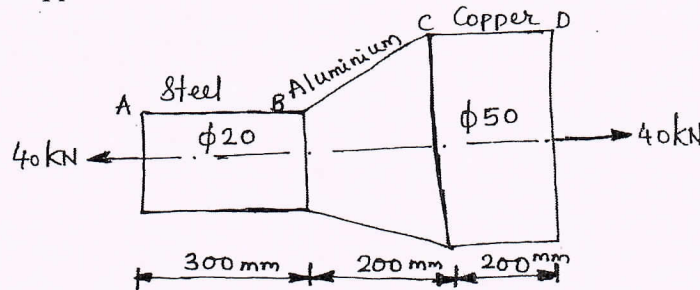


Fig. Q1(c)

OR

- 2 a. Draw Stress – Strain diagram for mild steel subjected to tension and indicate salient points on the diagram. (06 Marks)
- b. A composite section comprises of a steel tube 10cm internal diameter and 12cm external diameter fitted inside a brass tube of 14cm internal diameter and 16cm external diameter. The assembly is subjected to a compressive load of 500kN. Find the load carried by each tube and change in the length of tubes. The length of tube is 150cm. Take $E_s = 200\text{GPa}$ and $E_b = 100\text{GPa}$. (08 Marks)
- c. The bronze bar 3m long with 320mm^2 cross sectional area is placed between two rigid walls. At -20°C there is a gap $\Delta = 2.5\text{mm}$ as shown in Fig. Q2(c). Find the magnitude and the type of stress induced in the bar when it is heated to a temperature 60°C . Take $E = 80\text{GPa}$ and $\alpha_B = 18 \times 10^{-6}/^\circ\text{C}$. (06 Marks)

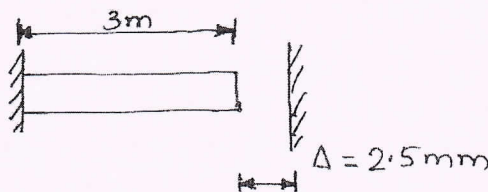


Fig. Q2(c)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-2

- 3 a. Derive the expression for normal stress and tangential stress on a plane inclined at θ° to the vertical axis in a biaxial stress system with shear stress as shown in Fig.Q3(a). Also find Resultant stress and Angle of Obliquity. **(10 Marks)**

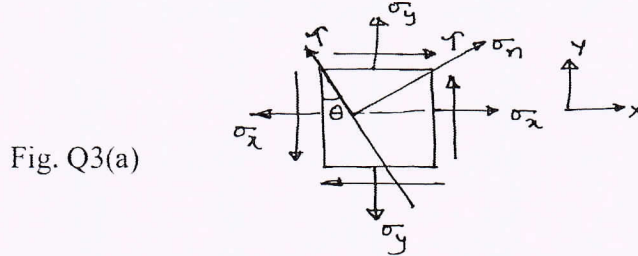


Fig. Q3(a)

- b. The state of stress at a point in a strained material as shown in Fig. Q3(b). Determine
 i) The principal stresses and principal planes.
 ii) Maximum shear stress and plane on which it is acting. Also find the normal stress on the maximum shear plane.
 iii) Sketch the element aligned with planes of principal stresses and planes of maximum shear. **(10 Marks)**

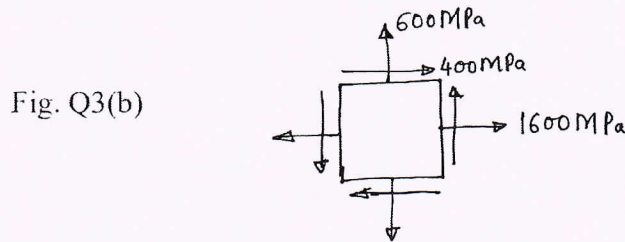


Fig. Q3(b)

OR

- 4 a. A thin cylinder of 75mm internal diameter and 250mm long has 2.5mm thick walls. The cylinder is subjected to an internal pressure of 7MN/m^2 . Determine the change in internal diameter and change in length and change in volume of cylinder. Also compute the Hoop stress and Longitudinal stress and maximum shear stress. Take $E = 200\text{GPa}$ and $\mu = 0.3$. **(10 Marks)**
- b. A thick cylinder with internal diameter 80mm and external diameter 120mm is subjected to an external pressure of 40kN/m^2 , when the internal pressure is 120kN/m^2 . Calculate the circumferential stress at external and internal surfaces of the cylinder. Plot the variation of circumferential stress and radial pressure on the thickness of the cylinder. **(10 Marks)**

Module-3

- 5 Draw Shear force and Bending moment diagrams for the beam shown in Fig. Q5. Locate the point of contra flexure if any. **(20 Marks)**

