	Program: BE Mechanical Engineering Engineering **Curriculum Scheme: Revised 2016** **Examination: Final Year Semester VIII** **Course Code: MEC801 and Course Name: Design of Mechanical System**
Q=QUESTION A=ANSWER	question_description answer_description Module-1
Q	For the optimum design, which of the following objective is not acceptable.
A	a) Maximizing the power transmitting capacity
A	b) Maximizing the load carrying capacity
A	c) Maximizing the energy storing capacity
A	d) Maximizing the cost of the system
Q	In the optimum design, the stress equation are the part of
A	a) Primary design equation
A	b) Subsidiary design equation
A	c) Limit equation
A	d) Secondary equation
Q	In optimum design, the desirable effects are_____
A	a) Maximized
A	b) Minimized
A	c) Kept constant
A	d) Not considered
Q	Which of the following equation takes care of the minimization of undesirable effect like weight.
A	a) Primary design equation
A	b) Subsidiary design equation
A	c) Limit equation
A	d) Stress equation
Q	The design equations as suggested by the Johnson for the optimum design are……I) Primary design equation, II) Subsidiary design equation, III) Limit equation
A	a) I and II
A	b) I, II, and III
A	c) I and III
A	d) II and III
Q	Which of the following subsystem unit is not a part hoisting mechanism.
A	a) Trolley travel unit
A	b) Snatch block unit
A	c) Rope and pulley unit
A	d) Tension take-up unit
Q	For Optimum design_____ method is popular method
A	a) Wilson
A	b) Johnson
A	c) Jackson
A	d) Thomson
Q	Blue print of the design of assembly and components includes_____
A	a) Mode of failure
A	b) Tolerances
A	c) Requirement of the products

A	d) Dimensions, Tolerances & Manufacturing methods
Q	How many equation’s are suggested by Johnson for optimum design?
A	a) 2
A	b) 3
A	c) 5
A	d) 4

Q=QUESTION A=ANSWER	question_description answer_description **Module-2**
Q	In the selection of wire rope for hoisting purpose, which strength should be considered?
A	Tensile strength
A	Compressive strength
A	Shear strength
A	Tensile and bending strength
Q	Steel wire rope used in EOT crane are specified by
A	Weight of wire per meter length
A	Nominal rope diameter in millimeter followed by number of strands and number of wire in each strands
A	Breaking load in KN followed by diameter of strand in millimeter and number of wire in each strand
A	Diameter and length
Q	Within 6X37 specification of wire rope, the _____ can vary from 31 to 49.
A	Number of wires in each strand
A	Number of strands
A	Diameter of wire
A	Pattern of strand
Q	Number of falls decided in EOT crane are on the basis of
A	Load
A	Hoisting speed
A	Height of travel
A	Speed of drum
Q	In four fall system in EOT crane, relation between velocity of rope on drum and velocity of hook
A	velocity of rope on drum is equal to velocity of hook
A	velocity of rope on drum is twice of velocity of hook
A	velocity of rope on drum is square of velocity of hook
A	velocity of rope on drum is half of velocity of hook
Q	Over bridge crane has
A	Transverse moment
A	Longitudinal moment
A	Vertical moment
A	Transverse and Longitudinal moment
Q	For bearing SKF 6219, bore diameter will be?
A	19 mm
A	38 mm
A	95mm
A	100mm
Q	Preffered cross section of hook of EOT crane is
A	Circular
A	Rectangular
A	Trapezoidal
A	Square
Q	In a curved beam neutral axis and centroidal axis distance from center of curvature is

