उच्च एवं तकनीकी शिक्षा विभाग

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संख्याः–तoशिoप्रoस्थाo–13 / 2019 / तिथि.....

अधिसूचना

'भारत का संविधान' के अनुच्छेद 309 की परन्तुक द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए झारखण्ड के राज्यपाल झारखण्ड, अभियंत्रण / बहुप्रावैधिकी सेवा संवर्ग के समूह "ख" एवं समूह "ग" तकनीकी अराजपत्रित पद पर नियुक्ति, प्रोन्नति एवं सेवा शर्तो को विनियमित करने के लिए निम्नलिखित नियमावली बनाते है :–

1. संक्षिप्त नाम, विस्तार एवं प्रारम्भ :–

(1) यह नियमावली "झारखण्ड अभियंत्रण / बहुप्रावैधिकी सेवा संवर्ग (ग्रुप 'ख' एवं 'ग' तकनीकी अराजपत्रित पद) सेवा नियमावली, 2023" कहलायेगी।

(2) इसका विस्तार सम्पूर्ण झारखण्ड राज्य में होगा।

(3) यह नियमावली "झारखण्ड राजपत्र" में प्रकाशन की तिथि से प्रवृत्त होगी।

2. परिभाषाएँ :–

इन नियमों में जबतक संदर्भ से अन्यथा अपेक्षित न हो :–

(i) "राज्यपाल" से अभिप्रेत है, झारखण्ड के राज्यपाल।

(ii) "समिति" से अभिप्रेत है, विनिर्दिष्ट सदस्यों से मिलकर सरकार द्वारा निर्धारित पदोन्नति समिति।

(iii) "नियुक्ति प्राधिकारी" से अभिप्रेत है, समूह "ख" के लिये सचिव, उच्च एवं तकनीकी शिक्षा विभाग तथा समूह "ग" तक के लिये निदेशक, तकनीकी शिक्षा, झारखण्ड, रांची।

(iv) "अनुसूचित जाति" से अभिप्रेत है, भारत का संविधान के अनुच्छेद 341 के अधीन इस राज्य के संबंध में यथा उल्लेखित अनुसूचित जाति।

(v) "अनुसूचित जनजाति" से अभिप्रेत है, भारत का संविधान के अनुच्छेद 342 के अधीन इस राज्य के संबंध में यथा उल्लेखित अनुसूचित जनजाति।

(vi) "अन्य पिछड़े वर्ग" से अभिप्रेत है, राज्य सरकार द्वारा समय–समय पर निर्गत अधिसूचना जो अन्य पिछड़े वर्ग के लिये हो।

(vii) "सेवा" से अभिप्रेत है, "झारखण्ड अभियंत्रण / बहुप्रावैधिकी सेवा / संवर्ग के ग्रुप–'ख' एवं 'ग' तकनीकी अराजपत्रित पद सेवा।

(viii) "प्रतियोगिता परीक्षा" से अभिप्रेत है, भर्ती के लिये नियम 6 के अधीन आयोजित प्रतियोगिता परीक्षा।

(ix) "आयोग" से अभिप्रेत है, झारखण्ड राज्य कर्मचारी चयन आयोग।

(x) "अनुसूची" से अभिप्रेत है, इस नियमावली के साथ में संलग्न अनुसूची।

(xi) "समूह 'ख' के पदों" से अभिप्रेत है कोई ऐसा पद, जिसका वेतन अथवा जिसके वेतनमान कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग के द्वारा निर्धारित समूह 'ख' हो।

(xii) "समूह 'ग' के पदों" से अभिप्रेत है कोई ऐसा पद, जिसका वेतन अथवा जिसके वेतनमान कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग के द्वारा निर्धारित समूह 'ग' हो।

(xiii) "विभाग" से अभिप्रेत है, उच्च एवं तकनीकी शिक्षा विभाग।

3. <u>विस्तार तथा प्रयुक्ति</u> :–

झारखण्ड राज्य में राजकीय सेवा/संवर्ग के लिये गठित एवं प्रवृत्त सामान्य नियम में अन्तर्विष्ट उपबंधों की व्यापकता पर प्रतिकूल प्रभाव डाले बिना ये नियम सेवा/संवर्ग के प्रत्येक सदस्य पर लागू होंगे।

4. <u>सेवा का गठन</u> :– सेवा/संवर्ग में निम्नलिखित व्यक्ति होंगे अर्थात :–

क. वे व्यक्ति जो इन नियमों के प्रारंभ होने के समय अनुसूची में विनिर्दिष्ट पद मूल रूप से या स्थानापन्न रूप से धारण कर रहे हो।

ख. वे व्यक्ति, जो इन नियमों के प्रारंभ होने के पूर्व सेवा में भर्ती किये गये हो, और

ग. वे व्यक्ति, जो इन नियमों के उपबंधो के अनुसार सेवा में भर्ती किये जाऐंगे।

5. <u>सेवा की संरचना</u> :–

(क) अनुदेशक संवर्ग (Electrical)

(i) अनुदेशक संवर्ग (Electrical) में निम्न प्रकार से वर्गीकृत 03 (तीन) कोटियाँ होंगी:–

	कोटि	वर्गीकरण
(a)	सहायक कर्मशाला अधीक्षक (Electrical)	राज्य असैनिक सेवा समूह 'ख'
(b)	फोरमेन (Electrical)	राज्य असैनिक सेवा समूह 'ख'
(c)	कनीय अनुदेशक (Electrical)	राज्य असैनिक सेवा समूह 'ग'

(ख) अनुदेशक संवर्ग (Machinist)

(i) अनुदेशक संवर्ग (Machinist) में निम्न प्रकार से वर्गीकृत 03 (तीन) कोटियाँ होंगी :–

	कोटि	वर्गीकरण
(a)	सहायक कर्मशाला अधीक्षक (Machinist)	राज्य असैनिक सेवा समूह 'ख'
(b)	फोरमेन (Machinist)	राज्य असैनिक सेवा समूह 'ख'
(c)	कनीय अनुदेशक (Machinist)	राज्य असैनिक सेवा समूह 'ग'

(ग) प्रयोगशाला सहायक संवर्ग (विज्ञान)

(i) प्रयोगशाला सहायक (विज्ञान) में निम्न प्रकार से वर्गीकृत 03 (तीन) कोटियाँ होंगी :–

	कोटि	वर्गीकरण
(a)	मुख्य प्रयोगशाला सहायक (विज्ञान)	राज्य असैनिक सेवा समूह 'ख'
(b)	प्रयोगशाला सहायक कोटि–1 (विज्ञान)	राज्य असैनिक सेवा समूह 'ख'
(c)	प्रयोगशाला सहायक (विज्ञान)	राज्य असैनिक सेवा समूह 'ग'

(घ) प्रयोगशाला सहायक संवर्ग (अभियंत्रण संबंधित विषय)

(i) प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) में निम्न प्रकार से वर्गीकृत 03 (तीन) कोटियाँ होंगी :–

	कोटि	वर्गीकरण
(a)	मुख्य प्रयोगशाला सहायक (अभियंत्रण सम्बंधित विषय)	राज्य असैनिक सेवा समूह 'ख'
(b)	प्रयोगशाला सहायक कोटि–1 (अभियंत्रण सम्बंधित विषय)	राज्य असैनिक सेवा समूह 'ख'
(c)	प्रयोगशाला सहायक (अभियंत्रण सम्बंधित विषय)	राज्य असैनिक सेवा समूह 'ग'

(ङ) उक्त संवर्गो के सभी ग्रेड के पद अराजपत्रित होंगे।

6. <u>उक्त संवर्गों में भर्तियाँ</u> :–

(क) अनुदेशक संवर्ग (Electrical) में भर्ती :–

(i) सहायक कर्मशाला अधीक्षक (Electrical) ग्रेडः–

सहायक कर्मशाला अधीक्षक (Electrical) ग्रेड की रिक्तियाँ वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन फोरमेन (Electrical) से भरी जाएँगी, जिनके द्वारा फोरमेन (Electrical) के पद पर 05 (पांच) वर्ष की अन्यून अनुमोदित सेवा पूरी कर ली गयी हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमे किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(ii) फोरमेन (Electrical) ग्रेड :–

फोरमेन (Electrical) ग्रेड की रिक्तियां वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन कनीय अनुदेशक (Electrical) से भरी जाएंगी, जिनके द्वारा कनीय अनुदेशक (Electrical) के पद पर 06 (छः) वर्ष की अन्यून अनुमोदित सेवा पूरी कर ली गई हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमें किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(iii) कनीय अनुदेशक (Electrical) ग्रेड :–

कनीय अनुदेशक (Electrical) ग्रेड की रिक्तियां समय–समय पर आयोग द्वारा एतदर्थ आयोजित प्रतियोगिता परीक्षा के आधार पर सीधी भर्ती से भरे जाएंगे। इस परीक्षा का पाठ्यक्रम अनुसूची–2 के अनुरूप होगा।

(ख) अनुदेशक संवर्ग (Machinist) में भर्ती :–

(i) सहायक कर्मशाला अधीक्षक (Machinist) ग्रेडः–

सहायक कर्मशाला अधीक्षक (Machinist) ग्रेड की भर्तियां वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन फोरमेन (Machinist) से भरी जायेंगी, जिनके द्वारा फोरमेन (Machinist) के पद पर 05 (पांच) वर्ष के अन्यून अनुमोदित सेवा पूरी कर ली गई हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमें किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(ii) फोरमेन (Machinist) ग्रेड :–

फोरमेन (Machinist) ग्रेड की रिक्तियां वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन कनीय अनुदेशक (Machinist) से भरे जाएंगे, जिनके द्वारा कनीय अनुदेशक (Machinist) के पद पर 06 (छः) वर्ष की अन्यून अनुमोदित सेवा पूरी कर ली गई हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमें किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(iii) कनीय अनुदेशक (Machinist) ग्रेड :–

कनीय अनुदेशक (Machinist) ग्रेड की रिक्तियां समय–समय पर आयोग द्वारा एतदर्थ आयोजित प्रतियोगिता परीक्षा के आधार पर सीधी भर्ती से भरे जाएंगे। इस परीक्षा का पाठ्यक्रम अनुसूची–2 के अनुरूप होगा।

