

G 6842

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Mechanical Engineering/Automobile Engineering

MACHINE TOOLS (M, U)

(Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks

1. What is a mandrel and why are they used in lathes?
2. Describe the tapping attachment in a drilling machine.
3. What are the specifications of a shaper?
4. Explain the effect of relief angle of milling cutter in machining.
5. Distinguish between dry and wet grinding processes.
6. Describe the gear shaping process
7. Differentiate between NC and CNC machines.
8. What is a program controlled machine tool?
9. What are the applications of simulation study in manufacturing?
10. What is unmanned machining.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each full question carries 12 marks.

11. (a) Explain the terms cutting speed, feed and depth of cut in a turning operation
- (b) What is jig boring machine? Explain. (7 + 5 = 12 Marks)

Or

12. (a) Explain the differences between a vertical turret lathe and a vertical boring machine?
- (b) Write notes on manufacture of bushes. (7 + 5 = 12 Marks)

Turn over

13. (a) Describe the Whitworth quick return mechanism used in shaper.
(b) Explain the process of indexing in milling operations. (7 + 5 = 12 Marks)

Or

14. (a) With sketches describe the various milling processes.
(b) Explain the advantages and disadvantages of broaching. (7 + 5 = 12 Marks)
15. (a) With a neat sketch explain the hobbing process of a spur gear.
(b) How is a grinding wheel specified? (7 + 5 = 12 Marks)

Or

16. Explain the following processes (i) superfinishing (ii) honing (iii) lapping. (12 Marks)
17. Explain the important components of a CNC machine. What are the classifications of CNC machines? (12 Marks)

Or

18. Describe the features of (i) Swiss type automatic screw machines (ii) copying machine. (12 Marks)
19. (a) What are the features of JIT.
(b) What is FMS? Explain its components. (6 + 6 = 12 Marks)

Or

20. Write notes on (i) Cellular layout ; (ii) manufacture of ceramic circuit boards (iii) CIM. (12 Marks)

[5 × 12 = 60 marks]

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Mechanical Engineering

HYDRAULIC MACHINES (M)

(Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks

1. What are the non-dimensional parameters in fluid mechanics?
2. Distinguish between momentum equation and impulse momentum equation?
3. Draw the velocity triangle for a Pelton wheel and derive an expression for the hydraulic efficiency
4. How does the speed of a turbine get regulated?
5. What are the advantages of multistage pumping over single stage?
6. Explain (i) Mechanical efficiency (ii) Hydraulic efficiency (iii) Volumetric efficiency and (iv) Overall efficiency of a pump?
7. What is cavitation? How can it be prevented?
8. Explain the term negative slip used in connection with the working of a reciprocating pump. Why and when it occurs?
9. What are positive displacement pumps? Give 2 examples.
10. What is a hydraulic accumulator?

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each question carries 12 marks.

11. Explain (i) Geometric similarity (ii) Kinematic similarity and (iii) Dynamic similarity.

(12 marks)

Or

Turn over

12. The resisting force F of a supersonic plane during flight can be considered as dependent upon the length of aircraft l , velocity V , air viscosity μ , air density ρ , and bulk modulus of air K . Express the functional relationship between these variables and the resisting force.

(12 marks)

13. With neat sketches explain the working of a Francis Turbine. What are its construction features?

(12 marks)

Or

14. (a) What are the steps in the design of a Pelton Wheel? (5 marks)

- (b) Draw a neat sketch of the velocity triangle in the case of impulse turbine and get an expression for the hydraulic efficiency. (7 marks)

15. (a) Classify hydraulic pumps. (6 marks)

- (b) What are the main and operating characteristics of a centrifugal pump? (6 marks)

Or

16. The axis of a centrifugal pump is 2.5 m above the water level in the sump and the static lift from the pump centre is 32.5 m. The friction losses in the suction and delivery pipes are 1 m and 8 m respectively; suction and delivery pipes are each 12 cm in diameter. At outlet, the diameter and width of the impeller are 30 cm and 1.8 cm respectively and the vanes are set back at an angle of 30° with tangent to the wheel. For a speed of 1800 r.p.m., mechanical efficiency 75% and manometric efficiency 80%, make calculations for the discharge and the power required to drive the pump. Assume radial entry. (12 marks)