A	Neutral axis and centroidal axis are at same distance from center of curvature
A	Neutral axis is nearer to center of curvature compared to centroidal axis
A	Centroidal axis is nearer to center of curvature compared to Neutral axis
A	No relation between neutral axis and centroidal axis
Q	Rope life is approximately_____ to the number of bends
A	Directly proportional
A	Inversely proportional
A	Half of
A	Equal to
Q	While designing hook section of EOT crane, the bending moment is calculated as the product of load and _____
A	Distance between centre of curvature of hook and centroidal axis of hook cross section
A	Distance between centre of curvature of hook and neutral axis of hook cross section
A	Distance between centre of curvature of hook and inner edge of hook cross section
A	Distance between centre of curvature of hook and outer edge of hook cross section
Q	In case of reverse bending, the rope life is approximately _____ than original value.
A	Increased by 50%
A	Decreased by 50%
A	Equal to 90%
A	Equal to 20%
Q	In EOT crane, bearing selection for hook is dependent on
A	Static load carrying capacity
A	Dynamic Load carrying capacity
A	Static and dynamic load carrying capacity
A	Life in million revolutions
Q	Design of pulley axle in EOT crane, is carried out by considering
A	Bending stress
A	Shear stress
A	Bearing stress
A	Torsional shear stress
Q	In EOT crane, if it is a four fall system and hoisting speed is 8 m/min then rope velocity is _____?
A	8 m/min
A	32 m/min
A	16 m/min
A	20m/min
Q	In EOT crane, rope velocity is 14 m/min and diameter of pulley is 528mm, then speed of pulley is?
A	10 RPM
A	17.7 RPM
A	8.44 RPM
A	12 RPM
Q	Depth of the crosspiece in EOT crane is found out by considering
A	Tensile stress

A	Compressive stress
A	Bending stress
A	Shear stress
Q	Regarding the rope drum failure of EOT crane, identify the odd one out from given options
A	Bending stress
A	Shear stress
A	Crushing stress
A	Tensile stress
Q	In case of bearing selection for pulley of EOT crane, the race rotational factor V is
A	V = 1
A	V = 1.2
A	V = 1.5
A	V = 2
Q	In case if bearing selection for pulley of EOT crane, which of the following bearing is to be selected?
A	Axial thrust bearing
A	Radial bearing
A	Foot step bearing
A	Angular contact bearing
Q	In a hook of an EOT crane, in cross section exactly below the centre of curvature, which type of stress is induced?
A	Tensile stress
A	Bending stress
A	Shear stress
A	Compressive stress

Q=QUESTION A=ANSWER	question_description answer_description **Module-3**
Q	Which of the following empirical formula is used to find out the minimum width of belt for **ungraded** material? ($a_{max\ :\ lump\ size}$)
A	B_{min} = 2 * a_{max} + 200 mm
A	B_{min} = 2 * a_{max} - 300 mm
A	B_{min} = 2 * a_{max} + 400 mm
A	B_{min} = 4 * a_{max} + 200 mm
Q	Fabric rubber belts are not widely used as they can't be operated at high speeds.
A	They can't be used at velocities 50m/s
A	They can be used at high velocities
A	Limiting velocity is 20m/s
A	Limiting velocity is 40m/s
Q	Which belt conveyor prevents sliding down of material at an inclination of 55 degrees with horizontal?
A	Flat belt conveyor
A	Troughed belt conveyor
A	Blanket belt conveyor
A	Woven wire belt conveyors
Q	Which of the following statements is TRUE for troughed belt conveyors?
A	Troughed belt conveyors use flexible belts with five idlers.
A	They does not contain idlers
A	Depth of trough decreases with increasing number of idlers
A	Flexibility of belt increases as depth of trough decreases
Q	Which of the following empirical formula is used to find out the minimum width of belt for **graded** material? ($a_{max\ :\ lump\ size}$)
A	B_{min} = 3.3 * a_{max} + 200 mm
A	B_{min} = 3.3 * a_{max} - 300 mm
A	B_{min} = 2.3 * a_{max} + 400 mm
A	B_{min} = 3.3 * a_{max} + 200 mm
Q	Which of the following is not hoisting equipment with lifting gear?
A	Cage elevators
A	Jib cranes
A	Pulleys
A	Troughed belts
Q	Which of the following belt conveyors have low volume carrying capacity?
A	Flat belts
A	Troughed belts
A	Steel Cord belt
A	Fabric belt
Q	Belt conveyor can be transport over a distance_____.
A	30 km to 200 km
A	20 km to 1000 km
A	25 km to 100 km
A	50 km to 500 km