(ग) प्रयोगशाला सहायक संवर्ग (विज्ञान) में भर्ती :–

(i) मुख्य प्रयोगशाला सहायक (विज्ञान) ग्रेडः–

मुख्य प्रयोगशाला सहायक (विज्ञान) ग्रेड की रिक्तियां वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन प्रयोगशाला सहायक कोटि–1 (विज्ञान) से भरे जाएंगे, जिनके द्वारा प्रयोगशाला सहायक कोटि–1 (विज्ञान) के पद पर 05 (पांच) वर्ष की अन्यून अनुमोदित सेवा पूरी कर ली गई हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमें किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(ii) प्रयोगशाला सहायक कोटि–1 (विज्ञान) ग्रेड :–

प्रयोगशाला सहायक कोटि–1 (विज्ञान) ग्रेड की रिक्तियां वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन प्रयोगशाला सहायक (विज्ञान) से भरे जाएंगे, जिनके द्वारा प्रयोगशाला सहायक (विज्ञान) के पद पर 06 (छः) वर्ष की अन्यून अनुमोदित सेवा पूरी कर ली गई हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमें किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(iii) प्रयोगशाला सहायक (विज्ञान) ग्रेड :–

प्रयोगशाला सहायक (विज्ञान) ग्रेड की रिक्तियां समय–समय पर आयोग द्वारा एतदर्थ आयोजित प्रतियोगिता परीक्षा के आधार पर सीधी भर्ती से भरे जाएंगे। इस परीक्षा का पाठ्यक्रम अनुसूची–2 के अनुरूप होगा।

(घ) प्रयोगशाला सहायक संवर्ग (अभियंत्रण संबंधित विषय) में भर्ती :–

(i) मुख्य प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) ग्रेडः–

मुख्य प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) ग्रेड की रिक्तियां वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन प्रयोगशाला सहायक कोटि–1 (अभियंत्रण संबंधित विषय) से भरी जाएंगी, जिनके द्वारा प्रयोगशाला सहायक कोटि–1 (अभियंत्रण संबंधित विषय) के पद पर 05 (पांच) वर्ष की अन्यून अनुमोदित सेवा पूरी कर ली गई हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमें किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(ii) प्रयोगशाला सहायक कोटि–1 (अभियंत्रण संबंधित विषय) ग्रेड :–

प्रयोगशाला सहायक कोटि–1 (अभियंत्रण संबंधित विषय) ग्रेड की रिक्तियां वरीयता–सह–योग्यता के आधार पर प्रोन्नति द्वारा उन प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) से भरी जाएंगी, जिनके द्वारा प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) के पद पर 06 (छः) वर्ष की अन्यून अनुमोदित सेवा पूरी कर ली गई हो तथा राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल 04 सप्ताह का प्रशिक्षण, जिसमें किसी भी प्रशिक्षण की अवधि न्यूनतम एक सप्ताह से कम न हो एवं जिनकी प्रोन्नति की अनुशंसा एतद् हेतु गठित प्रोन्नति समिति से प्राप्त हो।

(iii) प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) ग्रेड :–

प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) ग्रेड की रिक्तियां समय–समय पर आयोग द्वारा एतदर्थ आयोजित प्रतियोगिता परीक्षा के आधार पर सीधी भर्ती से भरे जाएंगे। इस परीक्षा का पाठ्यक्रम अनुसूची–2 के अनुरूप होगा।

(iv) संबंधित विषय से तात्पर्य है संबंधित इंजीनियरिंग विषय यथा असैनिक (Civil), यांत्रिकी (Mechanical), विद्युत (Electrical), इलेक्ट्रॉनिक एवं दूरसंचार (Electronics & Communication), धातुकर्म (Metallurgy), रसायन (Chemical), खनन (Mining), कम्प्यूटर साईंस एवं अभियंत्रण (Computer Science & Engineering) इत्यादि।

7. <u>वेतनमान</u> :–

(क) विभिन्न संवर्गों एवं विभिन्न ग्रेडों के वेतनमान निम्न प्रकार होंगे:–

(i) अनुदेशक संवर्ग (Electrical)

क्र.सं.	कोटि	अपुनरीक्षित वेतनमान	पुनरीक्षित वेतनमान
1	2	3	4
(a)	सहायक कर्मशाला अधीक्षक (Electrical)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4600	वेतन मैट्रिक्स– Level 7
(b)	फोरमेन (Electrical)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4200	वेतन मैट्रिक्स– Level 6
(c)	कनीय अनुदेशक (Electrical)	पी.बी.–I रु० 5200–20200 ग्रेड पे०–रु० 2800	वेतन मैट्रिक्स– Level 5

(ii) अनुदेशक संवर्ग (Machinist)

क्र.सं.	कोटि	अपुनरीक्षित वेतनमान	पुनरीक्षित वेतनमान
1	2	3	4
(a)	सहायक कर्मशाला अधीक्षक (Machinist)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4600	वेतन मैट्रिक्स– Level 7
(b)	फोरमेन (Machinist)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4200	वेतन मैट्रिक्स– Level 6
(c)	कनीय अनुदेशक (Machinist)	पी.बी.–I रु० 5200–20200 ग्रेड पे०–रु० 2800	वेतन मैट्रिक्स– Level 5

(iii) प्रयोगशाला सहायक संवर्ग (विज्ञान संबंधित विषय)

क्र.सं.	कोटि	अपुनरीक्षित वेतनमान	पुनरीक्षित वेतनमान
1	2	3	4
(a)	मुख्य प्रयोगशाला सहायक (विज्ञान)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4600	वेतन मैट्रिक्स– Level 7
(b)	प्रयोगशाला सहायक कोटि–1 (विज्ञान)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4200	वेतन मैट्रिक्स– Level 6
(c)	प्रयोगशाला सहायक (विज्ञान)	पी.बी.–I रु० 5200–20200 ग्रेड पे०–रु० 2800	वेतन मैट्रिक्स– Level 5

(iv) प्रयोगशाला सहायक संवर्ग (अभियंत्रण संबंधित विषय)

क्र.सं.	कोटि	अपुनरीक्षित वेतनमान	पुनरीक्षित वेतनमान
1	2	3	4
(a)	मुख्य प्रयोगशाला सहायक (अभियंत्रण सम्बंधित विषय)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4600	वेतन मैट्रिक्स– Level 7
(b)	प्रयोगशाला सहायक कोटि–1 (अभियंत्रण सम्बंधित विषय)	पी.बी.–II रु० 9300–34800 ग्रेड पे०–रु० 4200	वेतन मैट्रिक्स– Level 6
(c)	प्रयोगशाला सहायक (अभियंत्रण सम्बंधित विषय)	पी.बी.–I रु० 5200–20200 ग्रेड पे०–रु० 2800	वेतन मैट्रिक्स– Level 5

8. <u>न्यूनतम शैक्षणिक योग्यता</u> :–

क्र. सं.	पदनाम	न्यूनतम शैक्षणिक योग्यता
क)	कनीय अनुदेशक (Electrical)	क) मैट्रिक / 10वीं उत्तीर्ण ख) संबंधित व्यवसाय (Electrical) में राष्ट्रीय व्यवसायिक प्रशिक्षण परिषद् (NCVT) से मान्यता प्राप्त संस्थान से आई0टी0आई0 में उत्तीर्ण एवं 01 वर्ष का Apprenticeship अथवा अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) मान्यता प्राप्त संस्थान से **विद्युत** में त्रिवर्षीय डिप्लोमा। ग) राष्ट्रीय कौशल योग्यता फ्रेमवर्क (NSQF) / इंदिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय (IGNOU) / राज्य अथवा केंद्र सरकार / विश्वविद्यालय / बोर्ड से मान्यता प्राप्त Certificate Course in Computer Application / Info. Tech. का छः माह का उत्तीर्णता प्रमाण पत्र।
ख)	कनीय अनुदेशक (Machinist)	क) मैट्रिक / 10वीं उत्तीर्ण ख) संबंधित व्यवसाय (Machinist) में राष्ट्रीय व्यवसायिक प्रशिक्षण परिषद् (NCVT) से मान्यता प्राप्त संस्थान से आई0टी0आई0 में उत्तीर्ण एवं 01 वर्ष का Apprenticeship अथवा अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) मान्यता प्राप्त संस्थान से **यांत्रिकी** में त्रिवर्षीय डिप्लोमा। ग) राष्ट्रीय कौशल योग्यता फ्रेमवर्क (NSQF) / इंदिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय (IGNOU) / राज्य अथवा केंद्र सरकार / विश्वविद्यालय / बोर्ड से मान्यता प्राप्त Certificate Course in Computer Application / Info. Tech का छः माह का उत्तीर्णता प्रमाण पत्र।
ग)	प्रयोगशाला सहायक (विज्ञान सम्बंधित विषय)	विश्वविद्यालय अनुदान आयोग (UGC) से मान्यता प्राप्त किसी संस्थान / विश्वविद्यालय से सम्बंधित विज्ञान विषय में प्रतिष्ठा (Honours) के साथ स्नातक डिग्री।
घ)	प्रयोगशाला सहायक (अभियंत्रण सम्बंधित विषय)	अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त किसी संस्थान से संबंधित अभियंत्रण (Engineering) विषय, जिसमे नियुक्ति होनी हो यथा असैनिक (Civil), यांत्रिकी (Mechanical), विद्युत (Electrical), इलेक्ट्रॉनिक एवं दूरसंचार (Electronics & Communication), धातुकर्म (Metallurgy), रसायन (Chemical), खनन (Mining), कम्प्यूटर साईंस एवं अभियंत्रण (Computer Science & Engineering) इत्यादि में त्रिवर्षीय डिप्लोमा।

9. आयु सीमा :–

(1) कनीय अनुदेशक (Electrical), कनीय अनुदेशक (Machinist), प्रयोगशाला सहायक (विज्ञान) एवं प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) के पद लिए न्यूनतम आयु सीमा 21 वर्ष होगी।

(2) कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग द्वारा समय–समय पर यथा निर्धारित अधिकतम आयु सीमा उक्त पदों पर भर्तियों के सन्दर्भ में प्रभावी होगी।

(3) न्यूनतम एवं अधिकतम आयु सीमा का निर्धारण हेतु सन्दर्भ तिथि अधियाचना वर्ष की पहली अगस्त होगी।