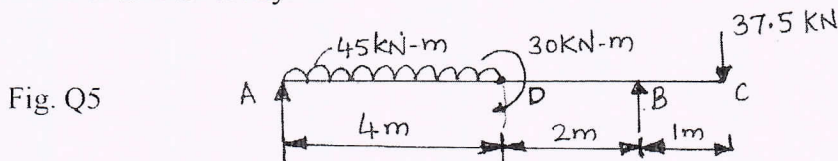


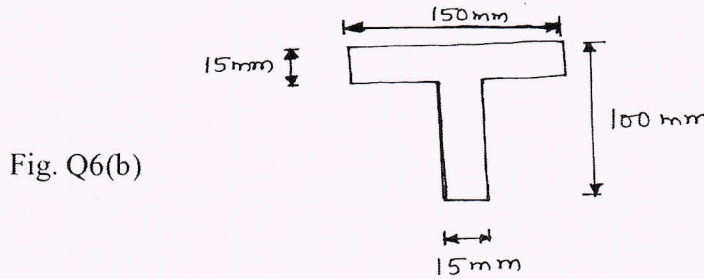
Fig. Q5

OR

- 6 a. A simply supported of beam span 5m has a cross section of $150\text{mm} \times 250\text{mm}$. If the permissible stress is 20N/mm^2 . Find
 i) Maximum intensity of uniformly distributed load it can carry.
 ii) Maximum concentrated load P applied at 2m from one end it can carry. **(10 Marks)**

18ME32

- b. The cross section of a beam is a T section (Fig. Q6(b)) 150mm × 100mm × 15mm with 150mm horizontal. Find the maximum intensity of shear stress and sketch the shear stress distribution across the section if it has to resist a shear force of 90kN. (10 Marks)



Module-4

- 7 a. Derive the torsional equation for a circular shaft with usual notations. State the assumptions made. (10 Marks)
- b. A solid circular shaft is subjected to a bending moment of 10kN-m and a torque of 15kN-m. The yield stress of the material in simple tension is 250MPa and $E = 200\text{GPa}$. If factor of safety is 3. Determine the maximum diameter of the shaft using Maximum Principal Stress theory and Maximum Shear Stress theory. (10 Marks)

OR

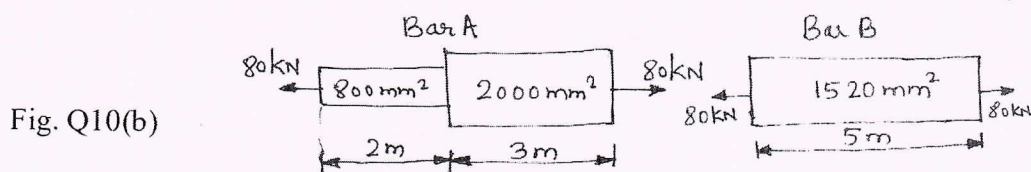
- 8 a. Write a note on :
 i) Maximum Principal Stress theory ii) Maximum Shear Stress theory. (08 Marks)
- b. A solid circular shaft is required to transmit 300kW at 120 rpm. The shear stress in the material is not to exceed 80N/mm^2 . Find the diameter required. If the shaft is replaced by a hollow one whose internal diameter is 0.6 times its external diameter. The length material and maximum shear stress being same. Calculate the percentage saving in weight, that could be obtained. (12 Marks)

Module-5

- 9 a. Explain Castigliano's theorem I with its applications and Castigliano's theorem II. (10 Marks)
- b. A hollow cast iron column whose outside diameter is 200mm and thickness of 20mm is 4.5m long and is fixed at both ends. Calculate the safe load by Rankine formula using factor of safety 2.5. Find the ratio of Euler's to Rankine's loads. Take $E = 1 \times 10^5\text{N/mm}^2$ and Rankine constant = $\frac{1}{1600}$ for both ends fixed and $\sigma_c = 550\text{N/mm}^2$. (10 Marks)

OR

- 10 a. Derive an expression for a critical load in a column subjected to compressive load. When one end is fixed and other end is free. (10 Marks)
- b. Calculate the strain energy stored in a bar shown in Fig. Q10(b), subjected to a gradually applied axial load of 80kN. Compare this value with what obtained in uniform bar of same length and having the same volume, when subjected to the same load. $E = 2 \times 10^5\text{N/mm}^2$. (10 Marks)



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18ME33

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Basic Thermodynamics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Use of thermodynamics charts and tables are permitted.*

Module-1

- 1 a. Distinguish between:
 (i) Macroscopic and microscopic approaches (10 Marks)
 (ii) Intensive and extensive properties
 b. Define the following terms:
 (i) System (ii) State (iii) Property
 (iv) Quasi-static process (v) Thermodynamic cycle (10 Marks)

OR

- 2 a. Define Thermodynamic Equilibrium. Also explain Mechanical, Chemical and Thermal equilibrium. (10 Marks)
 b. A constant volume gas thermometer containing helium gives readings of gas pressure 'P' as 1000 and 1366 mm of mercury at ice point and steam point respectively. Assuming a linear relationship of the form $t = a + bP$, express the gas thermometer celsius temperature 't' in terms of gas pressure P. What is the temperature recorded by the thermometer, when it registers a pressure of 1074 mm of mercury? (10 Marks)

Module-2

- 3 a. Compare work and heat. (10 Marks)
 b. A fluid contained in a horizontal cylinder fitted with a frictionless leak proof piston is continuously agitated by a stirrer passing through the cylinder cover. The diameter of the cylinder is 40 cm and piston is held against the fluid due to atmospheric pressure equal to 100 kPa. The stirrer turns 7000 revolutions with an average torque of 1 Nm. If the piston slowly moves outwards by 50 cm determine the network transfer to the system. (10 Marks)