17. (a) Distinguish between a reciprocating pump and a centrifugal pump. (6 marks)

- (b) With a neat sketch explain the working of a jet pump. (6 marks)

Or

18. (a) With a neat sketch explain the working of a single acting reciprocating pump. (6 marks)

- (b) The diameter and stroke of a single acting reciprocating pump are 10 cm and 20 cm respectively. The pump is fed by a suction pipe 5 cm in diameter and 6 m long; the suction lift being 3 m. What is the maximum speed at which the pump can be run without separation in the suction pipe? Given that separation occurs when pressure in the pump falls below 2.5 m of water absolute and the manometer reads 762 mm of mercury. (6 marks)

19. With neat sketches classify positive displacement pumps. (12 marks)

Or

20. With a neat sketch explain the working of (i) Hydraulic lift and (ii) Air lift Pump.

(12 marks)

[5 × 12 = 60 marks]

G 6822

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Mechanical Engineering

THEORY OF MACHINES – I (M)

(Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks

1. List out the inversions of a double slider crank chain.
2. Define mechanical advantage and transmission angle of a mechanism.
3. Define function generation and path generation of mechanism.
4. Differentiate between approximate synthesis and exact synthesis of mechanisms.
5. What do you mean by a straight line mechanism? Give examples
6. What is the condition for correct steering?
7. Describe the features of internal expanding brakes used in automobiles.
8. Discuss the advantages of V belts.
9. Explain the law of gearing.
10. Discuss the advantages of involute gear tooth profile.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each question carries 12 marks.

11. (a) Explain Gruebler's criterion for degrees of freedom of plane mechanism.
- (b) What is a quick return mechanism? Explain any one quick return mechanism.

(5 +7 =12 Marks)

Or

Turn over

12. A link AB of a four bar linkage ABCD revolves uniformly at 180 r.p.m. in a clockwise direction. Find the angular acceleration of links BC and CD and acceleration of point E in BC. Given AB=7.5cm, BC=17.5cm, EC=5cm, CD=15cm, DA=10cm and angle BAD=90°.

(12 Marks)

13. Explain the graphical procedures to synthesize four bar mechanism by (a) two position and (b) three position methods.

Or

14. Design a four bar mechanism which can co-ordinate the input and output angles as given below.

Input crank angle : 30° 50° 80°

Output crank angle : 0° 30° 60°

(12 Marks)

15. Sketch and explain the Davis steering mechanism.

Or

16. With a neat sketch explain how a pantograph mechanism can be used to produce the path exactly similar to one traced out by a point on the mechanism.

(12 Marks)

17. (a) What are the different types of clutches?

(b) A 10 kW engine develops a maximum torque of 100 N-m and is driving a car having a single plate clutch of two active surfaces. Axial pressure is not to exceed 0.85 bar. External diameter of friction plate is 1.25 times internal diameter. Assume uniform wear and co-efficient of friction is 0.3. Determine dimension of friction plate and axial force exerted by the springs.

(4 + 8 = 12 Marks)

Or

18. Explain (i) Band and block brake (ii) torsion dynamometer. (12 Marks)

19. Two mating gears have 50 and 13 involute teeth of module 10 mm and 20° pressure angle. The addendum is one module. Does the interference occur? If it occurs, to what value should the pressure angle be changed to eliminate interference?

Or

20. Find an expression for the efficiency of spiral gears which connect two shafts. (12 marks)

[5 × 12 = 60 marks]

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(Regular/Improvement/Supplementary)

(Common for all Branches)

Time : Three Hours

Maximum : 100 Marks

Answer one full question from each module.
Statistical tables permitted.