10. परीक्षा का स्वरुप एवं पाठ्यक्रम :–

कनीय अनुदेशक (Electrical), कनीय अनुदेशक (Machinist), प्रयोगशाला सहायक (विज्ञान संबंधित विषय) एवं प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) के पद पर भर्ती हेतु आयोजित प्रतियोगिता परीक्षा का पाठ्यक्रम इस नियमावली के नियम–6 के प्रावधानों के अनुसार निर्धारित होगा।

कनीय अनुदेशक (Electrical), कनीय अनुदेशक (Machinist) एवं प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) के पद के परीक्षा का स्वरूप कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग द्वारा गठित झारखण्ड कर्मचारी चयन आयोग परीक्षा (डिप्लोमा/तकनीकी एवं अन्य विशिष्ट योग्यता स्तर) संचालन नियमावली के आलोक में तथा प्रयोगशाला सहायक (विज्ञान संबंधित विषय) के पद के परीक्षा का स्वरूप कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग द्वारा गठित झारखण्ड कर्मचारी चयन आयोग परीक्षा (स्नातक स्तर तकनीकी/विशिष्ट योग्यता वाले पद) संचालन नियमावली के आलोक में होगा।

11. निरहर्ताएं :–

अभ्यर्थी द्वारा किसी भी प्रकार की समर्थन प्राप्त करने हेतु प्रयत्न किये जाने पर अभ्यर्थी को अयोग्य घोषित किया जायगा।

12. अभ्यर्थियों की पात्रता एवं अपात्रता के सबंध में नियुक्ति प्राधिकारी का विनिश्चय अन्तिम होगा।

13. सीधी भर्ती के लिए उपलब्ध रिक्त पदों के लिए सरकार द्वारा निर्धारित आरक्षण रोस्टर का अनुपालन कर नियुक्ति की जाएगी। विभिन्न संस्थानों के लिए प्रयोगशाला सहायक एवं अनुदेशकों के लिए शाखा एवं ट्रेड अनुसूची–1 के अनुरूप होगी।

भविष्य में विभाग द्वारा आवश्यकता अनुरूप विभिन्न शाखा एवं ट्रेड के पदों को पुनः संरचना (Restructuring) किये जाने पर वह इस नियमावली का भाग होगा।

14. वर्ग 'ख' एवं 'ग' के पद राज्य स्तरीय पद है, जिसके लिए राज्य स्तरीय वरीयता सूची तैयार कर ली जाएगी।

15. अभ्यर्थियों से आवेदन विज्ञापन प्रकाशन कर आमंत्रित किये जायेंगे।

16. इस नियमावली के अंतर्गत सेवा के किसी पद के लिये पात्र सरकारी सेवक, उचित माध्यम से विभागीय अनुमति प्राप्त कर आवेदन करेंगे।

17. अनुशंसित अभ्यर्थियों की सूची :–

(1) यदि नियुक्ति प्राधिकारी सूची में कोई परिवर्तन करना आवश्यक समझे तो नियुक्ति प्राधिकारी प्रस्तावित परिवर्तन की जानकारी सरकार को देगा तथा सूची को अन्तिम रूप से सरकार के परामर्श से अनुमोदित कर सकेगा।

(2) सूची में किसी अभ्यर्थी का नाम सम्मिलित किए जाने से ही उसे नियुक्ति का कोई अधिकार प्राप्त नहीं हो जाता, जब तक नियुक्ति प्राधिकारी नियुक्ति प्रक्रिया से सन्तुष्ट न हो लें।

(3) नियुक्ति के पूर्व नियुक्ति पदाधिकारी द्वारा चयनित अभ्यर्थियों के सभी मूल प्रमाण पत्रों का सत्यापन उपरान्त ही नियुक्ति पत्र निर्गत किये जायेंगे।

18. चयन सूची से सेवा में नियुक्ति :–

(1) चयन सूची में सम्मिलित व्यक्तियों की सेवा के संवर्ग अंतर्गत आने वाले पदों पर नियुक्तियां उसी क्रम से की जाएगी जिस क्रम में ऐसे व्यक्तियों के नाम चयन सूची में हों।

(2) किसी ऐसे व्यक्तियों को, जिसका नाम चयन सूची में सम्मिलित है, सेवा में नियुक्त किए जाने के लिए पुनर्विचार करना सामान्यतः तब तक आवश्यक नहीं होगा, जब तक चयन सूची में उसका नाम सम्मिलित किये जाने तथा प्रस्तावित नियुक्ति की तारीख के बीच की कालावधि के दौरान उसके कार्य में ऐसी कोई गिरावट न आई हो, जो नियुक्ति प्राधिकारी की राय में ऐसी हो जिसके कारण वह सेवा में नियुक्ति के लिए अनुपयुक्त हो गया हो।

19. प्रोन्नति :–

(1) नियमावली के नियम 6 में निर्धारित योग्यता एवं अनुभव रखने वाले उन सभी अभ्यर्थियों के नामों पर विभागीय प्रोन्नति समिति, जो सरकार द्वारा समय–समय पर कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग के अनुदेशों के आलोक में गठित की जायेगी, प्रोन्नति देने हेतु विचार करेगी और अपनी अनुशंसा तकनीकी शिक्षा निदेशालय को देगी। तकनीकी शिक्षा निदेशालय से प्राप्त प्रस्ताव पर विभाग द्वारा अंतिम रूप से निर्णय लिया जायेगा। पदोन्नति देते वक्त ज्येष्ठता–सह–उपयुक्तता का सिद्धान्त लागू की जायेगी।

(2) कालावधि– संवर्गीय उच्चतर पदों पर प्रोन्नति हेतु कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग द्वारा निर्गत कालावधि विषयक प्रावधान लागू होंगे।

20. पदोन्नति के लिए पात्रता संबंधी शर्तें :–

समिति उन समस्त व्यक्तियों के मामले पर विचार करेगी, जिन्होंने पद पर योगदान की तिथि को कम से कम उतने वर्षों की सेवा, पूरी कर ली है, जो निम्न है:–

क्र. सं.	पदनाम एवं वेतनमान	सीधी नियुक्ति एवं प्रोन्नति का क्रमशः अनुपात	प्रोन्नति हेतु कालावधि
01	02	03	04
01	फोरमेन, वेतनमान 9300–34800, ग्रेड पे0 4200/ Level–6	प्रोन्नति– 100%	कनीय अनुदेशक के पद पर 6 वर्ष का संबंधित ट्रेड में अनुभव एवं राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल चार सप्ताह का प्रशिक्षण अनिवार्य होगा, जिसमें किसी भी प्रशिक्षण के लिए न्यूनतम अवधि एक सप्ताह की होगी।
02	सहायक कर्मशाला अधीक्षक, वेतनमान् 9300–34800, ग्रेड पे0 4600/ Level–7	प्रोन्नति– 100%	फोरमेन के पद पर 5 वर्ष का संबंधित ट्रेड में अनुभव एवं राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल चार सप्ताह का प्रशिक्षण अनिवार्य होगा, जिसमें किसी भी प्रशिक्षण के लिए न्यूनतम अवधि एक सप्ताह की होगी।
01	प्रयोगशाला सहायक कोटि–1 वेतनमान् 9300–34800 ग्रेड पे0 4200/ Level–6	प्रोन्नति–100%	प्रयोगशाला सहायक के रूप में न्यूनतम 6 वर्षों के अनुभव के साथ राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल चार सप्ताह का प्रशिक्षण अनिवार्य होगा, जिसमें किसी भी प्रशिक्षण के लिए न्यूनतम अवधि एक सप्ताह की होगी।
02	मुख्य प्रयोगशाला सहायक, वेतनमान् 9300–34800 ग्रेड पे0 4600/ Level–7	प्रोन्नति–100%	प्रयोगशाला सहायक कोटि–1 के रूप में न्यूनतम 5 वर्षों के अनुभव के साथ राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान (NITTTR)/अखिल भारतीय तकनीकी शिक्षा परिषद् (AICTE) से मान्यता प्राप्त विभिन्न टूल रूम द्वारा संचालित कुल चार सप्ताह का प्रशिक्षण अनिवार्य होगा, जिसमें किसी भी प्रशिक्षण के लिए न्यूनतम अवधि एक सप्ताह की होगी।

21. <u>परिवीक्षा अवधि</u> :–

(1) सेवा में रिक्त अधिष्ठायी पदों पर सीधी भर्ती द्वारा की गई नियुक्तियाँ, परीक्ष्यमान पद पर होंगी। परीक्ष्यमान अवधि, पद पर योगदान की तिथि से दो वर्षों तक रहेगी।

(2) यदि किसी कर्मचारी के कार्य या आचरण सभी प्रकार से संतोषजनक नहीं पाए गए, अथवा वे अपनी कार्य दक्षता प्रमाणित नहीं कर सके तो उन्हें सेवा से बर्खास्त किया जा सकता है।

(3) सेवा के किसी पद पर बिताई गई अवधि, जिसके अन्तर्गत किसी व्यक्ति की स्थानापन्न अथवा अस्थायी नियुक्ति की गई है, उसकी गणना उस पद पर इस नियम के अधीन विहित परिवीक्षा अवधि के लिए करने की अनुमति विभाग द्वारा दी जा सकती है।

(4) परिवीक्षा अवधि के सफल एवं संतोषप्रद समाप्ति के पश्चात् परिवीक्षा पर नियुक्त कर्मचारी की सेवा सम्पुष्ट की जाएगी।

22. <u>आरक्षण</u> :–

नियुक्ति एवं प्रोन्नति में राज्य में प्रवृत आरक्षण विषयक उपबंध लागू होंगे।

23. <u>वरीयता</u> :–

सेवा के सदस्यों की वरीयता का निर्धारण कर्मचारी चयन आयोग द्वारा आयोजित प्रतियोगिता परीक्षा के परीक्षाफल में निर्धारित मेधाक्रम के अनुसार होगा एवं इस संबंध में कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग द्वारा यथा निर्धारित तथा समय–समय पर यथा संशोधित प्रावधान लागू होंगे।

24. <u>पदक्रम सूची</u> :–

सेवा के विभिन्न समूहों/शाखाओं के सदस्यों की पदक्रम सूची प्रत्येक वर्ष संवर्गवार प्रकाशित की जायेगी, जिसमें उनकी आपसी वरीयता, जन्म तिथि, नियुक्ति की तिथि एवं योगदान की तिथि आदि को दर्शाया जाएगा।