OR

- 4 a. With a neat diagram, explain Joule's experiments. Also state the first law of thermodynamics. (10 Marks)
 b. A centrifugal compressor delivers 20 kg/min of air. Air enters the compressor of 5 m/s, 100 kPa and leaves at 9 m/s, 600 kPa. Heat lost to the surroundings during this process is 10 kJ/s. If the increase in enthalpy of the fluid is 180 kJ/kg and inlet and outlet specific volume of air are 0.5 m³/kg and 0.16 m³/kg respectively, determine the power of the motor to drive the compressor. Also calculate the ratio of inlet pipe diameter to the outlet pipe diameter. Assume zero elevation difference. (10 Marks)

Module-3

- 5 a. Describe the limitations of first law of thermodynamics. Also explain Kelvin-Planck and Clausius statements of second law of thermodynamics with representative diagrams. (10 Marks)

- b. Two Carnot engines A and B are connected in series between two thermal reservoirs maintained at 1000 K and 100 K respectively. Engine A receives 1680 kJ of heat from high temperature reservoir and rejects heat to the Carnot engine B. Engine B takes in heat rejected by engine A and reject heat to the low temperature reservoir. If engines A and B have equal thermal efficiencies, determine:
- The heat rejected by engine B.
 - Temperature at which heat is rejected by engine A.
 - Work done by engine A and B.
- (10 Marks)**

OR

- 6 a. Define entropy and explain the principle of increase of entropy. **(10 Marks)**
- b. A closed system contains air at pressure 1 bar, temperature 290 K and volume 0.02 m^3 . This system undergoes a thermodynamic cycle consisting of the following three process:
 Process 1-2: Constant volume heat addition till pressure becomes 4 bar.
 Process 2-3: constant pressure cooling.
 Process 3-1: Isothermal heating to initial state. Evaluate the change in entropy for each process. Take $C_v = 0.718 \text{ kJ/kgK}$, $R = 287 \text{ J/kgK}$. Also represent the cycle on T-S and P-V plot. **(10 Marks)**

Module-4

- 7 a. Explain the concept of availability and unavailable energy by deducing suitable relevant equation. **(10 Marks)**
- b. Superheated steam at 40 bar and 300°C expands to 4 bar and 0.97 dry in a turbine. Determine: (i) Availability (ii) Actual work done (iii) Loss in availability. Assume $t_0 = 28^\circ\text{C}$. **(10 Marks)**

OR

- 8 a. Draw and explain the salient features of P-T diagram with water as an example. **(08 Marks)**
- b. The following data were obtained with a separating and throttling calorimeter pressure in steam main = 15 bar, mass of water drained from the separator = 0.55 kg. Mass of steam condensed after passing through the throttle valve = 4.20 kg. Pressure and temperature after throttling is 1 bar and 120°C . Evaluate the dryness fraction of steam in the main. **(12 Marks)**

Module-5

- 9 a. Define and explain Dalton's law of partial pressures and Amagat's law of additive volumes. **(10 Marks)**
- b. It is required to evacuate hydrogen gas from a 8 m^3 capacity tank form atmospheric pressure of 101.325 kPa to a pressure of 98.125 kPa vacuum at 400 K. Determine the mass of Hydrogen pumped out and pressure in kPa if the temperature of hydrogen left in the tank falls to 290 K. **(10 Marks)**

OR

- 10 a. Define and explain: (i) Dew Point temperature (ii) Relative humidity (iii) Humidity ratio (iv) Wet Bulb temperature (v) Degree of saturation **(10 Marks)**
- b. One kg of carbon monoxide has a volume of 2 m^3 at 80°C . Determine its pressure using:
 (i) Ideal gas equation (ii) Vander Waal's equation
 Constants for Vander Waal's equations:
 $a = 147.90 \text{ kN-m}^4/(\text{kgmol})^2$ and $b = 0.0393 \text{ m}^3/\text{kgmol}$. **(10 Marks)**

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18ME34

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Material Science

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. State and explain Fick's laws of diffusion. (08 Marks)
 b. Sketch and explain Edge dislocations. (04 Marks)
 c. Distinguish between SC, BCC, FCC and HCP with respect to structure, number of atoms, Lattice constant, coordination number and APF. (08 Marks)

OR

- 2 a. Draw stress-strain diagram of Ductile material and explain plastic properties. (08 Marks)
 b. Derive expressions showing relationship between True Stress versus Engineering Stress and True Strain versus Engineering Strain. (08 Marks)
 c. Sketch and explain plastic deformation by Twinning. (04 Marks)

Module-2

- 3 a. What is fatigue? Sketch and explain R.R. MOORE fatigue testing showing S-N curves. (08 Marks)
 b. What is Creep? Explain the stages of creep using creep curve. (08 Marks)
 c. Explain the application of Gibb's phase rule using binary phase diagram. (04 Marks)

OR

- 4 a. Draw Iron-Cementite diagram. Indicate phases, critical temperatures and explain invariant reactions. (12 Marks)
 b. Briefly explain the effect of alloying elements on Iron-Carbon diagram. (04 Marks)
 c. What is Solidification? Explain the mechanism of Solidification. (04 Marks)

Module-3

- 5 a. What is heat treatment? Mention the classification. (06 Marks)
 b. Sketch and explain TTT diagram. (06 Marks)
 c. Differentiate between hardness and hardenability. Sketch and explain 'JOMINY END QUENCH' test to determine hardenability. (08 Marks)

