Enrollment No…….

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Material Science [ES-220]
Branch-ME

Time: 3:00 Hrs **Max Marks 70**

Note : (i) Attempt any five questions. All question carry equal marks.
(ii) Answer should be precise & to be point only.
(iii) Assume suitable data if necessary & state them clearly

Q.1 Differentiate metals and nonmetals in terms of their properties and uses?

Q.2 What is atomic packing factor? Calculate the atomic packing factor of simple cubic, BCC and FCC crystal.

Q.3 Explain the concepts of lattice, basis and crystal structure? How are they related?

Q.4 What are defects? Discuss point and line defects in crystal with neat sketch.

Q.5 Define cold working and outline the change of properties due to cold working. Enlist its advantages and disadvantages of cold working?

Q.6 Describe the working of Iron carbon diagram with its advantages and limitations?

Q.7 Explain the following heat treatment process:-
(i) Normalizing (ii) Annealing
(iii) Spherodizing (iv) Tempering

Q.8 Discuss about the toxic and oxidizer materials also explain their classification and hazards?

Enrollment No…….

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Communication Skills [HU220]
Branch-CE/EX/EC/CSE/IT/ME

Time: 3:00 Hrs **Max Marks 70**

Note : Attempt any five questions. All questions carry equal marks.

Q.1 What do you mean by Communication? Describe it.

Q.2 Explain process of communication with diagram.

Q.3 What are upward and downward communication?

Q.4 Differentiate one way and two way communication.

Q.5 List out challenges in communication.

Q.6 Explain barriers to communication.

Q.7 Write a short note on Articles.

Q.8 What are parts of speech? Explain with suitable examples.

Enrollment No……

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Mathematics-III [MA-220]
Branch-EE/EC/CS/IT

Time: 3:00 Hrs **Max Marks 70**

Note : Attempt any five questions.
All question carry equal marks.

Q.1 (a) State and prove Cauchy's theorem.
(b) Show that the function $e^x(cosy + isiny)$ is analytic and find its derivative.

Q.2 (a) Using Cauchy's integral formula prove that : $\int_c^3 \frac{e^{2z}}{(z+1)^4} dz = \frac{8\pi e^{-2}}{3} i$, where C is the circle $|z| = 3$.
(b) Find the imaginary part of the analytic function whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2$.

Q.3 (a) Find the real root of the equations $x^3 - 9x + 1 = 0$ by the method of false position.
(b) Apply Newton Raphson method to solve $3x = cosx + 1$.

Q.4 (a) Using Newton's forward Interpolation formula, find the value of $f(1.6)$,if

x:	1	1.4	1.8	2.2
y:	3.49	4.82	5.96	6.5

(b) Solve the following system by Gauss elimination method

$$6x_1 + 3x_2 + 2x_3 = 6$$
$$6x_1 + 4x_2 + 3x_3 = 0$$
$$20x_1 + 15x_2 + 12x_3 = 0$$

Q.5 (a) Apply Lagrange's formula to find the value of x when f(x) = 0 given that

x:	30	34	38	42
$f(x)$:	−30	−13	3	18

(b) Solve initial value problem $\frac{dy}{dx} = 1 + xy^2$, $y(0)$=1 for $x = 0.4, 0.5$ by using Milne's method when it is given that

x:	0.1	0.2	0.3
y:	1.105	1.223	1.355

Q.6 (a) Solve the equation $\frac{dy}{dx} = x + y$ with initial condition $y(0) = 1$ by Runge kutta rule from $x = 0$ to $x = 0.4$ with $h = 0.1$

(b) Evaluate $\int_{0.5}^{0.7} x^{1/2} e^{-x} dx$ approximately by using a suitable formula.

Q.7 (a) Solve the following by Euler's modified method, the equation $\frac{dy}{dx} + \log(x + y), y(0) = 2$ at $x = 1.2$ and 1.4 with $h = 0.2$
(b) Use picard's method to approximate y when $x = 0.2$ given that $y = 1$ when $x = 0$ and $\frac{dy}{dx} = x - y$

Q.8 (a) Find the z Transform of Sinak, k7,0

(b) Solve the following by Gauss Seidel iteration Method

$$10x + y + z = 12$$

$$2x + 10y + z = 13$$

$$2x + 2y + 10z = 14$$

Enrolment No……

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Strength of Materials [ME-221]
Branch-ME

Time: 3:00 Hrs **Max Marks 70**

Note : Attempt any five questions. All question carry equal marks.

Q.1 (a) Explain the terms strain, Shear strain, young's modulusand modulus of rigidity.
(b) A tension bar taper from (d+a) diameter to (d-a) diameter Prove that the error involved in using the mean diameter to calculate the young modulus is (10a/d)^2 percent.

Q.2 (a) A closed coiled helical spring has its free length as 120mmit absorbs 40 N-m of energy when fully compressed and the coil are in contact. The mean coil diameter is 80mm. Determine the diameter of steel wire required and number
of coil, if maximum shear stress is to be 120MPa, G=80GPa.

(b) A 280mm*120mm*10mm I beam in to be used as a cantilever of 3.6 m length. Find the uniformly distributed load which can be carried safety if the permissible stress is 125 MPa.

Q.3 (a) What is the assumption made in the theory of torsion?
(b) Develop an expression for strain energy in a shaft subjected to torsion.

Q.4 (a) What do you mean by Theories of failure? What is their importance.

