College of Engineering, Pune

(An Autonomous Institute of Government of Maharashtra, Pune -411005)

END SEMISTER EXAMINATION

Subject : Finite Element Method-Elective 1

Academic Year: 2011-12
Year: T.Y B.Tech.(Mechanical)
Duration: 3 Hrs.
Semester: II
Branch: Mechanical
Max. Marks: 50

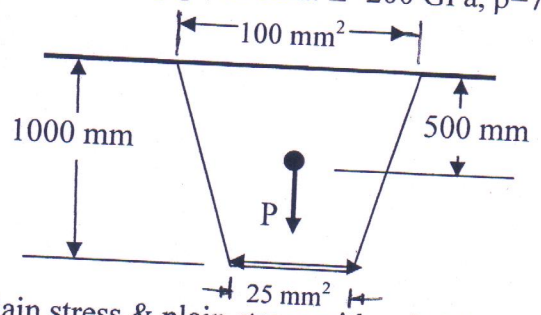
Instructions:

1. Question No. 1 is compulsory & Solve any TWO questions out of Q2 to Q4
2. Make necessary assumptions and assume suitable data wherever required.

Q1. a Explain the different types of symmetry with suitable examples. 5Marks

Q 1b Explain the elimination approach of imposing boundary condition with a suitable example 5 Marks

Q1c Part shown in figure. Find out nodal displacement, element stresses, support reaction using given data: E=200 GPa, ρ=77 KN/m^3 P=75KN 10 Marks



Q2a Explain plain stress & plain strain with suitable example. 7 Marks

Q2b A triangular element having coordinates (1,1), (6,1) and (4,3). Find the shape function at point (3,2) using area coordinate method. 8 Marks

Q3a A square fin is attached to base maintained at a temperature of 100^{0}C. The length of the fin is 30 cm. & has square cross section of side 5 cm. Assume the thermal conductive of fin as 37 W/mK & the convection heat transfer coefficient is 10 W/m^{2}K. Find the temperature of the fin at 10 cm, 20 cm & 30 cm from the base, if it is exposed to air at 40 ^{0}C 7 Marks

Q3b. Derived shape function of four nodal tetrahedron linear elements. 8 Marks

Q4a Derive shape function of linear quadrilateral Iso-parametric element 7 Marks

Q4b The coordination of quadratic element are given by: 1(1,1), 2(10,1), 3(10,5), 4(1,5) and point P (10,5). Find the local coordinates of a point P which has Cartesian coordinates (10,5). 8 Marks

COLLEGE OF ENGINEERING, PUNE

T.Y. B.TECH (MECH)

END SEMESTER EXAMINATION 2011-12

Sub: Refrigeration and Air Conditioning

Time: 3 hours **Max. Marks:** 50

INSTRUCTIONS: 1. All questions carry equal marks
2. Make suitable assumptions and state them clearly
3. Use of calculator is allowed
4. Use of refrigerant properties and charts allowed

1 A refrigeration system with R-12 as a refrigerant is shown in Figure is used to take the loads at different temperatures. The flow direction of the refrigerant is also shown in the figure. Assuming all ideal conditions, find out:

(a) Power required (in kW) to run the system 5

(b) COP of the system 2

(c) Quantity of the cooling water required to be circulated in the condenser in litres/min if rise in temperature of the cooling water is limited to 10^{O}C only. 3

Represent the process on h-s diagram

2 a) Define specific humidity, Degree of saturation, SHF, entrainment ratio 2

b) Give list of internal sources of heat in AC room. Explain any one of them. 3

b) Explain Single-zone central air conditioning system 5

OR

Explain with the help of sketches the various types of air filters.

3 a) Explain the winter air conditioning system with the help of block diagram and represent it on a psychrometric chart. 4

b) To provide air conditioning to a room: 6

Indoor conditions: 26.5^{O}C DBT and 50% RH

Room sensible heat gain = 26 kW

RSHF = 0.8

Find the following:

i) The room latent heat gain

ii) ADP

iii) The cmm of air if it is supplied to the room at the ADP

iv) The cmm and specific humidity of air if it is supplied to the room at 18^{O}C.

OR

b) Air at 25^{O}C and 60% RH is supplied to the drug formulation unit. It is conditioned to this state, first by cooling and dehumidification and then followed by reheating. Cooling coil surface temperature is 13^{O}C and

ambient conditions are 32°C DBT and 65% RH. If air supply rate is 15000 m3/hr determine:

(1) Cooling coil capacity in TR

(ii) Bypass factor of cooling coil

(iii) Heating capacity in kW

(iv) Heating coil surface temperature if bypass factor is 0.3

(v) Mass of water vapour removed per hour.

4 a) Explain the actual performance characteristic curves of a hermetic reciprocating compressor. Discuss the use of such curves. **5**

b) Name the methods to control the capacity of the compressor. Explain any one method with the help of a sketch. **5**

OR

b) Explain equal friction method and static regain method for designing the air duct. **5**

5 a) Explain the working of a Thermostatic expansion valve with a neat sketch. **05**

b) Explain with the help of a block diagram practical ammonia – absorption system **05**

OR **05**

b) How do you evaluate the performance of an air cooler? Explain

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Total No. of Questions: 4 Total No. of Pages: 3

College of Engineering, Pune

End Semester Examination

Subject: (ME 318) Operations Research **Class:** T.Y. B. Tech. (Mechanical Engg)

Time: 2 p.m. to 5 p.m. [Max. Marks: 50]
Date: 11th May 2012

Instructions to candidates:

1. *Question No. 1 is compulsory and answer any two questions from the remaining.*
2. *Figures to right indicate full marks*
3. *Assume necessary assumptions and data if required.*
4. *Use of non-programmable electronic calculator is allowed.*

Q. No. 1 **a** An airline organization has one reservation clerk on duty in its local branch at any given time. The clerk handles information regarding passenger reservations and flight timings. Assume that the number of customers arriving during any given period is Poisson distributed with an arrival rate of eight per hour and that the reservation clerk can service a customer in six minutes on an average, with an exponentially distributed service time.