OR

- 6 a. Sketch and explain Annealing heat treatment process. (06 Marks)
 b. What is Age hardening? Explain the Age hardening of Al-Cu alloys using phase diagram. (06 Marks)
 c. Explain the composition, properties and applications of Gray Cast Iron, White Cast Iron, Malleable iron and S.G. Iron. (08 Marks)

Module-4

- 7 a. What are composites? How do you classify them? (06 Marks)
 b. Sketch and explain the fabrication of MMC's using stir casting process. (08 Marks)
 c. Explain the functions of matrix and reinforcement. (06 Marks)

OR

- 8** a. Derive an expression for Elastic modulus of the composite under iso-strain condition. (06 Marks)
b. List advantages, disadvantages and applications of composite materials. (08 Marks)
c. Sketch and explain the fabrication of CMC's using "slurry infiltration process". (06 Marks)

Module-5

- 9** a. Briefly explain Thermoplastics, Thermosets and Elastomers. (06 Marks)
b. Sketch and explain the processing of plastics by "injection molding". (08 Marks)
c. What are ceramics? Mention the classification. (06 Marks)

OR

- 10** a. Briefly explain optical and thermal materials. (06 Marks)
b. What are smart materials? Explain briefly the types of smart materials. (08 Marks)
c. Write a brief note on Non-Destructive methods used for residual life assessment. (06 Marks)

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18ME35A/18MEA305

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Metal Cutting and Forming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are the difference between orthogonal cutting and oblique cutting? (06 Marks)
b. Briefly explain the mechanism and types of chip formation. (08 Marks)
c. Draw Mechant's circle diagram and state the assumptions made in establishing the relationship among the various forces. (06 Marks)

OR

- 2 a. Differentiate between Capston and Turret lattice. (06 Marks)
b. Draw the tool layout for producing a hexagonal headed bolt or a caster lathe from a hexagonal bar stock. Assume the dimensions. (08 Marks)
c. List and explain the various operations carried out on lattice machine. (06 Marks)

Module-2

- 3 a. Define Milling. Explain with a neat sketch vertical milling machine. (10 Marks)
b. Define Drilling. With a neat sketch explain a radial drilling machine. (10 Marks)

OR

- 4 a. Sketch and explain the fundamental parts of a horizontal shaping machine. (10 Marks)
b. With a neat sketch, explain the centerless grinding machine. (10 Marks)

Module-3

- 5 a. Define load wear. Explain creator wear and flank wear. (06 Marks)
b. Write a note on functions and types of cutting fluids used in metal cutting. (06 Marks)
c. Define tool life and explain the factors which affect the tool of life. (08 Marks)

OR

- 6 a. Which are the different forms of wear on the cutting edge of a tool? With suitable sketch explain. (08 Marks)
b. Explain the choice of cutting speed a feed. (06 Marks)
c. Explain the critical cutting parameters which affect the tool life. (06 Marks)

Module-4

- 7 a. What is forging? Explain working of board hammer with sketch. (10 Marks)
b. With a neat sketch explain the classification of metal working process on the basis of force applied. (10 Marks)

OR

- 8 a. With a neat sketch, explain different types of rolling mill arrangement. (10 Marks)
b. With a neat sketch, explain the wire drawing process. (10 Marks)

Module-5

- 9 a. How sheet metal operations are classified? Explain with a neat sketch. (10 Marks)
b. What do you mean by dies? Write a note on : i) Progressive dies ii) Combination dies. (10 Marks)

OR

- 10 a. With a neat sketch, explain V-bending and edge bending operations. (10 Marks)
b. With a neat sketch, explain the parts of open back inclinable press. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

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18ME36B/18MEB306

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define metrology and explain its significance in engineering. (06 Marks)
 b. Explain with neat sketches:
 i) Imperial standard yard
 ii) International prototype meter. (10 Marks)
 c. State the differences between line standards and end standards. (04 Marks)

OR

- 2 a. Describe with a neat sketch wringing phenomena of slip gauges. (06 Marks)
 b. Build up a length of 35.4875 using M112 set, using two protector slips of 2.5mm each. (08 Marks)
 c. Explain the principle of autocollimator with a neat diagram. (06 Marks)

Module-2

- 3 a. Briefly explain limits, fits and tolerances. (06 Marks)
 b. Differentiate between :
 i) Interchangeability
 ii) Selective assembly (04 Marks)
 c. Determine the tolerances on the hole and the shaft for a precision running fit designated by 50H7/96. Given:
 i) 50mm lies between 30-50mm
 ii) $i = 0.45 \sqrt[3]{D} + 0.001D$
 iii) Fundamental deviation for shaft = $-2.5D^{0.34}$
 iv) $IT7 = 16i$ and $IT6 = 10i$
 State the actual maximum and minimum sizes of the hole and shaft and maximum and minimum clearance. (10 Marks)

OR

- 4 a. Explain with a neat sketch the construction and working of Johnson Mikrokator comparator. (10 Marks)
 b. Explain with a neat sketch the construction and working of solex pneumatic comparator. (10 Marks)

Module-3

- 5 a. Derive an expression for the effective diameter of a screw thread by 3-wire method. (10 Marks)
 b. Explain with a neat sketch the measurement of major diameter and minor diameter of an Internal thread. (10 Marks)