25. <u>अनुशासनिक कार्रवाई</u> :–

सेवा के प्रत्येक सदस्य, सार्वजनिक सेवा में, उच्च प्रतिष्ठित अनुशासन और आचार बनाए रखेंगे तथा समय–समय पर यथा संशोधित झारखण्ड सरकारी सेवक आचार नियमावली, 2001 के सामान्य उपबंधों तथा झारखण्ड सरकारी सेवक (वर्गीकरण, नियंत्रण एवं अपील) नियमावली, 2016 के अधीन अनुशासनात्मक कार्रवाई किया जायेगा।

26. <u>सेवा वार्द्धक्य की आयु सीमा</u> :–

इस नियमावली से आच्छादित सभी सदस्य चाहे वे सीधी भर्ती से आये हो या प्रोन्नति पा कर आये हों, उनकी अधिकतम आयु सीमा 60 वर्ष की होगी। इस संबंध में राज्य सरकार द्वारा निर्गत परिपत्र/अधिसूचना से यह प्रभावित होगी।

27. <u>अतिरिक्त व्यवस्थाएं</u> :–

इस नियमावली द्वारा की गई व्यवस्था के सिवाय, वेतन, भत्ता, छुट्टियाँ, पेंशन, अनुशासन एवं सेवा के अन्य शर्तें से संबंधित सभी मामले सरकार द्वारा, तत्समय प्रवृत्त सामान्य या विशेष नियमों द्वारा विनियमित होंगे।

28. <u>कठिनाई को दूर करना</u> :–

इस नियमावली के उपबंधों को क्रियान्वित करने में उत्पन्न किसी कठिनाईयों को दूर करने के लिए राज्य सरकार नियमावली में संशोधन कर सकेगी तथा ऐसा आदेश निर्गत कर सकेगी, जो इस नियमावली के उपबंधों के मूल उद्देश्य से असंगत न हो।

29. <u>निर्वचन</u> :–

इन नियमों के निर्वचन में यदि कोई कठिनाई हो तो कार्मिक, प्रशासनिक सुधार तथा राजभाषा विभाग एवं वित्त विभाग की सहमति से उच्च एवं तकनीकी शिक्षा विभाग इसका निराकरण कर सकेगा।

30. <u>निरसन एवं व्यावृत्ति</u> :–

इस नियमावली के प्रारंभ होने से ठीक पहले, प्रवृत्त तत्संबंधी अन्य आदेशों अथवा नियमों का स्वतः निरसन हो जाएगा। ऐसे निरसन के होने पर भी इस नियमावली के पूर्व इस संबंध में की गई कार्रवाई, इस नियमावली के अंतर्गत या प्रदत्त शक्तियों के प्रयोग में की गई समझी जाएगी। परन्तु वर्तमान में कार्यरत विभाग के नियंत्रणाधीन राजकीय अभियंत्रण महाविद्यालय एवं राजकीय पोलिटेकनिक संस्थान में अन्य संकाय के अनुदेशक के संबंध में प्रस्तावित नियमावली के द्वारा पूर्व नियमावली के निरसन होने के बावजूद भी पूर्व नियमावली का प्रवर्तन ऐसे अन्य संकाय के अनुदेशक के संबंध में लागू होगा।

झारखण्ड राज्यपाल के आदेश से

6.11.23

(राहुल कुमार पुरवार)
सरकार के सचिव।

अनुसूची-1

Institution BIT Sindri

Sl. No.	Sanction posts	Name of post	Minimum Educational Qualification	No. of Posts
01.	37	Instructor	ITI in Carpentry / Diploma in Mechanical Engineering	1
02.			ITI in Machinist / Smithy / Foundry / Diploma in Mechanical Engineering	8
03.			ITI in Welder / Fitting / Metal Sheet/ Diploma in Mechanical Engineering	5
04.			ITI in Electrician/ Diploma in Electrical Engineering	4
05.			ITI in Air & Ref/ Diploma in Mechanical Engineering	1
06.			ITI in Motor Mechanic/ Diploma in Automobile Engineering	1
07.			ITI in Elect Machine / Diploma in Electrical Engineering	2
08.			ITI in TV & Radio / Diploma in Electronic & Communication Engineering	2
09.			ITI in Electronic Instrumentation / Diploma in Electronic & Communication Engineering	2
10.			ITI in Surveyor / Diploma in Civil Engineering	4
11.			ITI in Overman Diploma in Mining Engineering	2
12.			ITI in Draftsman Civil / Diploma in Civil Engineering	2
13.			ITI in Mech. ITI in Grinder / Diploma in Mechanical Engineering	2
14.			Diploma in Physical Education/Bachelor's in Physical Education	1

Institution BIT Sindri

Sl. No.	Sanction posts	Name of post	Minimum Educational Qualification	No. of Posts
01.	26	Lab Assistant	Diploma in Mechanical Engineering	4
02.			Diploma in Electrical Engineering	4
03.			Diploma in Electronic & Communication Engineering	2
04.			Diploma in Civil Engineering	2
05.			Diploma in Metallurgy Engineering	6
06.			Diploma in Chemical Engineering	3
07.			BSc in PCM	2
08.			BSc in PCB	2
09.			BSc Geology	1

Institution Govt. Polytechnic/Govt. Women's Polytechnic

Sl. No.	Sanction posts	Name of post	Minimum Educational Qualification	No. of Posts
01.	144	Instructor	ITI in Radio & TV / Diploma in Electronic & Communication Engineering	6
02.			ITI in Electronic Inst/ Diploma in Electronic & Communication Engineering	6
03.			ITI in Electrician/ Diploma in Electrical Engineering	21
04.			ITI in Electrical Machine /Diploma in Electrical Engineering	7
05.			ITI in Welder/Sheet Metal/Fitter /Diploma in Mechanical Engineering	13
06.			ITI in Pattern Maker/ Carpenter /Diploma in Mechanical Engineering	13
07.			ITI in Auto / Motor Mechanic /Diploma in Automobile Engineering	2
08.			ITI in Smithy/Foundry/Molder/ Diploma in Mechanical Engineering	11
09.			ITI in Machinist / Diploma in Mechanical Engineering	13
10.			ITI in Ref & Air Conditioning / Diploma in Mechanical Engineering	8
11.			ITI in COPA/IT/Diploma in Computer Science & Engineering	24
12.			ITI in M/c Grinder / Diploma in Mechanical Engineering	2
13.			ITI in Surveyor/ Diploma in Civil Engineering	11
14.			ITI in Overman/Diploma in Mining Engineering	3
15.			ITI in Marine Drilling / Drilling/ Diploma in Drilling Engineering	1
16.			ITI in Pump Mechanic/Diploma in Mechanical Engineering	1
17.			ITI in Interior Decoration/Diploma in Architecture Engineering	1
18.			ITI in Draftsman (Civil)/Diploma in Civil Engineering	1

Institution Govt. Polytechnic/Govt. Women's Polytechnic

Sl. No.	Sanction posts	Name of post	Minimum Educational Qualification	No. of Posts
01.	55	Lab Assistant	BSc (Phy. & Che.)	18
02.			Diploma in Civil Engineering	4
03.			Diploma in Electrical Engineering	8
04.			Diploma in Mechanical Engineering	2
05.			Diploma in Mining Engineering	3
06.			Diploma in Electronic & Communication Engineering	6
07.			Diploma in Computer Science & Engineering	12
08.			Diploma in Metallurgy Engineering	2

अनुसूची–2

अभियंत्रण/बहुप्रावैधिकी संस्थानों के अधीन कनीय अनुदेशक एवं प्रयोगशाला सहायक के पद पर सीधी नियुक्ति के लिए आयोजित की जाने वाली लिखित परीक्षा का पाठ्यक्रम

अभियंत्रण/बहुप्रावैधिकी संस्थानों के अधीन कनीय अनुदेशक के पद का पाठ्यक्रम

FUNDAMENTAL PRINCIPLE OF ELEMENTARY MECHANICAL ENGINEERING AND ENGINEERING MATERIAL

[MECHANICAL ENGINEERING (Machinist)]

SIMPLE MACHINES

Introduction to simple machines, M.A, U.R & η of simple wheel & Axle, Compound wheel & Axle, Screw jack, worm & worm wheel, Rack & pinion (simple numericals only)

Introduction to ferrous & non ferrous metals Physical & mechanical properties & uses of ferrous metals & Alloys & non ferrous metals like, Al, Cu, Zn, & their alloys Properties & uses.

GENERAL PROCESS

Introduction to Soldering, brazing & welding.

Application of soldering, brazing & welding.

Flame Cutting and Welding. Different types of flames used

Safety precautions in Welding

HEAT ENGINES & FLUID MACHINES

Introduction to External & Internal Combustion engines.

Difference between External & Internal Combustion engines.

Concept of Heat work and Energy. Thermodynamic system and their properties. (Introduction only) Introduction of Two-stroke and four-stroke I.C. engine, their working principles, water wheel, Introduction to Inpulse & reaction turbine, (Pelton, francis & Kaplan Turbine, working Principle only.)

POWER TRANSMISSION

Power transmission by belt

Rope chain & geardrive

Open & cross belt drive

Relation between tight side & slack side tension

Centrifugal tension, simple & compound

Gear drive, gear train.

BOILERS (Steam Generators)

Classification of boilers - Fire tube & water tube boiler. Working principle of classification boilers working principle of cochran boiler.

Boiler accessories & Mounting, their functions.

(ENGINEERING MATERIAL)

STONES:

Introduction of stones as engineering materials

Classification of Rocks, qualities, selection and uses of different types of stones in various engineering construction works.

List of tests on stones,

- Dressing of stones & quarrying of stones.

CLAY PRODUCTS:

Common Clay products, (Vitrified, Porcelain) their manufacture and application.

Uses of brick and characteristics of good bricks.

CEMENT & THEIR PRODUCTS

Lime:

- Introduction, Manufacturing Process
- Different types of limes & its applications,

Cement:

- Introduction, Manufacturing process
- Different types of cements, their ingredients and applications, grade of cements, storage of cement,

TIMBER

Classification of Timber

Characteristics of good timber

Introduction of seasoning of timber

Preservation of timber and its uses

FUNDAMENTAL PRINCIPLE OF MISCELLANEOUS MATERIALS

Plastics:

- Introduction, important commercial products of plastics used in engineering works
- Types of plastics - Themoplastic & Thermosetting. Epoxy Resins

Glass:

- Types of glass
- Composition of glass

- Uses of glass as industrial material

Adhesive:

- Types of Adhesive
- Its ingredients and uses sealant & joints fillers

Rubber:

- Characteristics of Rubber
- Types and uses of Rubber -

Available forms of Aluminum as structural cladding & partition

Different type of bar section & their uses.