1. What is the probability that the system is busy?
2. What is the average time a customer spends in the system
3. What is the average number of customers in the system and in the queue?

03

b An air force is experimenting with three types of bombs P, Q and R in which three kinds of explosives viz. A, B and C will be used. Taking the various factors into account, it has been decided to use the maximum 600 kg of explosive of A, at least 480 kg of explosive of B and exactly 540 kg of explosive of C. Bomb P requires 3, 2, 2 kg, bomb Q requires 1, 4, 3 kg, and bomb R requires 4, 2, 3 kg explosives A, B and C respectively. Bomb P is estimated to give the equivalent of a 2 ton explosion, bomb Q, a 3 ton explosion and bomb R, a 4 ton explosion respectively. Under what production schedule can the Air force make the biggest bang? Formulate the dual of the problem too.

12

Please turn over

Q. No.4 **a** For the following sequencing problem; find total elapsed time & machine utilization for each machine.

Jobs		1	2	3	4	5	6	7
Mach-ines	A	3	8	7	4	9	8	7
	B	4	3	2	5	1	4	3
	C	6	7	5	11	5	6	12

04

b Write a short note on "Sensitivity analysis in LPP".

04

c The project has the following time durations in weeks, find the duration required to complete the project also find the probability of completing the project within 31 and 46 weeks.

Activity	Optimistic time	Most likely time	Pessimistic time
1-2	3	6	15
2-3	6	12	30
3-5	5	11	17
7-8	4	19	28
5-8	1	4	7
6-7	3	9	27
4-5	3	6	15
1-6	2	5	14
2-4	2	5	8

07

COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Government of Maharashtra)

END-SEMESTER EXAMINATION

Course : Internal Combustion Engines (ME 312)

Program : T. Y. Mechanical **Date :**
Year: 2011- 12 **Term : II**
Duration: 3 hrs **Max. Marks: 50**

Instructions:

1) All questions. are compulsory .

2) Assume suitable data, if necessary.

3) Figures to the right indicate full marks for the questions

4) Use of Non programmable calculator, Steam Table is permitted.

Q1 Solve any **THREE**

a)

i) Draw a neat sketch of common rail injection system.(Mechanical) **2**

ii) How quantity of fuel and timing of injection are controlled in common rail injection system? **1**

iii) State any two advantages of common rail injection system over individual pump and nozzle system **1**

iv) What are the features of electronic common rail injection system? **1**

b)

i) Draw a neat sketch of evaporative cooling system with water cooled condenser. **2**

ii) State the working principal and advantages of evaporative cooling system **2**

iii) Show lubricating oil flow path in pressure feed lubrication system with the help of block diagram. **1**

c)

i) Briefly explain 1) Time loss factor 2) Heat loss factor 3) Exhaust blow down factor **3**

ii) State the working principal of Hit and Miss governing **1**

iii) State the factors to be considered before deciding firing order in case of multi cylinder engine. **1**

d) A test is conducted on two stroke diesel engine whose bore is 20 cm and stroke 30 cm running at 400 rpm at full load and the following data is recorded. IMEP = 3.2 bar, net brake load = 65 kg_f, fuel used = 0.07 kg/min, jacket cooling water = 8.4 kg/min with rise in temperature = 20^0C, A:F ratio = 30:1, Brake wheel diameter = 1 m, temperature of exhaust gases = 400^0C,and room temperature = 20^0C, C.V. of the fuel used = 40 MJ/kg. The fuel contains 85 % C and 15 % H_2. Take C_p for gas = 1 kJ/kg and C_p for steam = 2.1 kJ/kg, steam pressure in a exhaust = 0.035 bar. Find 1) I.P. 2) B.P. 3) draw up heat balance sheet on minute basis 4) Minimum air required for complete combustion of fuel. **5**

Q2 Solve any **FOUR**

a)

i) Explain the phenomenon of knock in in C.I. engine. compare it with the phenomenon of detonation in S.I. engine **3**

ii) Explain the effect of following factors on flame propagation
1) Turbulence 2) Fuel-air ratio **2**

b)

i) Draw a neat sketch of over head valve combustion chamber. **2**

ii) State the advantages of over head valve combustion chamber over side valve combustion chamber with the help of its constructional features. **2**

iii) State any two objectives achieved in Ricardo turbulent chamber.. **1**

c)

i) What is meant by combustion induced swirl ? Describe pre-combustion chamber with the help of neat sketch **3**

ii) State the advantages and disadvantages of pre-combustion chamber **2**

d)

i) What is 1) Vapour lock 2) Carburetion icing 3) Hot starting 4) Crankcase deposits ? **3**

ii) Explain and show how above phenomenon are related to ASTM distillation curve of the fuel.? **2**

e)

A four cylinder, four stroke cycle petrol engine 85 mm bore,130 mm stroke develops 30 kW brake power while running at 1500 rpm and using 20 % rich mixture. If the volume of the air into the cylinder when measured at 17^0C and 762 mm of mercury is 70% of the swept volume. The theoretical air fuel ratio is 14.8. The heating value of petrol used is 45000 kJ/kg and Mechanical efficiency is 90 %. Find i) Indicated thermal efficiency ii) BMEP Take R = 0.287 kJ/kg K for air. **5**