OR

- 6 a. With a neat sketch, explain the construction of a tool maker's microscope. What are its applications? (10 Marks)
b. Describe a gear tooth vernier calipers and show how this is used for checking gears. (10 Marks)

Module-4

- 7 a. Describe the 3 stages of measurements with an example. (10 Marks)
b. Elaborate the significance of the following terms used with reference to measurement:
i) Accuracy ii) Precision iii) Repeatability iv) Hysteresis v) Threshold (10 Marks)

OR

- 8 a. Distinguish between:
i) Primary and secondary transducer
ii) Active and passive transducer. (06 Marks)
b. With a block diagram explain telemetry. (06 Marks)
c. With a neat sketch, explain the construction and parts of a cathode ray oscilloscope. (08 Marks)

Module-5

- 9 a. Sketch and explain the analytical balance (Equal arm balance). (10 Marks)
b. Explain how the torque is measured using prony brake dynamometer. (10 Marks)

OR

- 10 a. Explain the construction and working of optical pyrometer. (10 Marks)
b. What is thermocouple? State the laws of thermocouple. (10 Marks)

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Question Paper Version : D

Third/Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Constitution of India, Professional Ethics and Cyber Law
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

- Answer all the hundred questions, each question carries one mark.
 - Use only **Black ball point pen** for writing / darkening the circles.
 - For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
 - Darkening two circles for the same question makes the answer invalid.
 - Damaging/overwriting, using whiteners on the OMR sheets are strictly prohibited.**
- Who of the following acted as the Constitutional Advisor of the Constituent Assembly?
 - Dr. B.R. Ambedkar
 - Dr. Babu Rajendra Prasad
 - B.N. Rao
 - Dr. Sachidanand Sinha
 - Which one of the following provisions of the Constitution came into force soon after its adoption on 26th November 1949?
 - Provision relating to Citizenship
 - Elections
 - Provisional Parliament
 - All the above
 - The three types of Justice referred in our Preamble are
 - Social, Economic and Social
 - Economic, International and Political
 - Economic, Religious and Social
 - Religious, Social and Political
 - What was the exact Constitutional status of the Indian Republic on January 26, 1950, when the Constitution was inaugurated?
 - A Democratic Republic
 - Sovereign Democratic Republic
 - A Sovereign Secular Democratic Republic
 - A Sovereign Socialist Secular Democratic Republic.
 - Right to against Exploitation seeks to protect the weaker sections of Society by
 - Giving equal pay for equal work for men and women.
 - Prohibiting human trafficking and beggar
 - Providing compulsory education for children below the age of 14 years
 - Forcing a person to work against his will without payment
 - Which one of the following Directive principles can be described as Gandhian in nature?
 - Providing equal pay for equal work for both Men and Women
 - Workers Participation in Management
 - Organization of Village Panchayats as units of self Government
 - Separation of Judiciary from the Executive.
 - Who has been vested with the power to decide whether the restrictions imposed on the Fundamental Rights of Indian Citizen are reasonable or not?
 - The Parliament
 - The President
 - The Courts
 - None of the above
 - Which one of the following rights conferred by the Constitution is also available to Noncitizens.
 - Freedom of speech assembly and association
 - Freedom to move, reside and settle in any part of the territory of India
 - Freedom to acquire property or to carry on any occupation, trade or business
 - Right to Constitutional remedies.
 - Which one of the following has been wrongly listed as a special feature of Fundamental Rights in India
 - Fundamental Rights are more sacrosanct than rights granted by ordinary laws
 - Fundamental Rights are subject to reasonable restrictions
 - Fundamental Rights are Justifiable and can be enforced through the Supreme Court
 - None of these.
 - The main objective of the Cultural and Educational Rights granted to the Citizen is
 - To preserve the rich culture heritage of India.
 - To evolve a single integrated India culture.
 - To help the minorities to conserve their culture.
 - All the above.
 - The Chief Election Commissioner can be removed from his office before the expiry of term by the
 - Chief Justice of India
 - Prime Minister on the recommendation of Cabinet
 - President on the recommendation of Parliament after the impeachment
 - President on the advice of Chief Justice of India.
 - The quorum of minimum number of members required to hold the meetings of either Houses of Parliament is
 - One - tenth
 - One - fifth
 - One - third
 - 72 hours
 - The Advice of the Supreme Court is
 - Binding of the President
 - Binding on the President if it is rendered unanimously
 - Not binding on the President
 - Binding in certain cases and not binding in other cases
 - The Governor reserves the right to issue ordinances
 - When the State Legislature is not in session and he feels that there is an immediate need of action
 - Whenever the State is under President's Rule
 - Whenever he likes
 - None of these
 - The Writ of Certiorari is issued by a Superior Court
 - To an Inferior Court to stop further proceedings in a particular case
 - To an Inferior Court to transfer the record of proceedings in a case for its review
 - To an Office to show his right to hold a particular Office
 - To a Public authority to produce a person detained by it before the Court within 24 hours.