Q	In conveyor belting part skims means _____.
A	Rubber that resist cutting abrasion
A	woven fabric material
A	Fabric coat above carcass
A	Rubber layers between carcass plys
Q	For metal stamping, chip removal and small part transport application the belt conveyor is used_____.
A	magnetic slide conveyor
A	pallet conveyor
A	Zero pressure conveyor
A	Gravity conveyor
Q	In requirement of belt conveyor includes----------
A	high elastic and permanent elongation
A	medium elastic and temporary elongation
A	low elastic and permanent elongation
A	low elastic and temporary elongation
Q	Conveyor belts are subject to three primary failure mechanisms----------
A	Yield, Fatigue and Wear
A	Torsion, wear, tension
A	Yeild, fatigue, compressive
A	shear,wear,tension
Q	In belt conveyor, Toughing idlers having Toughing angles are_____ degrees
A	10,30,40
A	20,35,50
A	20,35,45
A	20,30,60

Q=QUESTION A=ANSWER	question_description answer_description **Module-4**
Q1	Calculate Length (mm)of piston ring for Bore dia od 130mm ,(for range of value use average value)
A	(a) 173
A	(b) 175
A	(c) 179
A	(d) 177
Q2	Compression Ratio Of SI Engine and CI engine respectively
A	(a) 6 to 10, 14 to 22 respectively
A	(b) 6 to 10, 11 to 14 respectively
A	(c) 14 to 22, 6 to 10 respectively
A	(d) 1 to 10, 11 to 14 respectively
Q3	Bottom Portion of Cylinder Block is called as_____ , Which acts as sump of lubricating oil.
A	(a) Crankcase
A	(b) piston block
A	(c) Fins
A	(d) Cylinder Cover
Q4	According to rankine buckling formula, for Cross section to be most economical the relation for 'I' Cross section And that of Circular cross sections are as follows Ixx = Moment of inertia about horizontal Axis Iyy = Moment of Inertia about Vertical Axis
A	(a) Ixx ≤ 4 Iyy, Ixx = Iyy
A	(b) Iyy ≤ 4 Ixx, Ixx = Iyy
A	(c) Ixx = Iyy , Ixx ≤ 4 Iyy
A	(d) Ixx ≤ 5 Iyy, Ixx = Iyy
Q5	In design of Cylinder liner for calculation of thickness of liner is based on which stress?
A	(a) Design Strss (Sd)
A	(b) Thermal Stree (St)
A	(c) Maximum Pressure criteria (Sx)
A	(d) Crushing Stress (Sc)
Q6	Design of Connecting rod will be based on _____ and Checking for _____
A	(a) Bending, Buckling
A	(b) Buckling , Bending
A	(c) Buckling, Tention
A	(d) Bending, Crushing
Q7	For Design of 4 Stroke Single Cylinder Diesel Engine with Brake power of 35KW. Speed=2500 RPM and Compression ratio is 14 find Bore Diameter (D)mm of Cylinder
A	(a) 125
A	(b) 130

A	(c) 135
A	(d) 150
Q8	Connecting rod is designed for I cross section , AS per the standard condition what is the location of critical Section from center of small end ,l = crank length
A	(a) l
A	(b) 1.5 l
A	(c) 1.57 l
A	(d) 1.6 l
Q9	Find out Normal force (N) Acting on Connecting rod (Fn= Fg -Fi) where Fg is Gas force and Fi is Inertia force, bore Dia is 140mm Speed is 1200rpm Pmax=3.123 N/mm2 Select Approximate Value Speed is 1200rpm Pmax=3.123 N/mm2 Select Approximate Value
A	(a) 25
A	(b) 30
A	(c) 35
A	(d) 40
Q10	What is the function of gudgeon pin?
A	(a) Acts as stiffeners
A	(b) Supports piston head
A	(c) All remaining options
A	(d) Connects piston to connecting rod
Q11	Condition 1, D>125mm Condition 2, D<= 125mm Type of liner used for condition 1 and 2 respectivly
A	(a) wet, Dry
A	(b) Dry, Wet
A	(c) selection does not depends on bore dia
A	(d) Wet for both
Q12	Thickness of water jacket for water cooled engine of bore dia 100mm is
A	(a) 4
A	(b) 5
A	(c) 6
A	(d) 7
Q13	While Calculating Critical load for Buckling in connecting rod the angle at which load is maximum in degree as per KK design data book
A	(a) 5
A	(b) 8
A	(c) 10
A	(d) 12
Q14	Generaly number of pressure rings on piston is