Q3 Solve any **THREE**

a)

i) What is meant by crankcase blow by ?Explain any one method of positive crank case ventilation system with the help of neat sketch **3**

ii) What are the sources of evaporative emission in petrol engine.? State the factors affecting to it. **2**

b)

i) What is the cause of diesel smoke ?What are the ways of controlling diesel smoke ? **3**

ii) State the purpose and working principle of EGR method. **2**

c)

i) Compare the emission from S.I and C.I. engines giving proper explanation for the same. **2**

ii) What are particulates ? What is regeneration in case of particulate trap? **2**

iii) Draw a neat sketch of catalytic converter package. **1**

d) A two cylinder C I engine with a compression ratio of 13: 1 and cylinder bore 200 mm and stroke 250 mm works on four stroke cycle and consumes 14 kg/hr of fuel while running at 300 rpm. The relative efficiency on I.P. basis and mechanical efficiencies are 65 % and 76 % respectively. The fuel injection is effected up to 5 % of the stroke. If the calorific value of the fuel used is 41800 kJ/kg. Calculate Indicated mean effective pressure and indicated specific fuel consumption. **5**

Total No. of Questions: 4

Total No. of Pages: 2

College of Engineering, Pune

End Semester Examination

Subject: (ME 320) Advanced Manufacturing Techniques Class: T.Y. B. Tech. (Mechanical)

Time: 2 p.m. to 5 p.m.
Date: 11th May 2012

[Max. Marks: 50]

Instructions to candidates:

1. *Question No. 1 is compulsory and answer any two questions from the remaining.*
2. *Figures to right indicate full marks*
3. *Assume necessary assumptions and data if required.*
4. *Use of non-programmabie electronic calculator is aliowed.*

Q. No. 1 **a** Prove in relaxation generator maximum dissipation across the spark gap occurs when the gap-voltage reaches at about ¾th of the source voltage. **09**

b State at least six design principles/considerations that should be followed during powder metallurgy. **03**

c State the various secondary and finishing operations carried out during powder metallurgy and describe in brief one of them **03**

d How many ways a laser beam can be manipulated to process material? **05**

Q. No. 2 **a** What are the primary and secondary requirements of hard coatings? State the different types of coats that can be obtained through PVD and CVD. **09**

b "Rapid prototyping is also known as layered manufacturing" Justify **03**

c Explain how the following basic characteristics of polymers affect on their properties.

1. Molecular weight
2. Degree of polymerization
3. Bonding

Q. No. 3 **a** State the various (at least four) solid based RPT systems and explain Fused deposition modeling in detail. **05**

Please turn over

	b	With a neat sketch explain how one can obtain micro holes of high nozzle coefficient.	05
	c	State the various types of thermoforming processes (at least four). With the help of neat sketch explain vacuum thermoforming in detail	05
Q. No.4	a	State the different power generators that are used in EDM and WEDM, explain the significance of any two of them.	06
	b	Give a neat sketch of an Electron Beam Processing set up and explain in brief its important components.	05
	c	Why additives are used in polymers? State at least three examples of different additives used for specific purpose	04

College of Engineering, Pune
(T.Y.B. Tech.)- (MECHANICAL)
(ME-311)- (Machine Design-II)

Date-13/5/2012
Academic Year: 2011- 12

Timing: 3 hrs
Max. Marks: 50

END SEM EXAM (SPRING)

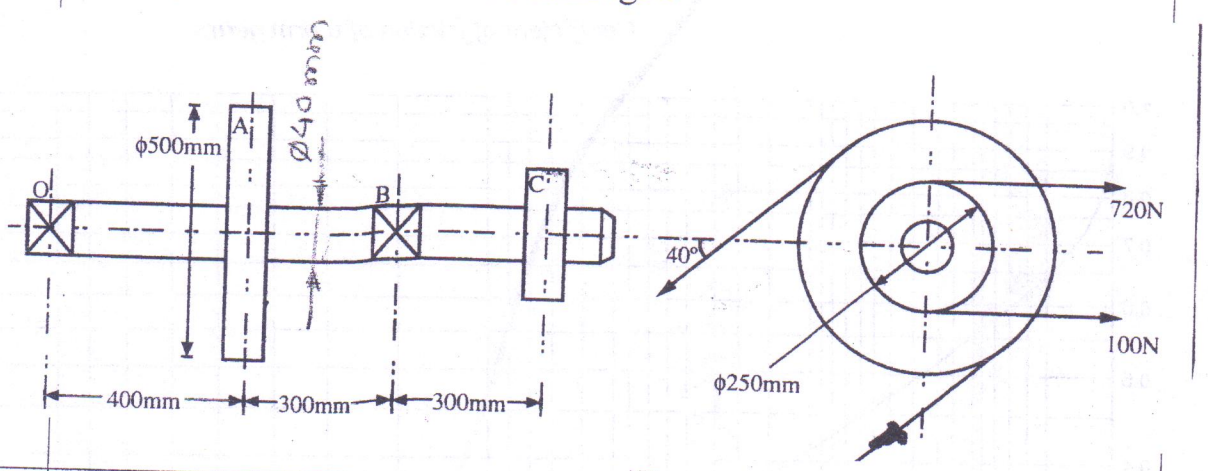
Instructions:

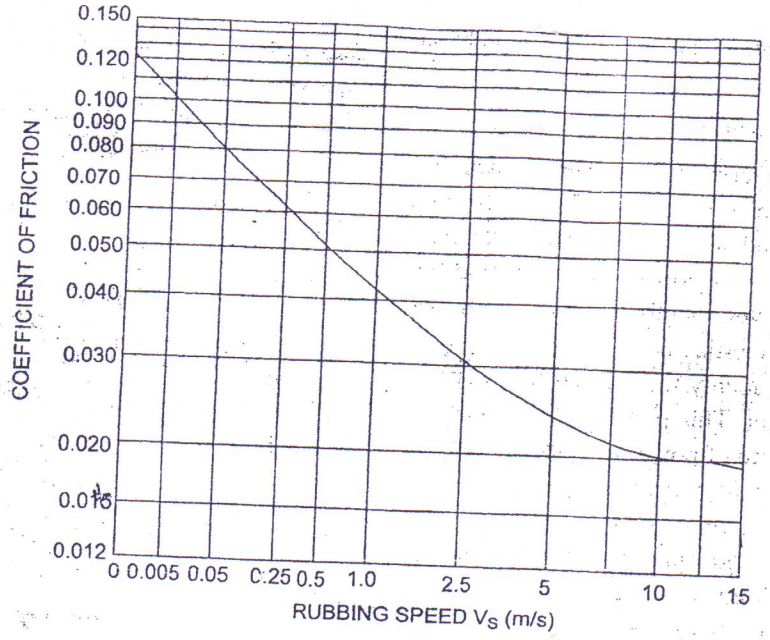
1. **All questions are compulsory**
2. **Assume suitable data if necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of only non-programmable calculator is allowed.**