16. Which one of the following was wrongly listed as a duty of Indian Citizens
- To uphold and protect the Sovereign unity and integrity of the Country
 - To promote harmony and the spirit of common brotherhood among the people of India
 - To protect and preserve the natural Environment
 - To practice Family planning and control population.
17. The Directive Principles Ann at
- Ensuring Individual liberty
 - Ensuring strengthening of the Country's Independence
 - Providing a social and economic base for a genuine democracy in the Country.
 - Achieving all the above objectives.
18. The Directive Principles are the
- Positive instructions to the Government to refrain from encroaching on the freedom of the people
 - Negative injunctions to the Government to refrain from encroaching on the freedom of the people
 - Directive to the State to enhance the International prestige of the Country
 - Directives to the Government to pursue a policy of non alignment.
19. Which one of the following has been wrongly listed as Directive Principle based on 'Liberal Principles'?
- Separation of Judiciary and Executive
 - Provision of a Uniform Civil code for the Country
 - Protection of monuments and places of artistic or Historical importance
 - None of the above has been wrongly listed.
20. The Constitution has vested the Executive power of the Union Government in
- The President of India
 - The Prime Minister
 - The Council of Minister
 - All the above
21. Impeachment proceedings can be initiated against the President in either House of Parliament only if a resolution signed by members of the house is moved.
- 10 percent of total
 - 25 percent of total
 - 20 percent of total
 - 15 percent of total
22. Which one of the following functions of Prime – Minister has been wrongly listed?
- He presides over the meeting of the Cabinet
 - He prepares the agenda for the meeting of the Cabinet.
 - He coordinates the working of various department
 - He chairs the meeting of the various standing and ad-hoc committees of Parliament.
23. A motion of no – confidence against the Council Ministers can be moved in the Lok – Sabha, if it is supported by atleast
- 50 members
 - 55 members
 - 100 members.
 - One – third of the total members of Lok - Sabha
24. The President can call a Joint session of the two Houses of Parliament
- If a bill passed by one house is rejected by the other
 - If the amendment proposed to the bill by one house is not acceptable to the other house.
 - If the house does not take any action for six months on a bill remitted by the other house.
 - Under all the above conditions.

25. The Members of the Rajya – Sabha except the nominated ones are
- Directly elected by the people
 - Elected by local Self – Governing bodies
 - Elected by the Legislative Assemblies of the States.
 - Elected partially by Legislative Assemblies and partially by the Local Self Governing bodies.
26. The President who is the head of the State under the Parliamentary system prevailing in India
- Enjoys absolute powers
 - Enjoys limited but real powers
 - Enjoys only nominal powers
 - Enjoys no powers
27. The Vice – President is the Ex – Office Chairman of
- The Rajya Sabha
 - The National Development Council
 - The Planning Commission
 - None of the above
28. The Speaker of the Lok – Sabha is:
- Appointed by the President.
 - Appointed by the President on the recommendations of the P.M.
 - Elected by the members of the two houses at a joint sitting.
 - Elected by the members of the Lok – Sabha.
29. The Rajya – Sabha is a permanent House but
- One – third of its members retire every two years
 - One – half of its members retire every three years
 - One – fifth of its members retire every year
 - One – half of its member retire every two years.
30. The power to control the Expenditure of the Government of India rests exclusively with
- The Parliament
 - The President
 - The Comptroller and Auditor General
 - The Union Finance Minister
31. Cooking Means
- Boiling under pressure
 - Retaining results which fit theory.
 - Making deceptive statements
 - Misleading the Public about quality of the product.
32. Which one is not a Trade Secret?
- Theorem
 - Equipment
 - Formulae
 - Patent
33. The codes of Ethics can be taken as guidelines by the Engineers to
- Resolve the conflicts
 - Formulate problems
 - Overcome the work pressure
 - Escape from the responsibility
34. A Fault tree is used to
- Assess the risk involved
 - Claim compensation
 - Take free consent
 - Improve safety
35. Risk of harm equal to probability of producing benefit is
- Inevitable Risk
 - Acceptable Risk
 - Risk which cannot be avoided
 - None of these