A	(a) 5 to 6
A	(b) 3 to 4
A	(c) 1 to 2
A	(d) 2 to 3
Q15	General Material for Cylinder liner is
A	(a) Alloy CI
A	(b) GCI
A	(c) Mild steel
A	(d) SAE 1100
Q16	Small end of Connecting rod are designed and ckecked for following stresses
A	(a) Bending, Tensite, Bearing Failure,Crushing
A	(b) Bending, Shear, Bearing Failure,Crushing
A	(c) Bearing Failure,Crushing
A	(d) Bending, Tensite
Q17	A piston made of gray cast iron has piston head thickness of 20 mm. What will be thickness of piston barrel under piston rings if it has allowable tensile stress of 30 N/mm2? (Bore diameter = 60 mm & Pmax =15 N/mm2) Approximate ans
A	(a) 10
A	(b) 15
A	(c) 20
A	(d) 30
Q18	Calculate number of compression rings for bore dia of 130 mm
A	(a) 4
A	(b) 5
A	(c) 6
A	(d) 7
Q19	Calculate area (mm2) of connecting rod at critical cross section if thickness of web and flange of I cross section is 10 mm
A	(a) 1100
A	(b) 1050
A	(c) 1200
A	(d) 1075
Q20	Calculate BSFC in Kg/ Kw. hr if mechanical efficiency is 76% and ISFC 0.2 Kg/Kw.hr
A	(a) 0.155
A	(b) 0.152
A	(c) 0.148
A	(d) 0.156

Q=QUESTION	question_description
A=ANSWER	answer_description
	Module-5
Q	Discharge of a centrifugal pump is proportional to .....
A	Impeller diameter(D)
A	D^ 2
A	D^ 3
A	1/D^ 3
Q	In a centrifugal pump the liquid enters the pump .....
A	At the top
A	At the bottom
A	At the centre
A	From sides
Q	For small discharge at high-pressure following pump is preferred .....
A	Centrifugal
A	Axial flow
A	Mixed flow
A	Reciprocating
Q	In a centrifugal pumps maximum efficiency is obtained when the plates are
A	Straight
A	Bent forward
A	Bent backward
A	Radial
Q	Indicator diagram of a reciprocating pump is a graph between
A	Floor vs swept volume
A	Pressure in cylinder vs swept volume
A	Flow vs speed
A	Pressure vs speed
Q	What cause discharge of fluid in an external gear pump? 1. the electric motor drives one gear which turns the other gear 2. the electric motor drives both the gears simultaneously 3. fluid passes between the gears to discharge side 4. fluid passes through interior of the casing between teeth and casing and not between the
A	1 and 3
A	2 and 3
A	1 and 4
A	2 and 4
Q	What causes internal leakage in internal gear pump?
A	Less tolerance level between the meshing surfaces
A	More tolerance level between the meshing surfaces
A	No tolerance between the meshing surfaces
A	No relation between tolerance and leakage
Q	What is the relation between pressure and overall efficiency for a gear pump?
A	As pressure increases, overall efficiency decreases
A	As pressure increases, overall efficiency increases
A	Overall efficiency is not affected by change in pressure
A	As pressure decreases, overall efficiency decreases

Q	What is the advantage of internal gear pump?
A	Moderate speed
A	Medium pressure
A	High viscosity fluids can be used
A	Low pressure
Q	In centrifugal pumps, the rotation of which inner element causes the liquid to pump out?
A	Internal gear
A	Rotation of the impeller
A	Cylinder rotor
A	External gear
Q	Which force causes vanes to come out of the rotor slots?
A	Centripetal force
A	Centrifugal force
A	Friction force
A	Inertia force
Q	Overall efficiency of a centrifugal pump is the ratio of
A	Energy available at the impeller to the energy supplied to the pump by the prime mover
A	Actual work done by the pump to the energy supplied to the pump by the prime mover
A	Energy supplied to the pump to the energy available at the impeller
A	Manometric head to the energy supplied by the impeller per Newton of water
Q	Multi stage centrifugal pumps are used to
A	Give high discharge
A	Produce high heads
A	Pump viscous fluids
A	Give no discharge
Q	Discharge of a centrifugal pump is (N= Rotating speed of Impeller, rev/min)
A	Directly proportional to N
A	Inversely proportional to N
A	Directly proportional to N2
A	Inversely proportional to N2
Q	The ratio of actual power output of pump to actual power input of pump is known as
A	Mechanical efficiency
A	Volumetric efficiency
A	Manometric efficiency
A	Overall efficiency
Q	The ratio of the theorotical power that must be deliver to a pump to the actual power delivered to the pump is known as
A	Mechanical efficiency
A	Volumetric efficiency
A	Manometric efficiency
A	Overall efficiency
Q	Which of the following centrifugal pumps has higher specific speed than the others?
A	Axial flow
A	Radial flow
A	Mixed flow