Q.1		Answer any four	**10**
	A.	With neat sketches, explain the different arrangements of worm gear reducer.	
	B.	With neat sketch explain straddle mounting of bevel pinion and gear. State advantages and disadvantages of straddle mounting.	
	C.	Explain effect of pressure angle on design of gear.	
	E.	Explain with the help of diagram, the comparison between straight and spiral bevel gears. Also write the salient features of the design of spiral bevel gear.	
	F.	Why worm gear always governs the design in worm gear pair?	
	G.	With the help of neat sketch, explain the components of forces acting on straight bevel gear teeth.	
Q. 2		A pair of worm gear is designated as 1/40/10/4. The input speed of worm shaft is 1000 r.p.m. The worm wheel is made of phosphor-bronze (sand cast), while worm of case-hardened carbon steel 10C4. Determine Power transmitting capacity based on beam strength and wear strength. The gear box for the worm gear has an effective surface area of 0.25 m^2. A fan is mounted on worm shaft to circulate air over the surface of fins. The coefficient of heat transfer may be taken as 25 W/ m^2 ^{0} C. The permissible temperature rise of lubricating oil above the atmospheric temperature is 45 ^{0} C. The coefficient of friction is 0.035 and normal pressure angle is 20^0 . Calculate power transmitting capacity based on thermal considerations.	**08**

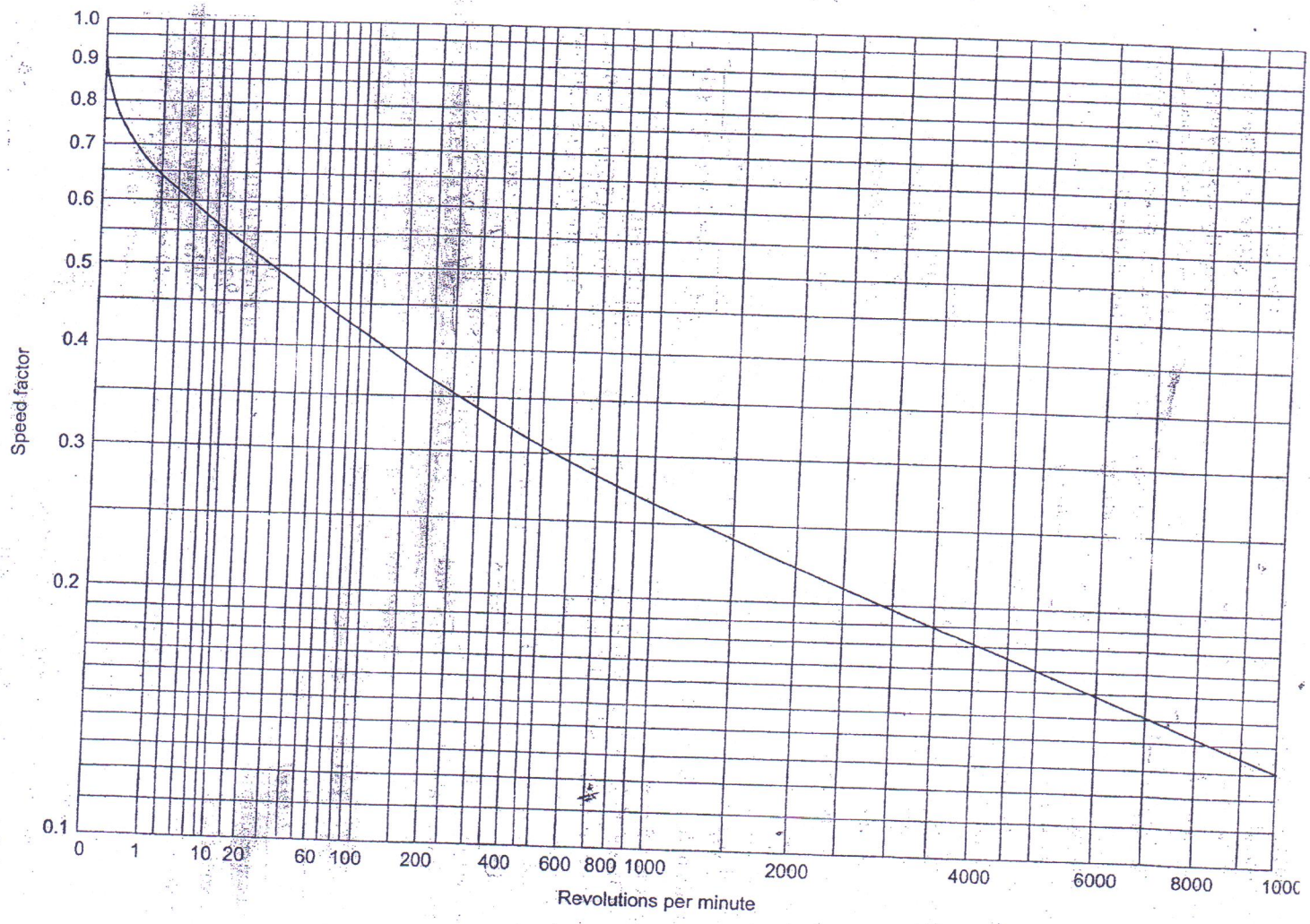
Q. 3	A helical pinion having 14 teeth to be made of alloy steel (Sut = 800 N/mm^2) is to mesh with a gear made of plain carbon steel (Sut = 720 N/mm^2). The gear pair is required to transmit 30 kW power from an electric motor running at 720 r.p.m. to a machine running at 225 r.p.m. The application factor and load concentration factor are 1.3 and 1.1 respectively. The required factor of safety is 2.0 The face width is ten times the normal module. The tooth system is 20^0 full-depth involute, while the helix angle is 25^0. The gear pair is machined to meet the specifications of grade 7. The deformation factor for gear pair is 11000 e N/mm. Design the gear pair by using the velocity factor and Buckingham's equation for dynamic load. Suggest the surface hardness for gear pair. Use the following data: Velocity factor, $K_V = \frac{5.6}{5.6+\sqrt{V}}$ Lewis form factor, $Y = 0.484 - \frac{2.87}{z'}$ Load stress factor, $K = 0.16[BHN/100]^2$ N/mm^2 For grade 7, $e = 11.0 + 0.9\,[m_n + 0.25\sqrt{d}]$, μm Standard module in mm: 1.0, 1.25, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0, 12.0 and 16.0.	07
Q 4.	The following data is given for a360 hydrodynamic bearing: • Radial load =3.2 kN • Journal diameter =50 mm • Bearing length =50 mm • Journal speed =1490 rpm • Radial clearance =50 microns • Viscosity of lubricant =25 cP Assuming the total heat generated in the bearing is carried by the total oil flow in the bearing ,calculate: • The minimum oil film thickness • The coefficient of friction • The power lost in friction • The total flow rate of lubricant in lit/min • Side leakage in lit/min	07