Module I

- 1. (a) Solve $(1 + y^2)dx = (\tan^{-1}y - x)dy$. (7 marks)
- (b) Solve $(D^2 - 2D + 1)y = e^x \log x$ by the method of variation of parameters. (9 marks)
- (c) Solve $y' + y \tan x = y^3 \sec x$. (4 marks)

Or

- (d) Solve $\left[\left(1 + \frac{1}{x}\right)y + \cos y \right]dx + [x + \log x - x \sin y]dy = 0$. (5 marks)
- (e) Solve $(D^2 - 3D + 2)y = x^2 + e^x$. (7 marks)
- (f) Using method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$. (8 marks)

Module II

- 2. (a) If $u = \sin^{-1} \left(\frac{x^2 + y^2}{x + y} \right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$. (7 marks)
- (b) Using Lagrange's undetermined multipliers find the maximum value of $x^2 + y^2 + z^2$ subject to $ax + by + cz = p$. (8 marks)
- (c) Solve by Cherpit's method $(p^2 + q^2)y = qz$. (5 marks)

Or

- (d) The two ends A and B of a rod 30 cm. long have the temperature at 40° C and 90° C until steady state prevails. The temperatures of the ends are changed to 50° C and 70° C respectively. Find the temperature distribution in the rod at time t . (20 marks)

Turn over

Module III

3. (a) Define Fourier transform of a function $f(x)$. Show that $F[f(x - \alpha)] = e^{i\alpha a} F(\alpha)$, where $F(\alpha)$ is the Fourier transform of $f(x)$.

(5 marks)

- (b) Find the Fourier cosine transform of the function $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x > a \end{cases}$. (7 marks)

- (c) Verify the Parseval's identity for the function $f(x) = \begin{cases} 1, & \text{for } |x| \leq a \\ 0, & \text{for } |x| > a \end{cases}$. (8 marks)

Or

- (d) Find the Fourier transform of: $f(x) = \begin{cases} 1 - x^2, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$. (5 marks)

- (e) Find the Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$, $a > 0$, $x \neq 0$ and hence show that

$$\int_0^{\infty} \tan^{-1}\left(\frac{x}{a}\right) (\sin x) dx = \frac{\pi}{2} e^{-a}$$

(8 marks)

- (f) State and prove the convolution theorem for Fourier transforms. (7 marks)

Module IV

4. (a) If a random variable X has a Poisson distribution with parameter α , then prove that $E(x) = \alpha$, and $V(x) = \alpha$.

(5 marks)

- (b) The probability that a patient recovers from a disease is 0.4. If 18 persons have such a disease, determine the probability that :

(i) exactly 6 survive.

(ii) at least 10 survive.

(iii) from 3 to 9 survive.

(10 marks)

- (c) If X has normal distribution with mean m and variance s^2 , find $P[\mu - \sigma < X < \mu + \sigma]$.

(5 marks)

Or

- (d) Small electric motors are shipped in lots of 50. Before such a shipment is accepted, an inspector chooses 5 of these motors and inspects them. If none of these tested motors are defective, the lot is accepted. If one or more are found to be defective, the entire shipment is inspected. Suppose that there are, in fact, three defective motors in the lot, what is the probability that 100 % inspection is required ?

(10 marks)

- (e) Suppose that the probability that an item produced by a particular machine is defective equal 0.2. If 10 items produced from this machine are selected at random, what is the probability that not more than one defective is found ?

(6 marks)

- (f) Find the probability that 5 out of 10 persons are in favour of a given piece of legislation given that the sample is taken from 100 persons among whom 60 are for it.

(4 marks)

Module V

5. (a) Let \bar{X} be the mean of a random sample of size " n " from a distribution which is $N(\mu, 9)$. Find n such that $P[\bar{X} - 1 < \mu < \bar{X} + 1] = 0.90$.

(10 marks)

- (b) A set of five similar coins is tossed 320 times and the result is :

No. of heads	:	0	1	2	3	4	5
Frequency	:	6	25	74	110	73	32

Test the hypothesis that the data follow a binomial distribution at 0.05 level of significance.

(10 marks)

Or

- (c) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.

x	:	0	1	2	3	4
f	:	419	342	164	54	21

(10 marks)

- (d) The voltage of a voltage source is measured 100 times and the mean voltage is found to be 230.14 V, with a standard deviation of 0.6 V. Test the hypothesis that the mean voltage of the source is 230 V at 0.05 level of significance.