A	All have same specific speed
Q	Which of the following is NOT a type of positive displacement pumps?
A	Reciprocating pump
A	Rotary displacement pump
A	Centrifugal pump
A	Gear Pump
Q	_____ pump is also called as velocity pump.
A	Reciprocating
A	Rotary displacement
A	Centrifugal
A	Screw
Q	Discharge capacity of the reciprocating pump is _____ that of the centrifugal pump
A	higher than
A	lower than
A	same as
A	unpredictable
Q	The process of filling the liquid into the suction pipe and pump casing upto the level of delivery valve is called as _____.
A	filling
A	pumping
A	priming
A	leveling

Q=QUESTION	question_description
A=ANSWER	answer_description
	Module-6
Q	The basic function of a gear box is to
A	Provide variable speed ratios
A	Provide variable forces
A	Provide variable distances
A	Transmit load
Q	Which of the following represents formula for cutting speed in terms of diameter of work piece and spindle rpm?
A	pD/N
A	pN/D
A	pDN
A	pD^2N
Q	_____ is the distance the tool advances for each revolution of the work
A	Depth of cut
A	Feed
A	Material removal rate
A	Spindle distance
Q	Which of the following represent the unit of cutting speed?
A	m^2 / min
A	min / m
A	min / m^2
A	m / min
Q	Which of the following progressions is considered ideal while designing machine tool gear boxes?
A	Geometric
A	Arithmetic
A	Harmonic
A	Logarithmic
Q	Structural diagram is graphical representation of
A	Ray formula
A	Structural formula
A	Deviation formula
A	Gearing formula
Q	Structural formula does not indicate
A	Number of transmissions stages
A	Number of gears
A	Diameter of jobs achievable
A	Number of speeds possible
Q	If spindle speed is 500 rpm, cutting speed is 2 m/s. What will be the diameter of job produced?
A	1.27 mm
A	1.27 m
A	7.6 mm
A	76 mm
Q	Which of the following design criteria is incorrect for multi speed gear box?
A	It should be compact i.e more gears in less space
A	Operator should be able to change speeds quickly.
A	All gears should be engaged at same time

A	Number of shafts, gear and levers should be less
Q	Select incorrect statement
A	Higher the number of speed ratios higher would be cost of gear box
A	Higher the number of speed ratios lower would be cost of gear box
A	Higher the number of speed ratios diameter range of jobs possible increases
A	Higher the number of speed ratios more is the number of spindle speeds possible
Q	In Arithmetic progression _____ is constant
A	Difference between two successive speed steps remains constant
A	Gear Ratio of two successive speed steps remains constant
A	Diameter change between two successive speed ranges remain same
A	Log of Gear Ratio of two successive speed steps remains constant
Q	In Geometric progression _____ is constant
A	Difference between two successive speed steps remains constant
A	Log of Gear Ratio of two successive speed steps remains constant
A	Diameter change between two successive speed ranges remain same
A	Gear Ratio of two successive speed steps remains constant
Q	Range ratio is defined as ratio of
A	Maximum diameter to Minimum diameter of job
A	Minimum to Maximum diameter of job
A	Maximum spindle speed to minimum spindle speed
A	Minimum spindle speed to maximum spindle speed
Q	In a structural equation (P1)(X1) . (P2)(X2), P indicates
A	No. of speed steps in each stage
A	Speed step difference between two rays
A	Number of shafts
A	Number of gears per stage
Q	In a structural equation (P1)(X1) . (P2)(X2), X indicates
A	No. of speed steps in each stage
A	Speed step difference between two rays
A	Number of shafts
A	Number of gears per stage
Q	For structural diagram to be optimum, value of X1 in structural formula should be
A	0
A	2
A	-1
A	1
Q	For a given gear box its structural formula and ray formula will be ___
A	Reverse of each other
A	Symmetrical to each other
A	First and last term would be equal
A	Exactly same