Q.5		Answer any two.	
	A.	Explain relationship between bearing life and reliability .(Weibull distribution)	05
	B.	Explain Miner's equation.	
	C.	Explain the significance of fatigue stress concentration factor and notch sensitivity.	
	D.	Explain the terms viscosity and viscosity index.	
Q.6		The overhung countershaft shown in fig.1 is supported at O and B by two identical deep groove ball bearings. The angle of lap for pulley A as well as pulley C is 180^0.The slack side tension on pulley A is 20% of its tight- side tension. The shaft rotates at 720 rpm. The load factor is 1.5.The L_{10} life of bearing is 6500 million revolutions. Select suitable bearings from manufacturer's catalogue.	07
Q 7.		Derive Stribeck's equation for static load carrying capacity of bearing.	05





Coefficient of friction of worm gears



Speed factor for worm gears for strenght (X_b)

Values of the zone factor Y_z

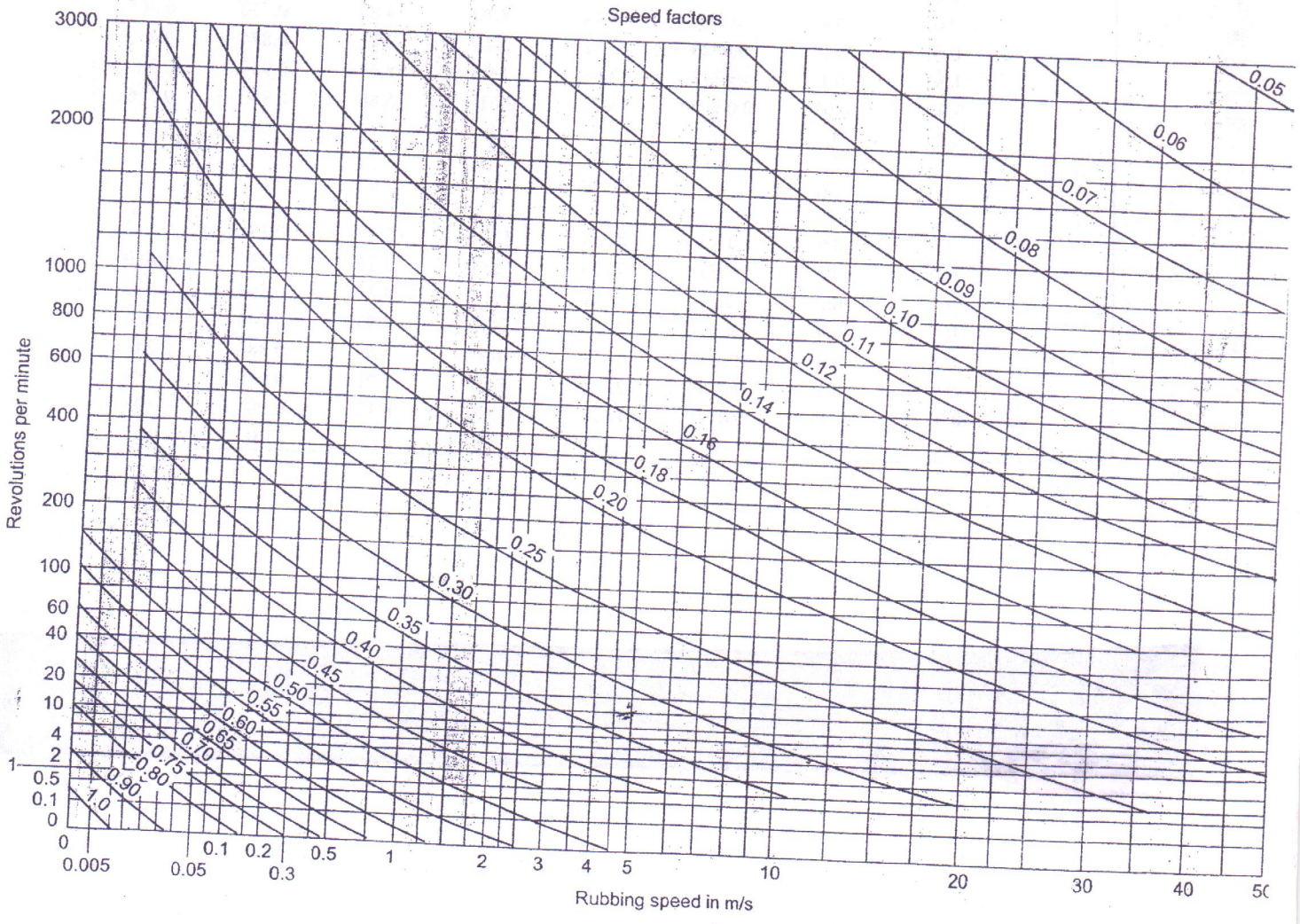
z_1	$q = 8$	$q = 9$	$q = 10$	$q = 12$	$q = 16$	$q = 20$
1	1.084	1.128	1.143	1.202	1.374	1.508
2	1.114	1.214	1.231	1.280	1.418	