BASIC OF COMPUTER & INFORMATION TECHNOLOGY

INTRODUCTION TO COMPUTER:

History and evolution of Computers. Classification, application and limitations of different types of computers.

Basics of Computer

Computer Organisation, Block diagram of a Computer, C.P.U. Booting Process, Concepts of program & program implementation.

Concepts of Hardware & Software; Operating System, System Software, Applications Software.

Binary and other number systems and their conversion from one to other.

Memory, bit, byto & word.

ASCII und EBCDIC Codes - Machine Language, Assembly Language & High Level Language.

Compilers, Assemblers, Loaders and Linkers.

Input & Output Devices

Working of various Input Devices such as:

- Key Board Mouso
- Joystick
- Light Pen
- Digitizers

Working of various Output devices such as:

- Monitor/ V.D.U. (C.G.A., E.G.A., V.G.A., S.V.G.A.)
- Different types of Printers and Plotters Scanners.

Memory

Primary & Secondary Memory, Primary Storage Media: RAM, ROM, PROM, EPROM, Cache, extended and expanded memory,

Removable & non-removable secondary memory, Magnetic Tapes & Disks, CD ROM, DVD.

Comparison of these devices based on technology (technical characteristics) & speed.

Organisation of data on disks, tracks, sectors, cylinders

Heads, access time, seek time, latency time., Device controllers: serial port, parallel port, system bus.

Basics of Data & Information

Introduction, Definition and application of data, difference between data and information.

Data types, entities, attributes and relationship - Introduction only.

Elements of Electronic Data Processing -different stages involved- processing methodologies

Transaction and Online Data Processing, Real Time Processing and their uses. Introductory Concepts of Text Processing and its applications.

POWER SUPPLY:

N-E. Voltage, Earthings.

Working of Constant Voltage Transformer (C.V.T.) -KVA & KW ratings.

Working of Uninterrupted Power Supply (U.P.S.).

Connections & Cables.

INTRODUCTION TO OPERATING SYSTEM:

Concepts of Operating System, A brief history of operating system, definition.

operating System classification, single user, multi-user, batch processing, time-sharing, real time and multi-operating System.

DOS

Introduction, Definition & Application of Operating System and types of OS. Introduction to Booting, File and Directory.

Commands: Internal & External commands, Using various commands such as Directory commands,

File Management commands, General commands, DISK. Management commands, Edit commands.

Batch file commands, Introduction to simple batch files.

DOS Utility commands

Security & Recovery of Data

Windows Operating System

Concept of windows, overview of Graphic User Interface, Mouse, ICONS. Using the mouse & manipulation of ICONS, Menus and opening different applications simultaneously.

Basic commands of windows: CREATE, MOVE, COPY, DELETE, RENAME a file or folder. Copy a file to floppy disk.

Difference in Windows 95, 98 and 2000.

Working with documents: changing, moving, deleting and saving information.

Brief introduction of Windows Accessories like Notepad, Calculator etc.

Printing: Setting up a printer and printing a document.

Basic concepts of installing Windows and based packages.

UNIX

Overview of UNIX, Comparison of DOS with UNIX.

Log on and Log off, user passwords.

Basic files/directory manipulation commands.

Concept of Shell and Kernel, Elements of V-I editor.

Windows NT

Overview of Windows NT

Concept of client server and Windows NT server.

Log on and Log off Control Panel

Administrative tools, File Manager.

COMPUTER & COMMUNICATION:

Introduction to Networking, Need and advantages.

Introduction to Internet & Web Browser.

Concept of LAN und WAN, Internet Protocol and TCP/IP.

Applications of Internet like e-mail & browsing, PPP, SMTP, Terminal types.

Down loading information from internet.

Sending and receiving e-mail through standard e-mail clients.

BASIC ENGINEERING DRAWING

Introduction:

Importance of Engineering Drawing as graphic communication. Link between engineering drawing and other subjects of study in diploma course.

I. S. specification for preparation of drawings.

Use of drawing instruments and materials. Basic Tools- classification and brief description.

Special tools- Mini-drafter. Drafting Machine.

Scales, Recommended, reduced & enlarged scale. Lines, Types of lines, Selection of line thickness.

Selection of Pencils.

Drawing sheets, different sheet sizes and standard layouts. Title block as per I.S. specification.

Care and maintenance of drawing material

LETTERING, NUMBERING & DIMENSIONING:

Importance of lettering. Different types of lettering as per B.I.S. code. capital and small letters of vertical & slanting type as per B.I. S. code.

Numerical figures of vertical and slanting type as per B.I.S. code. Single stroke and double stroke, advantages.

Necessity of dimensioning. Principles and method of dimensioning and dimensioning practice as per I.S.I. code.

Making of centre line, Section line, dimensioning lines etc.

Drawing of plain and diagonal scales and dimensioning practice.

Tutorial & test

CONIC SECTION:

Concept of Drawing and concept of conic section and its simple properties.

Concept of ellipse and its construction by various methods. Drawing of tangent & normal on ellipse. Concept of parabola and its construction by various methods, Drawing of tangent & normal to parabola.

Concept of hyperbola and its construction by various methods. Drawing of tangent & normal to hyperbola.

Tutorial & Test

ORTHOGRAPHIC PROJECTIONS:

Principles of orthographic projection. Concept of horizontal, vertical and auxiliary planes. 1st angle and 3rd angle projection.

Projection of points on horizontal, vertical and auxiliary planes and its implication.

Projection of lines on different planes, Length of line and its true inclination with different planes and its traces.

Concept of orthographic projection of planes.

Projection of solids (Prism, Cone, Pyramids, Cylinder, Cube and tetrahedron etc.).

SECTION VIEWS & AUXILIARY VIEWS:

Concept of sectioning and drawing section lines, need for drawing sectional views.

Section of simple geometrical solids-cases involving different types of cutting planes, single plane only.

ISOMETRIC PICTORIAL

Introduction to pictorial drawing. Brief description of different types of pictorial drawing viz Isometric, and their applications.

Concept of Isometric views. Isomeric Projection and Isometric Scale.

Isometric Projection of simple solids, frustum of solids, truncated solids and sets of simple solids.

DEVELOPMENT OF SURFACE:

Development of surfaces of Cylinders, Prism, Pyramids, cones and their frustum only.

FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING

PART-A

Electrical Engineering

Electro-Magnetism

Magnetic field due to current carrying straight conductor. Circuit loop and solenoid, Magnetic flux, Flux density.

Force between two current carrying parallel conductors. Magnetic circuit, series and parallel, Reluctance. Analog between magnetic and electiric circuits. Faraday's Laws of Electromagnetic induction, Lenz's law. Fleming Right hand rule. Eddy current, concept. Eddy current loss. Induce e.m.f. dynamically and statically induced e.m.f.

Selft and mutual inductance. Energy storaged in a magnetic field. Related problems.

D. C. Circuits

Ohin's law and Laws of resistance. Concept of resistivity and conductivity, their units and dependence on temperature in a conductor, Kirchoff's Voltage and current laws and their application in simple circuits. (Simple idea only).

Star-delta transformation. Thevenin's theorem, Norton's theorem, Super position theorem, Maximum power transfer theorem (Simple idea only).

D. C. Machines

D.C. Generator construction, principle, types D.C Motors-working principle, type Starter-necessity and types.

A.C. Fundamentals

Concept of Alternating current and voltage. Difference between A.C. and D.C. concept of cycle, Frequency, period, amplitude, instantaneous value. Average value, L.M.S. value and peak value. Form factor, (Definition only) Power in A.C. circuits and power factors. (Basic idea only) Alternating voltage applied to pure resistance, pure inductance and pure capacitance. (Simple idea only) Poly phase and 3 phase circuits. Concept of line voltage and current in 3 phase star and delta system.

A.C. Machines

Tramformer-principle construction. Transformer Ratio, efficiency and rating. Induction Motor-Principle, construction and types. (Simple idea) Alternators-working principle, Brief idea.

Storage Batterirs

Cell-Primary and Secondary Cell. Construction of Lead Acid battery (Brief idea only) Methods of charging circuits on D.C. and A.C. Application. Maintenance of Battery. Study of Battery charges.

Measuring Instruments

Classification of Instuments. Watt Meter, Ammeter, Voltmeier, Frequency Meter and energy meter (Simple idea only).

Electrical House Wiring

Switches, Socket and other itmes used in House wiring. Types of House wiring (Brief idea only).

Safety devices

Fuse- Introduction, Use of fuse, Idea about relay and circuit breakes.

Safety Procedure

Effects of shocks and burns. Procedures to be adopted in case of electrical shocks.

PART-B
Electronics

Resistor & Colour Code

Definition, Introduction, connection of Resistors, Condenser, Colour Code, Value calculation of resistors through colour code.

Semiconductor and Diodes

Conductors, Semiconductors, insulators, differences between them.

Conduction in intrinsic and extrinsic semiconductors. Concept of electrons and holes, Donor and accepter impurities. P and N type semiconductors and their conductivity, drift and diffusion currents.

P-N Junction diode, Forward and Reverse bias, characteristics of P-N Junction and effect of Temperature, breakdown voltage.

Introduction - Zener Diode (Simple idea only)

Photo diodes

Light Emitting diode.

Transistors

Concept of Bipolar Transistor, PNP and NPN Transistors, Trumaistor action, Transistor configurations

Transistor as an amplifier. Classification of Amplifiers, CB, CC and CE amplifiers.

Field Effect Transistor

Introduction, Classification, its application (Simple idea only).

Digital Electronics

Number System, Binary number, Decimal number and Hexadecimal number, Conversion of each other.

Basic idea about Gates.

Introductory Concept of Memories.

BASIC SURVEYING & MEASUREMENT

GENERAL INTRODUCTION:

Definition, Classification, Principle of Surveying

Vernier scales, GPS & GIS, Fundamental and its application.

CHAIN SURVEVING:

Measurement of distance, different types of chain & tapes, testing of chain & its adjustment. Instruments used in chain survey, Ranging Direct & Indirect Ranging, line ranger, error in length due to incorrect chain, chaining of sloping ground, error in chaining, Tape corrections.