[5 × 20 = 100 marks]

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Mechanical Engineering

MACHINE DRAWING—II (M)

(Regular/Improvement/Supplementary)

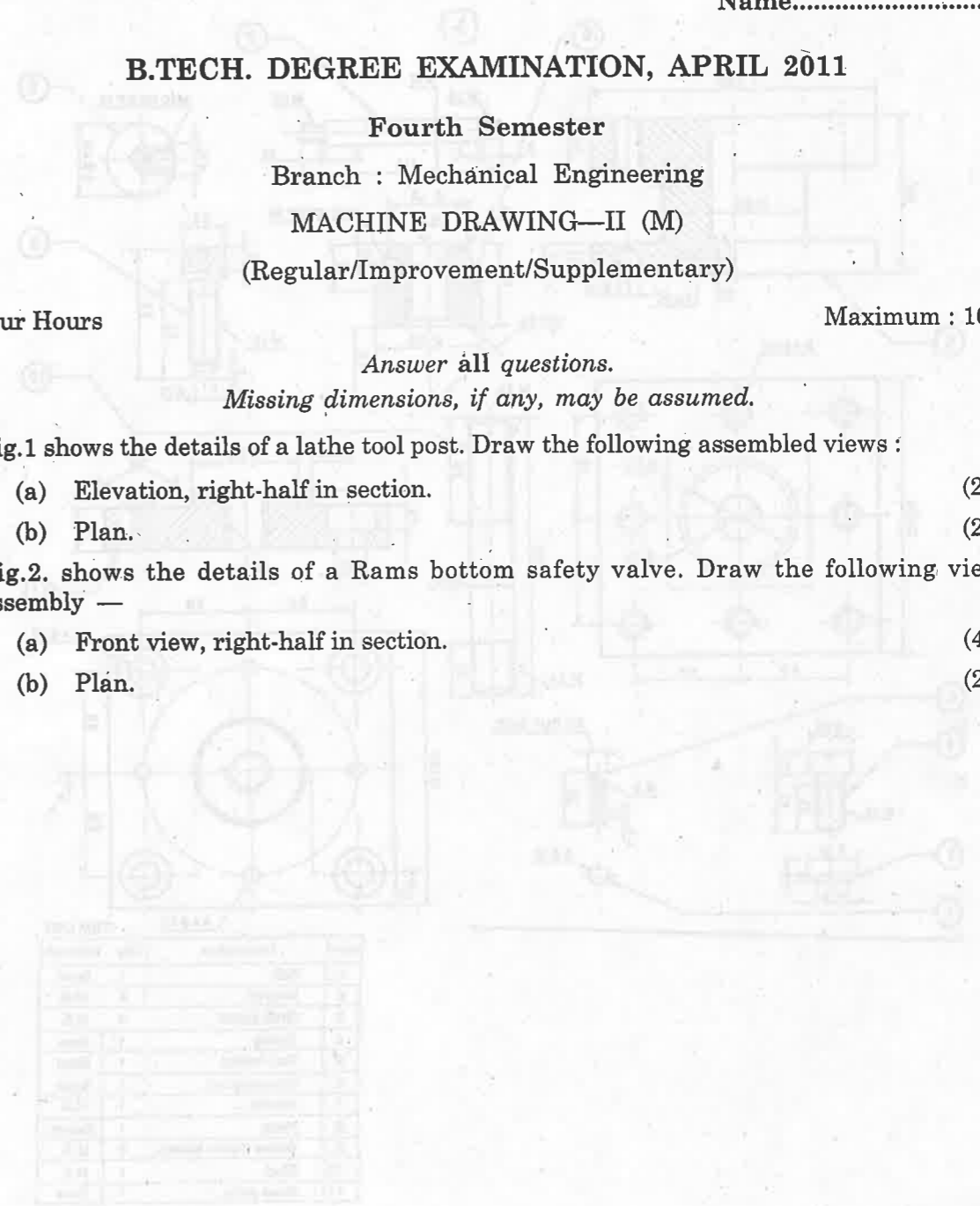
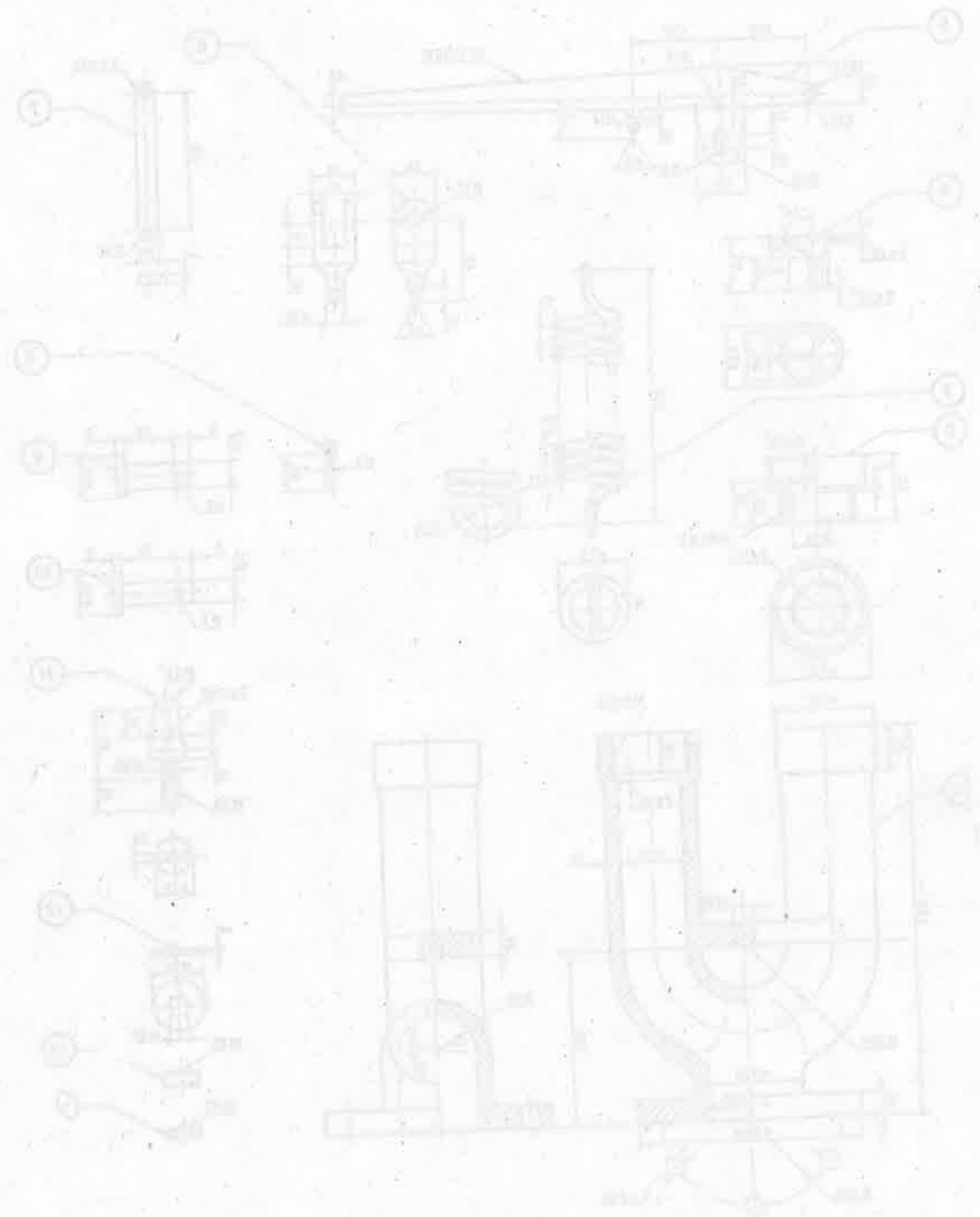
Time : Four Hours