Values of the surface stress factor S_c

	Materials	Values of S_c when running with A	B	C	D
A	Phosphor-bronze (centrifugally cast)	–	0.85	0.92	1.55
	Phosphor-bronze(sand cast and chilled)	–	0.63	0.70	1.27
	Phosphor-bronze (sand-cast)	–	0.47	0.54	1.06
B	0.4% Carbon steel-normalized (40C8)	1.1	–	–	–
C	0.55%Carbon steel-normalized (55C8)	1.55	–	–	–
D	Case- hardened carbon steel (10C4, 14C6)	4.93	–	–	–
	Case-hardened alloy steel (16Ni80Cr60, 20Ni2Mo25)	5.41	–	–	–
	Nickel chromicem steel (13Ni3Cr80,15Ni4Cr1)	6.49	–	–	–

Values of bending stress factor S_b

Material	S_b
Phosphor-bronze (centrifugally cast)	7.00
Phosphor-bronze (sand-cast and chilled)	6.40
Phosphor-bronze (sand-cast)	5.00
0.4% Carbon steel-normalized (40C8)	14.10
0.55% Carbon steel-normalized (55C8)	17.60
Case-hardened carbon steels (10C4, 14C6)	28.20
Case-hardened alloy steels (16Ni80Cr60 and 20Ni2Mo25)	33.11
Nickel-chromium steels (13Ni3Cr80 and 15Ni4Cr1)	35.22



Dimensionless performance parameters for full journal bearing with side flow

$\left(\frac{l}{d}\right)$	ε	$\left(\frac{h_o}{c}\right)$	S	ϕ	$\left(\frac{r}{c}\right)f$	$\left(\frac{Q}{rcn_s l}\right)$	$\left(\frac{Q_s}{Q}\right)$	$\left(\frac{p}{p_{max.}}\right)$
∞	0	1.0	∞	(70.92)	∞	π	0	–
	0.1	0.9	0.240	69.10	4.80	3.03	0	0.826
	0.2	0.8	0.123	67.26	2.57	2.83	0	0.814
	0.4	0.6	0.0626	61.94	1.52	2.26	0	0.764
	0.6	0.4	0.0389	54.31	1.20	1.56	0	0.667
	0.8	0.2	0.021	42.22	0.961	0.760	0	0.495
	0.9	0.1	0.0115	31.62	0.756	0.411	0	0.358
	0.97	0.03	–	–	–	–	0	–
	1.0	0	0	0	0	0	0	0
1	0	1.0	∞	(85)	∞	π	0	–
	0.1	0.9	1.33	79.5	26.4	3.37	0.150	0.540
	0.2	0.8	0.631	74.02	12.8	3.59	0.280	0.529
	0.4	0.6	0.264	63.10	5.79	3.99	0.497	0.484
	0.6	0.4	0.121	50.58	3.22	4.33	0.680	0.415
	0.8	0.2	0.0446	36.24	1.70	4.62	0.842	0.313
	0.9	0.1	0.0188	26.45	1.05	4.74	0.919	0.247
	0.97	0.03	0.00474	15.47	0.514	4.82	0.973	0.152
	1.0	0	0	0	0	0	1.0	0
$\left(\frac{1}{2}\right)$	0	1.0	∞	(88.5)	∞	π	0	–
	0.1	0.9	4.31	81.62	85.6	3.43	0.173	0.523
	0.2	0.8	2.03	74.94	40.9	3.72	0.318	0.506
	0.4	0.6	0.779	61.45	17.0	4.29	0.552	0.441
	0.6	0.4	0.319	48.14	8.10	4.85	0.730	0.365
	0.8	0.2	0.0923	33.31	3.26	5.41	0.874	0.267
	0.9	0.1	0.0313	23.66	1.60	5.69	0.939	0.206
	0.97	0.03	0.00609	13.75	0.610	5.88	0.980	0.126
	1.0	0	0	0	0	–	1.0	0
$\left(\frac{1}{4}\right)$	0	1.0	∞	(89.5)	∞	π	0	–
	0.1	0.9	16.2	82.31	322.0	3.45	0.180	0.515
	0.2	0.8	7.57	75.18	153.0	3.76	0.330	0.489
	0.4	0.6	2.83	60.86	61.1	4.37	0.567	0.415
	0.6	0.4	1.07	46.72	26.7	4.99	0.746	0.334
	0.8	0.2	0.261	31.04	8.8	5.60	0.884	0.240
	0.9	0.1	0.0736	21.85	3.50	5.91	0.945	0.180
	0.97	0.03	0.0101	12.22	0.922	6.12	0.984	0.108
	1.0	0	0	0	0	–	1.0	0