36. One of the Aims of studying Engineering Ethics is to
 a) Inspire Engineers to acquire in depth knowledge in their field
 b) Acquire new skills in Engineering testing.
 c) Stimulate moral imaginations
 d) Make Engineers self – confident in discharging their duties.
37. Which one is not an impediment to responsibility?
 a) Group think
 b) Microscopic vision
 c) Trademark
 d) Egocentric tendencies
38. Being safe or blaming others is type of attitude of responsibility of Engineers
 a) Minimalist
 b) Reasonable care
 c) Good works
 d) None of these
39. To overcome an impediment 'Uncritical Acceptance', what step an Engineer has to take?
 a) Accept and Analyse
 b) Analyse and Accept
 c) Always say Yes Boss
 d) None of these
40. Engineering Ethics .
 a) Stimulates the moral imagination
 b) Provides up – to – date knowledge in the field of Engineering.
 c) Stimulates to Conduct Research
 d) Stresses on Time Management.
41. For hacking a database or accessing and manipulating data which of the following language the hacker must know?
 a) SQL
 b) HTML
 c) TCL
 d) F#
42. _____ are piece of programs or scripts that allow hackers to take control over any system.
 a) Exploits
 b) Antivirus
 c) Firewall bypassers
 d) Worms
43. The process of finding vulnerabilities and exploiting them using exploitable scripts or programs are known as
 a) Infiltrating
 b) Exploitation
 c) Cracking
 d) Hacking
44. How many types of exploits are there based on their nature from hackers perspective?
 a) 04
 b) 03
 c) 02
 d) 05
45. A _____ is a set of changes done to any program or its associated data designed for updating fixing or improving it.
 a) Scratch
 b) Patch
 c) Fixer
 d) Resolver
46. Fixing of security vulnerabilities in a system by additional programs is known as
 a) Hacking patches
 b) Database
 c) Server
 d) Security
47. _____ are some very frequent updates that come for every antivirus.
 a) Patch update
 b) Data update
 c) Code update
 d) Definition update
48. Cyber – Crime can be categorized into _____ types.
 a) 04
 b) 03
 c) 02
 d) 06
49. Which of the following is not a type of peer to peer cyber – crime.
 a) Phishing
 b) Injecting Trojans to a target victim
 c) MITM
 d) Credit card details leak in deep web
50. In which year India's IT Act came into existence?
 a) 2000
 b) 2001
 c) 2002
 d) 2003
51. The Constitution of India was enacted by a Constituent Assembly set up
 a) Under the Cabinet Mission Plan 1946
 b) Under the Indian Independence Act 1947
 c) Under a resolution of the Provisional Government.
 d) By the Indian National Congress.
52. The Members of the Constituent Assembly are
 a) Directly elected by the people
 b) Nominated by various Political Parties
 c) Nominated by rulers of the Indian States
 d) Elected by the Provincial Assemblies
53. The Federal feature of the Indian Constitution provides for
 a) Distribution of Legislative powers between the Union Government and the State Government.
 b) Division of powers between the Executive and Judiciary.
 c) Distribution of powers between the P.M and Cabinet.
 d) None of these
54. The Governor of State is
 a) Directly elected by the people
 b) Elected by the State Legislature
 c) Appointed by the President
 d) Nominated by the Parliament.
55. The source of Authority of the Indian Constitution is
 a) The Government of India
 b) The People of India
 c) The President
 d) The Parliament
56. The Preamble was Amended by
 a) 24th Amendment
 b) 42nd Amendment
 c) 39th Amendment
 d) None of the above
57. Fraternity means
 a) Spirit of brotherhood
 b) Fatherly treatment
 c) Unity and integrity
 d) Elimination of Economic Justice
58. In the final form of the Constitution adopted by the Constituent Assembly, how many Articles and Schedules were there?
 a) 397 Articles and 7 Schedules
 b) 395 Articles and 4 Schedules
 c) 400 Articles and 10 Schedules
 d) 395 Articles and 8 Schedules
59. The Preamble of the Indian Constitution does not contain concept of
 a) Democratic
 b) Adult Franchise
 c) Sovereignty
 d) Fraternity
60. The strength of the Constituent Assembly, after the withdrawal of the Muslim League, was reduced to
 a) 299 members
 b) 329 member
 c) 331 members
 d) 359 members
61. The Fundamental Rights of a Citizen can be suspended
 a) By the Parliament through a Law enacted by two – third majority
 b) By the President during a National emergency
 c) By the Supreme Court
 d) None of these

62. Which authority can a Citizen approach for securing right of Personal freedom
 a) The Parliament
 b) The President
 c) Supreme Court alone
 d) Both Supreme Court and High Court
63. The main objective of the Fundamental Rights is to
 a) Ensure Independence of Judiciary
 b) Promote a Socialist Pattern of Society
 c) Ensure Individual liberty
 d) Ensure all the above
64. Under which section of II Act, stealing any digital asset or information is written a cyber crime
 a) 65
 b) 65 - D
 c) 67
 d) 70
65. Fundamental duties of the Indian Citizen, were
 a) Enshrined in the original Constitution
 b) Added to the Constitution by the 42nd Amendment
 c) Added to the Constitution by the 44th Amendment
 d) Added to the Constitution in the wake the Supreme Court Judgment Kesavananda Bharti case with consent of all the Political parties.
66. Which one of the following Fundamental Right has been subject of maximum litigation since the inauguration of the Constitution?
 a) Right to Freedom of speech
 b) Right to Constitutional remedies
 c) Right to property
 d) Right against exploitation
67. The Fundamental Rights of Citizens were
 a) Incorporated in the original Constitution
 b) Outlined in an Act of Parliament in 1952
 c) Incorporated by the 42nd Amendment
 d) Incorporated by the 44th Amendment
68. The Fundamental Rights of Indian Citizen have been criticized on the ground that
 a) They are hemmed in by too many restrictions.
 b) They are couched in language beyond the comprehension of ordinary citizen
 c) They are absolute
 d) Both (a) and (b).
69. Respite means
 a) Death due to drowning
 b) Awarding lesser punishment
 c) Death due to strangulation
 d) Painless death
70. The Governor recommends the imposition of President's rule in the State
 a) On the recommendation of the State Legislature
 b) On the recommendation of the C.M.
 c) On the recommendation of Council of Minister
 d) If he is satisfied that the State Government cannot be carried on his accordance with the provision of the Constitution.
71. Which one of the following does not take part in the Election of the President?
 a) Elected members of Lok - Sabha
 b) Elected members of Rajya - Sabha
 c) Members of the Legislative Council
 d) None of these
72. The President can be removed by impeachment procedure on the ground of violating the Constitution by
 a) The Supreme Court
 b) The Lok - Sabha only
 c) Both Houses of Parliament
 d) The High Court