(b) What is meant by equivalent length of columns? What are its values for different end conditions of column?

Q.5 (a) Derive the equation for principal stress from a given two dimensional stress element
(b) Derive the relation.

$$\frac{\sigma}{y}=\frac{M}{I}=\frac{E}{R}$$ for simple bending.

Q.6 (a) Deduce an expression for allowable tungsten moment of a thin walled tube. Also find an approximate Expression
for strength weight ratio of such tube.
(b) Derive the expression of stress and deflection of helical spring of circular wire.

Q.7 (a) Derive Euler's formula for column with pinned ends.
(b) Briefly explain true stress and true strain.

Q.8 (a) Briefly describe the construction of leaf spring with neat sketch
(b) A shaft transmits 280 KW of power at 160 rpm. Determine The diameter of solid shaft to transmit the power.

Enrollment No……

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Theory of Machines & Mechanism [ME-222T]
Branch- ME

Time: 3:00 Hrs **Max Marks 70**

Note : (i) Attempt any five questions. All question carry equal marks.

Q.1 (a) Write short notes on following:
(i) Creep in belt.
(ii) Gruebler's and Kutzbach's criterion.
(b) Find relations to determine velocity ratio and center distance of helical gears?

Q.2 (a) What are the requirements of high speed CAM?
(b) Discuss various types of CAMS.

Q.3 (a) Two parallel shafts, about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 r.p.m. and the other at 120 r.p.m. Design the gears, if the circular pitch is to be 25 mm.
(b) What is Degree of Freedom?

Q.4 (a) Discuss stability of two and four wheel vehicles on the basis of gyroscope.
(b) Define gyroscopic couple. Explain gyroscopic effect on naval ships

Q.5 (a) Define: Base circle, Pitch circle, Trace point, Pitch curve and Pressure angle.
(b) Derive relations for velocity acceleration for convex CAM with flate faced follower.

Q.6 (a) Explain the types of belts.
(b) Explain materials used for belts?

Q.7 (a) A crank and slotted mechanism used in shaper has a centre distance of 300 mm between the centre of oscillation of the slotted lever and the centre of rotation of the crank. The radius of the crank is 120 mm. Find the ratio of the time of cutting to the time of return stroke.
(b) Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 r.p.m. The coefficient of friction between the belt and the pulley is 0.25, angle of lap 160^{o} and maximum tension in the belt is 2500N.

Q.8 (a) Write and Explain Gruebler's and Kutzbach criterion.
(b) Define Couple and Moment of Inertia?

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Bachelor of Engineering

Third Semester Main Examination, Dec-2020

Thermodynamics [ME-223T]

Branch- ME

Time: 3:00 Hrs **Max Marks 70**

Note : (i) Attempt any five questions. All question carry equal marks.
(ii) Answer should be precise and to be point only.
(iii) Assume suitable data if necessary & state them clearly.

Q.1 (a) State & explain zeroth law of thermodynamics. Also explain equation of state.
(b) What is thermodynamic equilibrium? Explain the phenomenon of thermal equilibrium.

Q.2 (a) What is constant volume process? Derive an expression for the workdone, change in internal energy, heat transfer in constant volume process
(b) State & explain first law of thermodynamics as applied to closed system undergoing a cycle.

Q.3 (a) Discuss the heat engine and refrigerator cycle with the help of a neat sketch.
(b) Give the two statements of second law of thermodynamics and prove their equivalence.

Q.4 (a) What is real gas? State the main reasons for deviation of real gases from ideal gases.
(b) Write down Vander Waal's equation and derive equations for evaluation of its constants

Q.5 (a) Derive an expression for the first & second T ds equations.
(b) Explain the process of steam generation. Show the various stages on p-v and T-s diagrams.

Q.6 (a) What is an Otto cycle? Show that the efficiency of the Otto cycle depands only on the compression ratio
(b) Explain the terms- critical point, triple point, pure substance, wet steam, dry steam.

Q.7 (a) Explain with neat sketch working of two-stroke petrol engine and four-stroke diesel engine.

Q.8 Write short note on following-
(i) Brayton Cycle
(ii) P-V-T relationship
(iii) Throttling calorimeter
(iv) Mollier Chart

Enrollment No……

Bachelor of Engineering

Third Semester Main Examination, Dec-2020

Manufacturing Process [ME-224]

Branch-ME

Time: 3:00 Hrs **Max Marks 70**

Note : Attempt any five questions. All questions carry equal marks.

Q.1 (a) Explain with Neat sketch the Cupola furnace?
(b) What is thermite welding? Explain with neat sketch.

Q.2 (a) What is pattern allowance? Explain the different types.
(b) What is application of forging? Discuss the various types of forging operation.

Q.3 (a) What is hot and cold rolling techniques? Explain the difference in application.
(b) What are the Different types of roll mills?

Q.4 (a) Explain any five Lathe operations in brief.
(b) What is the basic difference in shaper and planer?

Q.5 (a) Explain the various types of casting process.
(b) State the essential Properties of a moulding Sand.

Q.6 (a) Write the Classification of moulding and casting processes.
(b) Describe in brief the equipment required for Oxy-Acetylene welding and cutting.

Q.7 (a) Compare the merits and demerits of using A.C and D.C Arc Welding.
(b) Explain working principle of Lathe machine with the help of suitable diagram.

Q.8 (a) Explain Quick Return Mechanism of Shaper machine
(b) Explain the use of safety devices in a press.