Principal dimensions (mm)			Basic load ratings (N)		Designation
d	*D*	*B*	*C*	C_0	
12	21	5	1430	695	61801
	28	8	5070	2240	6001
	32	10	6890	3100	6201
	37	12	9750	4650	6301
15	24	5	1560	815	61802
	32	9	5590	2500	6002
	35	11	7800	3550	6202
	42	13	11400	5400	6302
17	26	5	1680	930	61803
	35	10	6050	2800	6003
	40	12	9560	4500	6202
	47	14	13500	6550	6303
	62	17	22900	11800	6403
20	32	7	2700	1500	61804
	42	8	7020	3400	16404
	42	12	9360	4500	6004
	47	14	12700	6200	6204
	52	15	15900	7800	6304
	72	19	30700	16600	6404
25	37	7	3120	1960	61805
	47	8	7610	4000	16005
	47	12	11200	5600	6005
	52	15	14000	6950	6205
	62	17	22500	11400	6305
	80	21	35800	19600	6405
30	42	7	3120	2080	61806
	55	9	11200	5850	16006
	55	13	13300	6800	6006
	62	16	19500	10000	6206
	72	19	28100	14600	6306
	90	23	43600	24000	6406
35	47	7	4030	3000	61807
	62	9	12400	6950	16007
	62	14	15900	8500	6007
	72	17	25500	13700	6207
	80	21	33200	18000	6307
	100	25	55300	31000	6407

Principal dimensions (mm)			Basic load ratings (N)		Designation
d	*D*	*B*	*C*	C_0	
40	52	7	4160	3350	61808
	68	9	13300	7800	16008
	68	15	16800	9300	6008
	80	18	30700	16600	6208
	90	23	41000	22400	6308
	110	27	63700	36500	6408
45	58	7	6050	3800	61809
	75	10	15600	9300	16009
	75	16	21200	12200	6009
	85	19	33200	18600	6209
	100	25	52700	30000	6309
	120	29	76100	45500	6409
50	65	7	6240	4250	61810
	80	10	16300	10000	16010
	80	16	21600	13200	6010
	90	20	35100	19600	6210
	110	27	61800	36000	6310
	130	31	87100	52000	6410
55	72	9	8320	5600	61811
	90	11	19500	12200	16011
	90	18	28100	17000	6011
	100	21	43600	25000	6211
	120	29	71500	41500	6311
	140	33	99500	63000	6411
60	78	10	8710	6100	61812
	95	11	19900	13200	16012
	95	18	29600	18300	6012
	110	22	47500	28000	6212
	130	31	81900	48000	6312
	150	35	108000	69500	6412
65	85	10	11700	8300	61813
	100	11	21200	14600	16013
	100	18	30700	19600	6013
	120	23	55900	34000	6213
	140	33	92300	56000	6313
	160	37	119000	78000	6413

College of Engineering, Pune
Final Exam – May 2012
T. Y. B. Tech.(Mechanical)
Entrepreneur Development and Communication Skills (EDCS)

Day & Date-Saturday, 14th May, 2012 Time: - 2pm-5pm

Maximum Marks: 50 Duration – 180 minutes.

Instructions:

1 Solve all the questions
2 Figures to right indicates full marks.
3 Do not keep mobile phones with you; the handsets will be retained permanently by exam cell.

Q1. Write short notes on the following: 10 marks

1. Break-Even Analysis
2. Environment Scan
3. Innovation and its various types
4. Importance of entrepreneurship
5. Entrepreneur Environment

Q2.

a) What is a feasibility study? How does it act as a supporting document for a formal business plan? 10 marks

b) Explain in detail the steps taken in problem solving and decision making process.

.Q3

a) Make a comparative analysis of the company forms of organization from the point of view of an entrepreneur 10 marks

b) What do you mean by term business idea, explain the Government procedure involved in it?

c) Elaborate business planning process, in detail. Why do some business plans fail?

d) What is crisis management? What are the reasons which make organizations fail to properly protect their core assets

Q4

a) Explain why an executive summary is the most vital part of the business plan 10 marks

b) Explain the concept of Total Quality Management with a commonly used technique.

Q5

a) Elaborate the role of state Government in providing incentives, subsidies, grants & tax concessions to the entrepreneurs & new ventures. 10 marks

b) Debbie is about to decide which career path to pursue. She has narrowed her options to two alternatives. She can either become a marine biologist or a concert pianist. Debbie lives two periods .In the first, she gets an education. In the second, she works in the labor market. If Debbie becomes a marine biologist, she will spend $15,000 on education in the first period and earn $472,000 in the second period. If she becomes a concert pianist, she will spend $40,000 on education in the first period and then earn $500,000 in the second period.

i. Suppose Debbie can lend and borrow money at a 5 percent annual rate. Which career will she pursue? What if she can lend and borrow money at a 15 percent rate of interest? Will she choose a different option? Why?

ii. Suppose musical conservatories raise their tuition so that it now costs Debbie $60,000 to become a concert pianist. What career will Debbie pursue if the discount rate is 5 percent?

Number of Questions 6(Six)

ME 313 ESE EC 1112

COLLEGE OF ENGINEERING, PUNE
2011-2012
End Semester Examination
ME-313: Energy Conversion

Programme: T.Y. B. Tech **Branch: Mechanical**
Time: 2.00 to 5.00 pm **Date 08/05/2012** **Max. Marks: 50**

Instructions:
1. ***Answer any FIVE questions. Write answer to each question separately.***
2. ***Illustrate your answer with neat sketches wherever necessary.***
3. ***Assume suitable standard data, if necessary and mention it correctly***
4. ***Figures to the right indicate full marks.***
5. ***Use of steam table, Mollier chart, psychometric chart, refrigerants' property table and non-programmable electronic calculator is permitted.***

Q.1 **a)** Following table shows variation of flow properties in subsonic and supersonic nozzles and diffusers. Complete it and rewrite. **4**

Nozzles					
Subsonic Nozzle			Super Sonic Nozzle		
M<1	P	Decreases	M>1	P	----------
	V	----------		V	Increases
	T	Decreases		T	----------
	ρ	Decreases		ρ	----------

Diffusers					
Subsonic Diffusers			Super Sonic Diffusers		
M<1	P	----------	M>1	P	Increases
	V	Decreases		V	----------
	T	----------		T	Increases
	ρ	Increases		ρ	----------

P=Pressure, V= Velocity, T=Temperature and ρ= Density

b) Derive an expression for mass of steam discharged through nozzle and then prove that maximum discharge depends upon area of nozzle at throat and initial conditions of the steam (i.e. pressure and volume) **6**