73. The Vice - President of India is elected by the
 a) People
 b) Members of State - Legislative Assembly
 c) Members of the Rajya - Sabha
 d) Members of both the Houses of Parliament at Joint sitting.
74. Who discharges the duties of the President in the event of President and Vice - President being not available?
 a) The Prime Minister
 b) The Chief Justice of India
 c) The Speaker of Lok - Sabha
 d) The Attorney General of India
75. Which one of the following can the President of India declare?
 a) Emergency due to threat of War, external aggression or armed rebellion
 b) Emergency due to breakdown of constitutional machinery in the State
 c) Financial emergency on account of threat to the financial credit of India
 d) All the above.
76. Which budget is placed first in the Parliament House
 a) Railway
 b) General budget
 c) Financial
 d) Vote of credit
77. The President can make Laws through ordinances
 a) During the recess of the Parliament
 b) On certain subjects even when Parliament is in session
 c) Only on subjects contained in the concurrent list
 d) Under no circumstances.
78. The President can grant pardon in
 a) All cases of punishment by Court martial
 b) All offences against laws in the Union and Concurrent list
 c) All cases involving death sentence
 d) All the above cases
79. If State fails to comply with the directives of the Central Government, the President can
 a) Declare break - down of Constitutional machinery in the State and assume responsibility for its governance
 b) Send reserve police force to secure compliance with directions
 c) Dissolve the State legislature and order fresh elections
 d) Can do either (a) or (b)
80. Which one of the following has been wrongly listed as Judicial power of the President of India?
 a) He appoints the Chief Justice and other Judges of the Supreme Court
 b) He can grant pardon, reprieve and respite to a person awarded punishment
 c) He can consult the Supreme Court on any question of law or fact.
 d) He can remove the Judges of Supreme - Court on ground of misconduct.
81. Who decides disputes regarding disqualification of Members of Parliament?
 a) The President
 b) The Concerned house
 c) The Election Commission.
 d) The President in consultation with the Election Commission.

82. Who presides over the Lok – Sabha if neither the Speaker nor the Deputy Speaker is not available?
 a) A member nominated by the President.
 b) A member chosen by the Council of Minister.
 c) A member of the panel of Chairman announced by the Speaker.
 d) The Senior most member of the Lok – Sabha.
83. Lok – Sabha is superior to the Rajya – Sabha because
 a) It is directly elected
 b) It alone controls the Finances
 c) It can oust the Council of Minister through a Vote of no – Confidence
 d) of all the above reasons.
84. The Supreme Court of India was setup
 a) By the Constitution
 b) Under the Indian Independence Act 1947
 c) Through an Act of Parliament in 1950
 d) Under the Government of India Act 1935
85. The Judges of the Supreme Court are
 a) Elected by the Parliament.
 b) Appointed by the President on the advice of the Parliament.
 c) Appointed by the President on the advice of the P.M.
 d) Appointed by the President on the advice of the Chief Justice of India.
86. The Judges of the Supreme Court after retirement are not permitted to carry on practice before
 a) The Supreme Court
 b) The High Courts
 c) The District and Session Courts
 d) Any of the above
87. Which of the following Jurisdiction of the Supreme Court of India has been wrongly listed
 a) Original Jurisdiction
 b) Appellate Jurisdiction
 c) Advisory Jurisdiction
 d) None of the above
88. Generally, the Governor belongs to
 a) The State where he is posted
 b) Some other State
 c) The Indian Administrative Service
 d) None of the above
89. Which of the following Legislative Powers is employed by the Governor of a State?
 a) He can summon or prorogue the State Legislature
 b) He can appoint one sixth of the members of the Legislative Council.
 c) He can nominate certain member of the Anglo Indian Community to the Legislative Assembly.
 d) All of above powers.
90. Engineering Ethics is a
 a) Preventive Ethics
 b) Developing
 c) Natural Ethics
 d) Scientifically developed Ethics.
91. Professional Ethics is
 a) Set of Rules relating to personal character of Professionals
 b) Traditional Rules observed since a long time.
 c) Set of Rules passed by Professional bodies.
 d) Set of standards adopted by Professionals.
92. Tight couple means
 a) Binding two beams tightly
 b) Erecting two pillars side by side
 c) Process tightly coupled
 d) Strong adhesive material
93. An Engineer may not be held legally liable or causing harm. When the harm is caused
 a) Intentionally
 b) Ignorantly
 c) Negligently
 d) Recklessly
94. A compound measure of the probability and magnitude of the adverse effect is known as.
 a) Risk
 b) Benefit
 c) Compensation
 d) Both (b) and (c)
95. Engineers shall issue public statements only
 a) In subjective manner
 b) In objective manner
 c) On their personal responsibility
 d) Based on the reports sent by higher Officers.
96. Attackers commonly target _____ for fetching IP address of a target or victim user.
 a) Website
 b) Web pages
 c) IP tracker
 d) Emails
97. _____ is the first phase of Ethical hacking
 a) DNS Poisoning
 b) Foot printing
 c) ARP – Poisoning
 d) Enumeration
98. Which of the following do not comes under the intangible skills of hackers?
 a) Creative thinking
 b) Problem solving capability
 c) Persistence
 d) Smart attacking potential
99. Why programming language is important for ethical hackers and security professionals?
 a) Only to write malware.
 b) For solving problems and building tool and programs
 c) To teach programming
 d) To develop program to harm others.
100. Understanding of _____ is also important for gaining access to a system through networks.
 a) OS
 b) Email servers
 c) Networking
 d) Hardware