Chain Surveying, principle of chain surveying, surveying stations, base fine, check line, tie line offarts, oblique offsets, booking field notes, field works Instruments for setting-out right angles staffs and optical square, right angle with chain & tape, obstacles in chaining, cross staff survey plotting of chain survey.

COMPASS SURVEYING

Purpose, use & comparison with chain surveying traversing.

Compass-prismatic & survey's compus, its description.

Bearing, meridians, type of bearing, Fore bearing & Back bearing, computation of included angles.

Local attraction cases, errors corrections, Dip, Declination.

Traversing with chain & compass, plotting of traverse survey, Closing error and its adjustment.

PLANE TABLE SURVEVING

Object & comparison with chain & compass surveying instruments used in plane table surveying.

Setting up of plane table, centering, orientation & levelling

Method of plane table surveying (i) Radiation (ii) Intersection (iii) Traversing (iv) Resection.

Stalement of two peints & three points problem and their solution.

Errors in plane tabling & their elimination.

LEVELLING

Definition of terms used in levelling, instruments used in levelling and their description.

Adjustment of the level, temporary adjustments. Bench marks, different types of B.M, change points, steps in levelling, Principle of levelling, reduction of levels, H.I. method, rise & fall method, booking of staff reading, examples on levelling.

Classification of levelling, fly levelling, longitudinal & cross-sectional levelling.

Curvature & refraction.

Elementary knowledge of contours, use & characteristic of contour lines.

THEODOLITE & LAYOUT OF STRUCTURES

Introduction, different parts of theodolite.

Temporary adjustments of the theodolite.

Measurements of horizontal and vertical angles.

Prolonging a line, bearing of a line. Ranging of a line.

BASIC ENGINEERING MECHANICS

INTRODUCTION:

Idealisation of mechanics; Concept of rigid body; External forces (Body forces & surface forces) Law of Mechanics.

VECTOR METHODS:

Equality and equivalence of vectors; Free and Bound vector; Moment of a force about a point and a line, Couple and moment of a couple.

INDTRODUCTION TO SYSTEM OF FORCES AND EQUILIBRIUM:

Statically equivalent force system; simplest equivalent of a system of forces; force analysis, free body diagram, equation of equilibrium.

FRICTION:

Basic Concept of different Friction (Static, Dynamic, Sliding, Rolling, Fluid).

KINEMATICS AND KINETICS OF A PARTICLE:

Rectilinear and curvilinear translations; normal and tangential component of acceleration.

KINEMATICS AND KINETICS OF RIGID BODY:

Simple concept of Angular Velocity and angular acceleration. Effective forces on a rigid body. D' Alembert's principle.

IMPULSE AND MOMENTUM:

Linear impulse and linear momentum, angular impulse and angular momentum, definitions only;

WORK, ENERGY AND POWER:

Work done by forces and couples, potential and kinetic energy, work-energy; conservation of energy; concept of power and efficiency.

SIMPLE STREES & STRAIN:

Definition of various terms and their units (S.I. Units).

Stress and strain due to axial load and transverse load relation between stress and struin. Hook's law. Studies of stress strain curve.

Factor of safety & working stress. Concepts of isotropic materials.

Stress & strain in simple section & composite bar. Stress & strain due to temperature variation. Shrinking on hoop's stresses.

ELASTIC STRESS & STRAIN:

Linear strain and lateral strain, poisson's ratio, volumetric strain.

Change in volume due to axial, biaxial & triaxial loading Bulk modulus,

Shear stress and strain, modulus of rigidity. Simple shear. Complementary shear stress.

Various Relations among modulus of elasticity, modulus of rigidity & bulk modulus:

CENTER OF GRAVITY (CENTROID);

Definition of center of gravity & centroid. Determination of CG of various sections.

Determination of C.G. of perforated sections symmetrical and unsymmetrical sections.

MOMENT OF INERTIA:

Definition of M.I.; radius of gyration, second moment of ares. Parallel axis theorem & perpendicular axis theorem.

Derivation of M.I. of regular area-rectangular, triangular circular about controidal axis.

M.I. of built up section, symmetrical and unsymmetrical atout centroidal asis, modulus of sections.

SHEARING FORCE & BENDING MOMENT:

Types of beams and types of supports, types of loading.

Concept and definitions of shear force and bending moment, sign convention.

Shear force and bending moment diagrams for cantilever, simply supported beam, over hanging beam for various types of loading & couples, point of contraflexure.

Relation between B.M, S.F. and rate of loading.

प्रयोगशाला सहायक (अभियंत्रण संबंधित विषय) के पद हेतु पाठ्यक्रम

LAB ASSISTANT SYLLABUS – MECHANICAL

Strength of Materials: Mechanical Properties of Materials, Simple stresses & Strains, Bending Moment & Shear Force Principal stresses and planes, Moment of Inertia, Bending and Shear stresses, Combination of Direct and Bending Stresses, Torsion, Deflection and Slope of Beam.

Machine Drawing: Auxiliary views, Sectional Views. Conversion of Projections, Fasteners, Rivet and Riveted Joints, Conventional Representation, Limits, Fits and Tolerances.

Engineering Mechanics: Introduction to Engineering Mechanics, Force, Equilibrium, Centroid and Centre of Gravity, Friction, Simple Machines: Basic concept, Law of machine, Basic concept of Lever& their types.

Engineering Materials: Engineering Materials and Their Properties, Ferrous Metals and Alloys: Classification, Fe-C Phase Equilibrium Diagram, TTT curves, Alloy Steels Tool Steels, Non Ferrous Metals and Alloys, Heat Treatment of Steels, Non Metallic Materials: Polymeric Materials, Thermoplastic Plastics & Thermosetting Plastics, Rubbers, Introduction to Composite Materials, Destructive & Nondestructive Testing.

Manufacturing Technology: Welding, Casting, Forging, Rolling and Extrusion, Press working, Lathe, Drilling, Boring & Reaming, Maintenance & Maintenance Planning

FLUID MECHANICS & MACHINE: Properties of fluid, Fluid Pressure & Pressure Measurement, Fluid Flow, Flow Through Pipes, Impact of jet, Hydraulic Turbines, Centrifugal Pumps, Reciprocating Pump

Thermal Engineering: Sources of energy, Ideal Gases, Fundamentals of Thermodynamics, Steam and Steam Boiler, Steam Turbines and Condensers, Heat Transfer.

Theory of Machine: Fundamentals and types of Mechanisms, Velocity and Acceleration in Mechanism, Cams and Followers, Power Transmission, Fly wheel and Governors, Brakes, Dynamometers, Clutches & Bearings, Clutches and Bearing, Balancing & Vibrations, Gyroscope (Introduction only)

Power Engineering: I.C. Engine and Testing: Power Cycles, I.C. engines, AIR COMPRESSER, Gas Turbine and Jet Propulsion, Refrigeration and Air- Conditioning: Air Refrigeration cycle, Vapour compression system, Vapour absorption system, Psychometric, Air conditioning systems.

Advance Manufacturing Processes: Non – traditional machining processes: Introduction, Mechanical Energy Based Processes, Electrical Energy Based Process, Chemical and Electro Chemical Energy Based Process, Thermal Energy Based Process, CNC Lathe, CNC milling machines: CNC programming, Machine Tool Automation: Internet of things (IoT), Maintenance of Machine Tools.

Metrology & Quality Control: Metrology Basics, Limits, Fits, Tolerances and Gauges, Linear Measurement, Angular Measurement, Standards and Comparators, Threads and Gear Metrology, Testing Techniques: Measurement of surface finish, Machine tool testing, Quality Control: Total Quality Management, ISO 9000 Series & other standards, Elementary Statistics & it's application in quality control, Acceptance Sampling

Industrial Engineering & Management: Productivity, Plant Layout and Material Handling, Work Study, Production Planning and Control (PPC): Material, Purchase and Stores Management: Quality Control and
TQM: Management, Organizational Management, Human Resource Management, Financial Management, Entrepreneurship.

Design of Machine Elements: Introduction to Design, Design of Shafts, Keys and Couplings, Design of simple machine parts like Cotter Joint, Knuckle Joint, Levers C– Clamp, Off-set links, Over hang Crank, Arm of Pulley, Design of Power Screws and Spur Gear, Design of springs, Design of Fasteners, Ergonomics & Aesthetic consideration in design,

Industrial Fluid Power: Introduction to oil hydraulic systems, Components of Hydraulic systems, Hydraulic Circuits, Introduction to pneumatic Systems, Components of pneumatic system, Pneumatic Circuits.

LAB ASSISTANT SYLLABUS – ELECTRICAL

Electrical Engineering: Electrical Engg Fundamentals, DC Networks & Theorems, AC Fundamentals, Magnetic circuits, Single Phase A.C. Circuits, Parallel A.C. Circuits.

Measurement: Fundamentals of Measurement, Measurement of Current and Voltage, Measurement of Power. Measurement of Energy, Measurement of Resistance, Measurement of Inductance & Capacitance, Transducers,

Electronics Engineering: Semiconductor Diode: Semiconductor Theory, Semiconductor Diode, Specification of diode, Zener Diode, Rectifiers and Filters: Rectifiers, Filters, Bipolar Junction Transistor: Transistor, Transistor as an amplifier (CE configuration only), Need of Cascaded

amplifier, Field Effect Transistor (Unipolar Transistor): FET, MOSFET, Regulated Power Supply, OP Amp.

Network Theory: Introduction, Network Theorems (DC & AC, Statement, procedure, applications and areas of applications, Simple Numerical on Circuits), TRANSIENTS (DC & AC): TWO-PORT NETWORK, Network Synthesis, FILTERS,

Electrical Machine I: D.C. GENERATORS, D.C. MOTORS, SINGLE PHASE TRANSFORMER, INTRODUCTION TO THREE—PHASE TRANSFORMER.

Digital Circuits and Microprocessor: Number System & Codes, Logic Gates, Boolean Algebra, Combinational Logic Design, Introduction to Sequential Logic, Semiconductor Memories, Microprocessor -8085, 8085 Instructions and Programming, Introduction to 8086 microprocessor

Electrical Estimation & Costing: Electrical Installation and IE rules, Service Connection, Domestic Building Electrification, Electrification of commercial Installation, Electrification of factory unit Installation, Testing of Installation, Contracts, Tenders and Execution.

POWER SYSTEM –I: Basics of Power Generation, Thermal Power Stations, Nuclear Power Stations, Hydro Power Stations, Diesel & Other Electric Power Stations, Economics of Power Generation, Interconnected Power Systems, Substations.