OR

b) Air expands in a propulsion nozzle from 3.5 bar and 425 °C down to a back pressure of 0.97 bar, at the rate of 18 kg/s. Taking a coefficient of discharge of 0.99 and a nozzle efficiency of 0.94, calculate the required throat and exit area of nozzle. Assume negligible inlet velocity, for Air γ=1.333 kJ/kgK and C_p=1.11 kJ/kgK **6**

Q.2 **a)** Following observations were made during a trial on steam condenser: **6**
Condenser vacuum= 70 cm of Hg; Barometer reading= 76.5 cm Hg; Hot well temperature= 28 °C; Mean condenser temperature= 35 °C; Condensate formed 1800 kg/hr; Quantity of cooling water= 80 T/hr; Circulating water inlet temperature = 15°C; Circulating water outlet temperature= 27 °C.
Determine: (i) vacuum corresponding to standard barometer of 76 cm Hg; (ii) Vacuum efficiency, (iii) under-cooling of condensate; (iv) state of steam entering the condenser, (v) condenser efficiency, (vi) mass of air per cubic meter of condense volume and (vii) mass of air present per kg of uncondensed steam.

OR

a) The velocity of steam at inlet to a simple impulse turbine is 1000 m/s and the nozzle angle is 20°. The mean blade speed is 400 m/s and the blades are symmetrical. The mass flow rate of steam is 0.75 kg/s. The friction effects on the blades are negligible. Using graphical method, Estimate: (a) the blade angles, (b) the tangential force on the blade, (c) axial thrust, (d) the diagram power, (e) the diagram efficiency. 6

b) Explain the need of compounding of impulse turbine. State methods of compounding. With a neat sketch explain Pressure-Velocity Compounding. 4

Q.3 a) (i) A stationary power plant operating on an Ideal Brayton cycle has a pressure ratio of 8. The gas temperature is 300 K at the compressor inlet and 1300 K at the turbine inlet. Using the air-standard assumptions determine, (a) the gas temperature at the exit of the compressor and turbine, (b) the back work ratio and the thermal efficiency. 3

(ii) If the isentropic compressor and turbine efficiency is 80 and 85 percent respectively and an 80% effective regenerator is installed, determine the change in thermal efficiency. 3

b) (i) Explain with neat sketch an Ideal Jet Propulsion Cycle. How does it differ from the ideal Brayton Cycle. 3

(ii) Define propulsive Efficiency. 1

OR

b) (i) Draw a neat block diagram and ***T-s*** diagram of a gas-turbine engine with two stage compression with complete inter-cooling, two stage expansion with ideal reheating and regeneration. 2

(ii) Somebody claims that at very high pressure ratios, the use of regeneration actually decreases the thermal efficiency of a gas-turbine engine. Is this claim valid? Justify. 2

Q.4 a) Define Load factor, diversity factor and capacity factor for a power plant and explain their importance in running the plant economically. 3

b) A small thermal power plant of 5MW capacity using liquid fuel, supplies power to two consumers. The load patterns of both consumers on the basis of 24- hrs are outlined below. 7

Consumer-A			
Time in hrs	0 - 8	8 -16	16-24
Load kW	500	2000	0.0
Consumer-B			
Time	0 - 14	14-22	22-24
Load kW	0.0	2500	0.0

(i) Draw the load curves for consumer A, consumer B and power plant also.

(ii) Find out the load factors for each consumer and power plant.

The load verses efficiency of power plant is given as

$$\eta = 0.0425(L)^{0.92}$$

Where L is percentage load on the plant.

(iii)Determine the mass of the fuel required in tons/day to run the plant on the basis of plant load factor, assuming L is on the basis of average load on plant.

Calorific value of fuel used is 42 MJ/kg and combustion efficiency is 96.5 %

Q.5 a) An $R134_a$ VCC plant evaporator pressure is 1.8260 bar condenser saturation pressure of 9.6065 bars. The vapour entering the compressor is saturated at 1.8260 bars and liquid leaving the condenser is saturated. Assume that the compression process is isentropic. If double acting, single cylinder, reciprocating compressor with a bore of 250 mm, a stroke of 300 mm, running at 200 rev/min, with volumetric efficiency of 85% is used. Calculate 6

i) the refrigerant flow rate in kg/s

ii) Refrigerating capacity of the plant

iii) COP.

iv) the work input to the compressor in kW, when mechanical efficiency is 90%

If vapour is superheated by 5 ^{0}C before suction and sub cooled by 5 ^{0}C, represent the cycle with this states on p-h and T-s plane.

b) Identify the refrigerant and the absorbent from the given two common combinations for vapour absorption refrigeration: 3

i)Water lithium bromide system
ii)Aqua-ammonia system.
One of these systems is used in air conditioning but not suitable for low temperature applications, while the other is not used in air conditioning. Identify these and state the reasons.

c) Why ammonia is commonly used refrigerant in ice plant.

OR

c) Which refrigerant having zero ozone depletion potential (ODP) and unity zero ozone depletion potential (ODP) **2**

Q.6 **a)** Hot dry air at 40 ^{0}Cand 10% RH passes through an evaporative cooler. Water is added as air passes through a wood wool pad and air exits at 27 ^{0}C.Find the RH, the amount of water added and the lowest possible temperature that could be realized. **3**

OR

a) Air at 27 ^{0}C DBTA and 50% RH is cooled and humidified to 10 ^{0}C DBT and 100% RH. How much sensible and latent heat is removed from 1000 liters/s of this air. **3**

b) State two major advantages of
i) Self contained units.
ii) Split systems
iii) Central station system **4**
in above systems for which one system, you can think about all air or all water system.

c) Classify seasonal air conditioning system. Represent its probable presentation on psychrometric chart. **4**
State at least one geographic application for each in regard of climatic conditions.