Maximum : 100 Marks

Answer all questions.

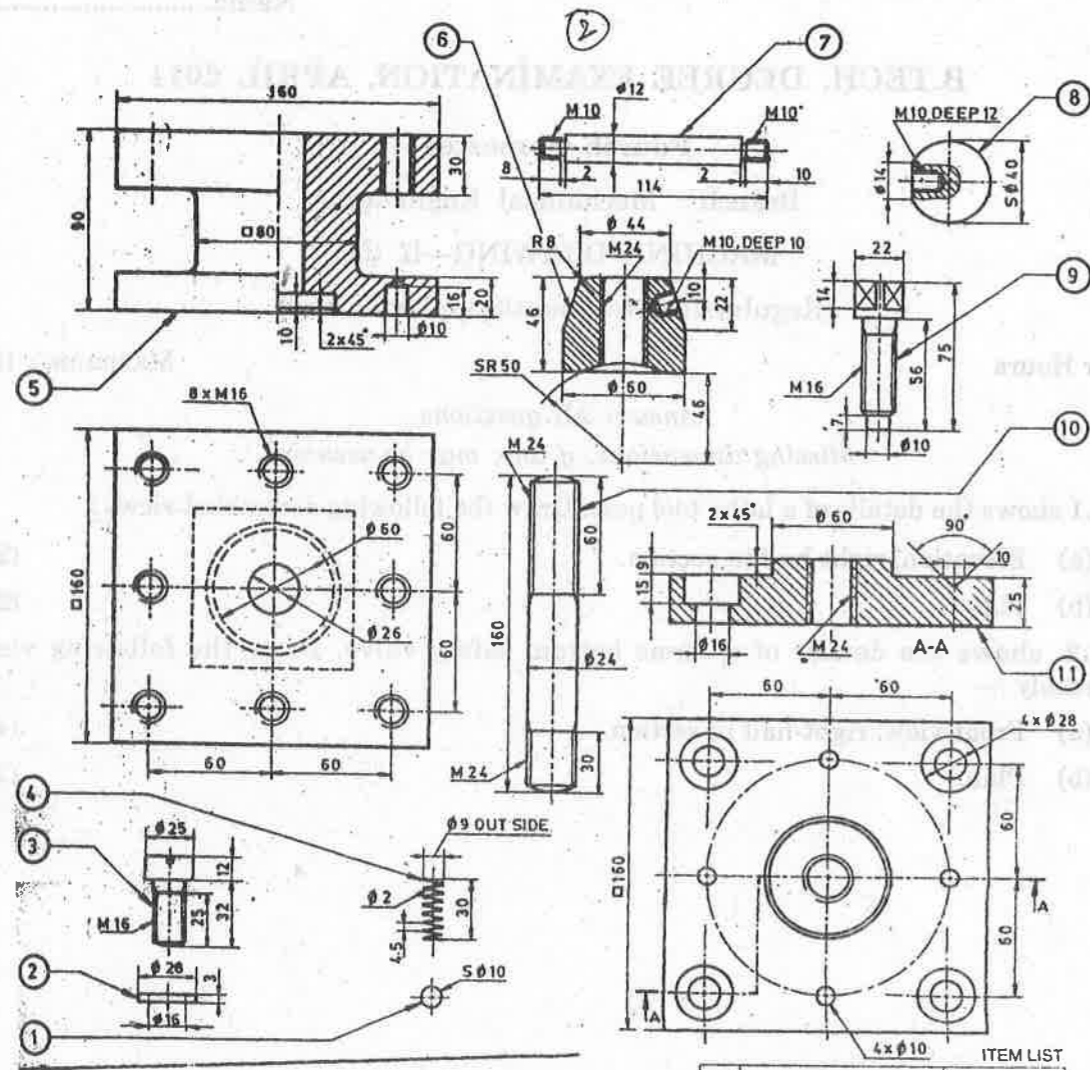
Missing dimensions, if any, may be assumed.