Power System –II: Transients in Power System and protection against them. Elements of Power System dynamics, Computer methods in Power System Analyses, load Flow Studies. Power transmission systems, Methods of active and reactive power control, Nature of faults in electrical systems, fault calculations, symmetric and asymmetric faults – method of sequence components – sequence networks, Study of Protective Devices- Isolators, disconnecting switch, lightening arrester, Horn gap, CT, PT, Protective relays and their applications to power apparatus and systems. Principles of circuit breakers – different types, oil circuit breakers, air circuit breakers, vacuum circuit breakers, SF6 – circuit breakers, their uses and comparison.

Electrical Machine -II: Three phase induction motor, Three Phase Alternator, Synchronous Motor, Single phase Motors, Special machines: Induction Generator, Linear Induction Motor, AC series motor

Traction: Traction Systems and Latest Trends, Mechanics of Train Movement, Traction Motors and Their Control, Electric Locomotives and Auxiliary Equipment, Feeding and Distribution System.

Illumination Engineering: Fundamentals of Illumination, Lamps & Lighting Accessories, Illumination Control & Control Circuits, Illumination for Interior Applications, Illumination for Outdoor Applications, Lighting for Special Applications,

Microprocessor & Microcontroller: The 8085 Microprocessor, the 8086 Microprocessor, 8086 System Bus Structure, I/O Interfacing, Microcontroller, Interfacing Microcontroller,

Programmable Logic Controller: PLC Basics, PLC Programming, PLC Functions, Intermediate Functions, Data Handling Functions. Working with Bits, Advanced PLC Functions,

Instrumentation System: Electronic Meters, Instrumentation for Generation and Analysis of Waveforms, Storage and Display Devices, Transducers and DATA Acquisition Systems, Instrumentation, Automation, Plc & Intelligent Controller,

Industrial Engineering & Management: Productivity, Plant Layout and Material Handling, Work Study, Production Planning and Control (PPC), Material, Purchase and Stores Management, Quality Control and TQM, Management, Organizational Management, Human Resource Management, Financial Management, Entrepreneurship,

Utilization of Electrical Energy: Illumination, Electric Heating and Welding, Elevators, Electric Drives, Electric Traction,

Power Electronics: Power semiconductor devices PNPN diodes, DIACS Thyristors, TRIACS, G.T.O. devices. Power Transistors, Power MOSFET, Rating, Losses and Cooling. Triggering circuits for SCR's, UJT, Blocking Oscillators, Schmitt trigger circuits – Power MOS gate drive circuits. Power semiconductor devices PNPN diodes, Uncontrolled and controlled Rectifiers, D.C. line commutation, Frequency conversion, Application: D.C. and A.C. drives, S.M.P.S., Resonant converters, A.C. Line Filters, ratio, interference suppression. HDVC transmission.

LAB ASSISTANT SYLLABUS – EEE.

Electrical Engineering: Electrical Engg Fundamentals, DC Networks & Theorems, AC Fundamentals, Magnetic circuits, Single Phase A.C. Circuits, Parallel A.C. Circuits.

Measurement: Fundamentals of Measurement, Measurement of Current and Voltage, Measurement of Power. Measurement of Energy, Measurement of Resistance, Measurement of Inductance & Capacitance, Transducers,

Electronics Engineering: Semiconductor Diode: Semiconductor Theory, Semiconductor Diode, Specification of diode, Zener Diode, Rectifiers and Filters: Rectifiers, Filters, Bipolar Junction Transistor: Transistor, Transistor as an amplifier (CE configuration only), Need of Cascaded amplifier, Field Effect Transistor (Unipolar Transistor): FET, MOSFET, Regulated Power Supply, OP Amp.

Network Theory: Introduction, Network Theorems (DC & AC, Statement, procedure, applications and areas of applications, Simple Numerical on Circuits), TRANSIENTS (DC & AC): TWO-PORT NETWORK, Network Synthesis, FILTERS,

Electrical Machine I: D.C. GENERATORS, D.C. MOTORS, SINGLE PHASE TRANSFORMER, INTRODUCTION TO THREE—PHASE TRANSFORMER.

Digital Circuits and Microprocessor: Number System & Codes, Logic Gates, Boolean Algebra, Combinational Logic Design, Introduction to Sequential Logic, Semiconductor Memories, Microprocessor -8085, 8085 Instructions and Programming, Introduction to 8086 microprocessor

Electrical Estimation & Costing: Electrical Installation and IE rules, Service Connection, Domestic Building Electrification, Electrification of commercial Installation, Electrification of factory unit Installation, Testing of Installation, Contracts, Tenders and Execution.

POWER SYSTEM –I: Basics of Power Generation, Thermal Power Stations, Nuclear Power Stations, Hydro Power Stations, Diesel & Other Electric Power Stations, Economics of Power Generation, Interconnected Power Systems, Substations.

Instrumentation System: Electronic Meters, Instrumentation for Generation and Analysis of Waveforms, Storage and Display Devices, Transducers and DATA Acquisition Systems, Instrumentation: Types of Instrumentation systems, Data acquisition system (DAS) and its uses in intelligent Instrumentation system, Detailed study of each block involved in making of DAS, Signal Conditioners: as DA, IA, Signal Converters (ADC & DAC), Sample and hold, Designing of Pressure, Temperature measuring instrumentation system using DAS, Data logger. AUTOMATION Introduction about Automation system, Concepts of Control Schemes, Types of Controllers, Components involved in implementation of Automation system i.e., DAS, DOS, Converter (I to P) and Actuators: Pneumatic cylinder, Relay, Solenoid (Final Control Element), Computer Supervisory Control System (SCADA), Direct Digital Control's Structure and Software. PLC & INTELLIGENT CONTROLLER: Introduction of Programmable logic controller, Principles of operation, Architecture of Programmable controllers, Programming the

Programmable controller. Introduction to Intelligent Controllers, Model based controllers, Predictive control, Artificial Intelligent Based Systems, Experts Controller, Fuzzy Logic System and Controller, Artificial Neural Networks, Neuro-Fuzzy Controller system.

Electrical Machine -II: Three phase induction motor, Three Phase Alternator, Synchronous Motor, Single phase Motors, Special machines: Induction Generator, Linear Induction Motor, AC series motor

Electronic System Design & Maintenance : Data Transfer Equipments, Switches: ATM Switch, Ethernet Switch, Fast Ethernet Switch, FDDI Switch, FDDI/Ethernet Switch, Fiber Channel Switch, Multi service Switch and Routing Switch – their working principle, operation, Installation, maintenance and repairing., Hubs : 100ZVG Hub, ATM Hub, Ethernet Hub, FDDI Hub, Fiber Channel Hub, Repeater Hub, USB Hub, Wireless Hub – their working principle, operation, Installation, maintenance and repairing, Router: ISDN Router, Cable/DSL Routers, Ethernet and ATM WAN Routers, Power supplies for Router with IP- Voice software, Board Band Router their working principal, operation, High Data Rate Terminal – their working principal, operation, Installation, maintenance and repairing, Earth Station, ISDN : NT, Terminal Adopter their working principle, operation, Installation, maintenance and repairing, UPS: On-Line, Off- Line interactive UPS – their working principle, operation, Installation, maintenance and repairing, ATM : Fundamentals of ATM, ATM adaptation layer, virtual paths and virtual channels, ATM signaling, addressing, NNI, LAN emulation, MPOA, ATM in WAN, Switch designs, traffic management, voice over ATM and ATM's relationship to DSL. Cell Phones: Study of the front panel & identification and function of different buttons. Disassembling & assembling of different units & Servicing of Cell Phone, Identification of problems, troubleshooting & repairing.

Power System –II: Transients in Power System and protection against them. Elements of Power System dynamics, Computer methods in Power System Analyses, load Flow Studies. Power transmission systems, Methods of active and reactive power control, Nature of faults in electrical systems, fault calculations, symmetric and asymmetric faults – method of sequence components – sequence networks, Study of Protective Devices- Isolators, disconnecting switch, lightening arrester, Horn gap, CT, PT, Protective relays and their applications to power apparatus and systems. Principles of circuit breakers – different types, oil circuit breakers, air circuit breakers, vacuum circuit breakers, SF6 – circuit breakers, their uses and comparison.

Industrial Engineering & Management: Productivity, Plant Layout and Material Handling, Work Study, Production Planning and Control (PPC), Material, Purchase and Stores Management, Quality Control and TQM, Management, Organizational Management, Human Resource Management, Financial Management, Entrepreneurship,

Utilization of Electrical Energy: Illumination, Electric Heating and Welding, Elevators, Electric Drives, Electric Traction,

Power Electronics: Power semiconductor devices PNPN diodes, DIACS Thyristors, TRIACS, G.T.O. devices. Power Transistors, Power MOSFET, Rating, Losses and Cooling. Triggering circuits for SCR's, UJT, Blocking Oscillators, Schmitt trigger circuits – Power MOS gate drive circuits. Power semiconductor devices PNPN diodes, Uncontrolled and controlled Rectifiers, D.C. line commutation, Frequency conversion, Application: D.C. and A.C. drives, S.M.P.S., Resonant converters, A.C. Line Filters, ratio, interference suppression, HDVC transmission.

LAB ASSISTANT SYLLABUS – ECE.