1. Fig.1 shows the details of a lathe tool post. Draw the following assembled views :
 - (a) Elevation, right-half in section. (20 marks)
 - (b) Plan. (20 marks)
2. Fig.2. shows the details of a Rams bottom safety valve. Draw the following views after assembly —
 - (a) Front view, right-half in section. (40 marks)
 - (b) Plan. (20 marks)



RAMS BOTTOM SAFETY VALVE

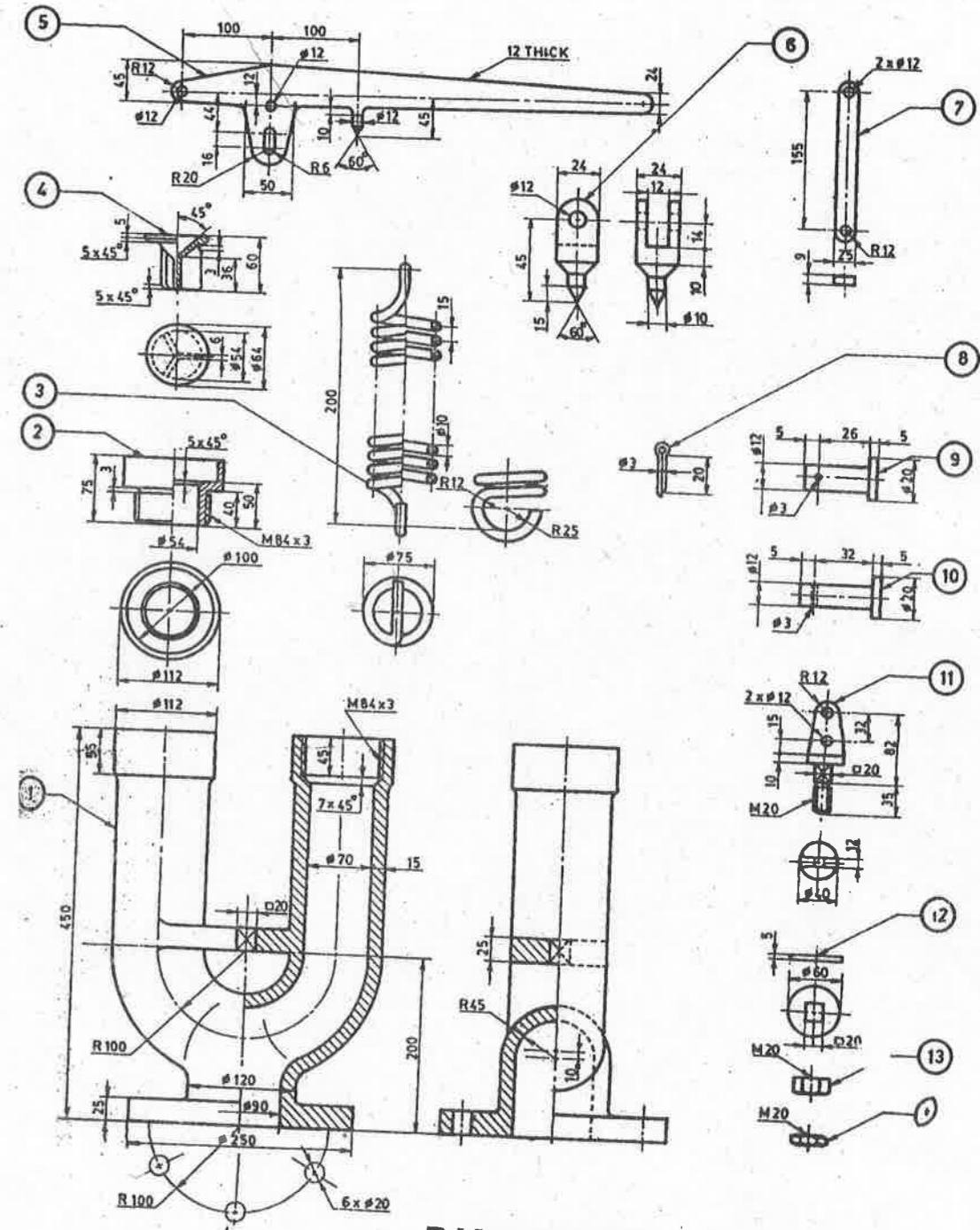
LATHE TOOL POST



Item	Description	Qty.	Material
1	Ball	1	Steel
2	Washer	4	M.S.
3	Grub screw	4	M.S.
4	Spring	1	Steel
5	Tool holder	1	Steel
6	Clamping nut	1	Steel
7	Handle	1	M.S.
8	Knob	1	Ebonite
9	Screw (Square headed)	8	M.S.
10	Stud	1	M.S.
11	Base plate	1	Steel

LATHE TOOL-POST
(MULTIPLE TOOL)

Fig. 1



RAMS BOTTOM SAFETY VALVE

Fig. 2

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(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Mechanical Engineering, Automobile Engineering

ELECTRICAL TECHNOLOGY (M, U)

(Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer all questions briefly.
Each question carries 4 marks.*

1. Define voltage regulation of a transformer. Given two transformers of identical rating having a voltage regulation of 8% and 4% respectively, which one will you choose ? Give reason for your selection.
2. Explain the significance of back e.m.f. in the operation of a dc motor under loaded condition.
3. Show that the maximum torque developed by an induction motor is independent of rotor resistance.
4. What are the advantages of having excitation for an alternator on rotor ? Explain salient pole alternator.
5. Explain with a diagram, the different models of operation of a d.c. drive.
6. Explain Electric traction and its uses.
7. What is feedback in amplifiers ? Explain the different types and their advantages.
8. With a neat circuit diagram, explain the working of a diode positive clamper.
9. Why pulse triggering is preferred is SCR and when does it fail ?
10. Define and distinguish between latching current and holding current of SCR.

(10 × 4 = 40 marks)

Part B

*Answer either Section (a) or (b) of each module.
Each full question carries 12 marks.*

MODULE 1

11. (a) (i) With neat diagram, explain the test to be conducted on a transformer to find its regulation.

(4 marks)

Turn over

- (ii) A single phase transformer working at UPF has an efficiency of 90% at both one half load and at the full load of 500W. Determine the efficiency at 75% full load.

(8 marks)

Or

- (b) (i) Explain the brake test and its practical significance.

(4 marks)

- (ii) A 4-pole, 250V lap wound dc series motor has armature and series field resistances of 0.02Ω and 0.2Ω respectively. There are 672 armature conductors. If the flux per pole is 0.25 Wb, and the total torque developed is 348 Nm, find the current taken by the motor and its speed.

(8 marks)

MODULE 2

12. (a) (i) Draw and explain torque-slip characteristics of 3-4 phase induction motor by making necessary deductions - Obtain the condition for maximum torque.

(6 marks)

- (ii) A synchronous motor absorbing 60 kW is connected in parallel with a factory load of 200 kW having a lagging power factor of 0.8. If the combined load has a power factor of 0.9, what is the value of leading KVAR supplied by the motor and at what power factor is it working?

(6 marks)

Or

- (b) (i) Why does the rotor rotate in the same direction of the rotating magnetic field in a 3-phase induction motor? Explain.

(4 marks)

- (ii) A 4-pole, 3 phase, 50 Hz, star connected alternator has 60 slots, with 4 conductors per slot. Coils are short pitched by 3 slots. If the phase spread is 60° , find the line voltage induced for a flux per pole of 0.9Wb distributed sinusoidally in space. All the turns per phase are in series.

(8 marks)

MODULE 3

13. (a) Explain the characteristics of motors to be used in (i) steel mill, (ii) crane, (iii) mine.

(3 × 4 = 12 marks)

Or

- (b) Explain electric braking and plugging method. Describe and distinguish between Regeneration and dynamic braking.

(12 marks)

MODULE 4

14. (a) (i) With a neat circuit diagram, explain the working of Wienbridge oscillator?

(6 marks)

- (ii) Draw the complete block diagram of a CRO and describe how it traces a sine wave.

(6 marks)

Or

- (b) With the help of neat circuit diagram and waveforms, explain the working of an astable multivibrator.

(12 marks)

MODULE 5

15. (a) Draw the VI characteristics of SCR, clearly labelling the various sections of the characteristics and explain. How the current through a load can be controlled by phase control of SCR with a.c. supply? Explain with reference to an illustrative circuit and waveforms.

(12 marks)

Or

- (b) With neat block schematic, explain resistance welding. Describe clearly the various timers used?

(12 marks)

[5 × 12 = 60 marks]