Elect & Electronic Measurement: Introduction to Measurements, Analog Instruments, DC & AC Bridges, Electronic Instruments, Oscilloscopes, Signal Generation and Signal Analysis, Transducers,

Electrical Technology: Electrical Engg Fundamentals, DC Networks & Theorems, AC Fundamentals, Magnetic circuits & Transformers, D C Machines, AC Machines, Power Systems,

Electromagnetic Field Theory: Static Electric Field, Static Magnetic Field, Electric and Magnetic Fields in Materials, Time Varying Electric and Magnetic Fields, Electromagnetic Wave,

Electronic Devices and Circuits: Semiconductor & PN Junction Diodes, Transistors, JFET & MOSFET, Small Signal Amplifiers, Feedback Amplifiers & Oscillators, Tuned Amplifier, Power Amplifiers,

Digital Technology and Microprocessor: Boolean Algebra, Basic Logic Gates and Families, Combinational Systems & Minimization Techniques, Sequential Systems,8085 Microprocessor, Instructions,8086 Microprocessor, General purpose programming peripheral devices,

Computer Hardware and Peripherals: Introduction, Memory Unit, CPU Design, Instruction Set Architecture, Control Design, Input/output Organization,

Communication System: NOISE EFFECTS IN COMMUNICATION SYSTEMS, AMPLITUDE MODULATION, FREQUENCY MODULATION, NOISE IN AM AND FM, PULSE ANALOG MODULATION,

DATA COMUNICATION AND COMPUTER NETWORKING: Introduction to data communication, Multiplexing & Access Techniques, Computer Network, Transmission & Network Devices, Computer Networking, Error Detection and Correction,

CONTROL SYSTEM: Introduction, Mathematical Modeling of Physical Systems, Time Response Analysis of First Order and Second Order System, Frequency Response Analysis, Control System Components, Stability and Algebraic Criteria, Stability in Frequency Domain, Study of preliminary considerations of lead, lag and lead-lag networks, Controllers,

Instrumentation System: Electronic Meters, Instrumentation for Generation and Analysis of Waveforms, Storage and Display Devices, Transducers and DATA Acquisition Systems, Instrumentation: Types of Instrumentation systems, Data acquisition system (DAS) and its uses in intelligent Instrumentation system, Detailed study of each block involved in making of DAS, Signal Conditioners: as DA, IA, Signal Converters (ADC & DAC), Sample and hold, Designing of Pressure, Temperature measuring instrumentation system using DAS, Data logger. AUTOMATION 4 hrs Introduction about Automation system, Concepts of Control Schemes, Types of Controllers, Components involved in implementation of Automation system i.e., DAS, DOS, Converter (I to P) and Actuators: Pneumatic cylinder, Relay, Solenoid (Final Control Element), Computer Supervisory Control System (SCADA), Direct Digital Control's Structure and Software. PLC & INTELLIGENT CONTROLLER: Introduction of Programmable logic controller, Principles of operation, Architecture of Programmable controllers, Programming the Programmable controller. Introduction to Intelligent Controllers, Model based controllers, Predictive control, Artificial Intelligent Based Systems, Experts Controller, Fuzzy Logic System and Controller, Artificial Neural Networks, Neuro-Fuzzy Controller system.

Power Electronics: Power semiconductor devices PNPN diodes, DIACS Thyristors, TRIACS, G.T.O. devices. Power Transistors, Power MOSFET, Rating, Losses and Cooling. Triggering circuits for SCR's, UJT, Blocking Oscillators, Schmitt trigger circuits – Power MOS gate drive circuits., Uncontrolled and controlled Rectifiers, D.C. line commutation, Frequency conversion, Application: D.C. and A.C. drives, S.M.P.S., Resonant converters, A.C. Line Filters, ratio, interference suppression. HDVC transmission.

Programmable Logic Controller: PLC Basics, PLC Programming, PLC Functions, Intermediate Functions, Date Handling Functions, Working with Bits, Advanced PLC Functions.

Industrial Engineering & Management: Productivity, Plant Layout and Material Handling, Work Study, Production Planning and Control (PPC), Material, Purchase and Stores Management, Quality Control and TQM, Management, Organizational Management, Human Resource Management, Financial Management, Entrepreneurship,

Optical Fiber Communication: Introduction, Optical Fibers Geometrical, Optical Transmitters Basic Concepts, Optical Receivers, Light Wave Systems, Multi channel Systems,

Mobile Communication System (Wireless): Introduction, Elements of Cellular Radio Systems Design, Digital Communication through fading multipath channels, Multiple Access Techniques for Wireless Communications, Wireless Systems & Standards, Future trend

LAB ASSISTANT SYLLABUS – CIVIL.

BUILDING DRAWING (AUTOCAD): CAD Software, CAD Command, Planning of Buildings, Creating, modifying points and surfaces, Parcel & Alignments, Submission/working Drawing,

BUILDING MATERIALS: Bricks, Lime, Cement, Sand, Stone, Refractory material and clay products, Mortar and concrete, Timber, Paint, Varnish and Distemper, Iron and steel, Bituminous material, Introduction to Nano Materials,

STRENGTH OF MATERIALS: Introduction, Stress and Strain, Centroid & Moment of Inertia, Analysis of beams, Stresses in Beams, Shear stresses in beams, Torsional Stresses, Columns and Struts,

SURVEYING: Introduction, Linear measurement, Compass Surveying, Levelling, Theodolite Survey, Plane Table Survey,

Construction Technology- Introduction, Site Investigation, Site Lay out and control, Foundations, Construction of Superstructure, Door and windows, Damp Proofing, Floors, Roofs, Stairs, Surface finishes, Building maintenance,

Geo-Technical Engg: Overview of geo technical engineering, Properties of soil, Shear strength of soil, Bearing capacity & Earth pressure, Foundation, Compaction, consolidation and stabilization,

Hydraulics: Hydrostatics, Kinematics of fluid flow, Dynamic of fluid flow, Open channel flow, Fluid machines,

Theory of Structure: Introduction to indeterminate structure, Combined direct and bending stress, Principal Stresses and Principal planes, Framed Structures, Slope & Deflection of Beams, Analysis of Continuous and Fixed Beam, Moment distribution method,

TRANSPORTATION ENGINEERING: Overview of transportation Engineering, Road Geometrics, Road Materials, Road Pavements, Hill Roads, Road Maintenance, Traffic studies, Railway Engineering: Alignment and Gauges, Permanent ways, Railway track Geometrics, Bridge engineering: Site selection and investigation, Component parts of bridge, Tunnel Engineering,

Irrigation Engineering: Introduction, Definition, Hydrology, Water Requirement of Crops, Investigation and Reservoir Planning, Dams and Spillways, Earthen Dams, Gravity Dams, Diversion Head Works, CANALS,

RCC DESIGN: General, Introduction to Working Stress Method, Introduction to Limit State Method, Analysis and Design of Beams for Flexure by L.S.M, Shear, Bond and Development Length (Lsm), Design of T- Beam and Continuous Beams by L.S.M, Design of Slabs by L.S.M, Design of Staircases By L.S.M, Design Of Columns And Footings By L.S.M, Pre-Stressed Concrete,

ADVANCE SURVEYING - Curves: Simple Circular Curves, Compound Curves, Reverse Curve, Vertical curves, Transition Curves, Trigonometrical Leveling, Triangulation and geodetic surveying, Volume measurements, Aerial Survey & Remote Sensing, Modern Surveying Techniques &Equipments,

Environmental Engineering: Water Supply: Planning for Water Supply System, Conveyance System, Water Treatment, Water Distribution and Supply to Buildings, Sewage Treatment: Planning for Sewerage Systems, Sewer Design, Primary Treatment of Sewage, Secondary Treatment of Sewage, Disposal of Sewage and Sludge Management,

Industrial Engineering & Management: Productivity, Plant Layout and Material Handling, Work Study, Production Planning and Control (PPC), Material, Purchase and Stores Management, Quality Control and TQM, Management, Organizational Management, Human Resource Management, Financial Management, Entrepreneurship,

Design of Steel Structure: Introduction, Limit State Design, Design of Connections and Detailing, Design of Tension Members by L.S.M, Design of Compression Members and Column Bases by L.S.M, Design of Flexural Members for BM and SF by L.S.M, Steel Roof Truss, Plastic Analysis.

Estimating & Costing: Introduction, Approximate estimate: Plinth area rate method, Cubical Content method, Service Unit method and its application, Typical bay method, Approximate Quantity method, problems., Detailed Estimate, Mode of Measurements, Estimate for Earthwork,

Contract & Account: Procedure of execution of work by P.W.D, Contract, Tender &Tender Documents, Unbalanced tender, ring formation accounts in P.W.D., Payment to Contractors, Specifications, Valuation.

LAB ASSISTANT SYLLABUS – METALLURGY ENGINEERING.

BASIC METALLURGY: Introduction : Metals and Metallurgy its application in different fields of engineering, a brief history of Metallurgical practices in India, Ores and Minerals, Crystal structures of metals, imperfection in crystal-point, line and surface defects., Gases dissolved in metals, Sievert's Law, Effect of presence of gases in metals, importance of vacuum treatment of metals., Major classification of Metallurgy :, Refractory materials :, Polymers and Polymertion methods, concept of composite materials, their types and importance., Fuels, Furnaces : Types of furnaces, Used in Industries, Pyrometry, Principle of Thermometry, Thermo Couples : Composition, Preparation and Calbration. Optical and radiation Pyrometers.

MATERIAL TESTING: Definition and difference in elasticity and plasticity of materials, Hook's law and Stress-strain graph, Effect of temperature on tensile strength and deformation behavior of metals, Effect of loading condition of forces on the strength of materials in application. Introduction of different mechanical properties, Necessarily of material testing, Broad classification of testing methods: Destructive test and Non destructive test (NDT), Measurement of Tensile strength of given materials,

Hardness tests : Brinell's Hardness, Vicker's Hardness and Rockwell Hardness tests., Effect of sudden loading on Strength of Material, Measurement of Impact strength by Izod and Charpy methods, Creep strength and study of Creep Curve, Fatigue and Fatigue Failure, S N Curve., Meaning of NDT, Types of NDT, Visual Test, Spark Test, Sound Test and Dyepenetrant Test., Magnetic Particle Test (Magna Flux Test), Radiography (x-ray & -ray),γ Ultrasonic test.

Physical Metallurgy: Solidification of metal, Phase Equilibrium Diagrams, Lever Rule, Iron-Carbon Equilibrium Diagram, Microscopic Examination, Macroscopic Examination, Quantitative Metallography, Metallurgy of Non- ferrous alloys: Brasses, Bronzes, Al-alloys, Bearing Metal-

Basic Foundry Technology: Pattern making, Core and mould, Mould making, Solidification of castings, Gating system: RISERING SYSTEM, Post shake-out Treatment of Castings,

Iron making: Raw materials and burden preparation for iron making, Construction of blast furnace, Blast furnace operation, Sponge iron production,

Non-Ferrous Metallurgy: Introduction, Preparation of ores, Extraction of copper, Extraction of Aluminium, Extraction of lead, Extraction of Zinc, Extraction of Tin,

MECHANICAL METALLURGY: Plastic deformation, Rolling of Metals, forging of metals, Extrusion of metal, Drawing of wire and Rod,

Geology and Chemical Analysis: Geology: General geology, information about interior of the earth, origin of the earth, Mineralogy, Physical property of minerals, Chemical analysis: Sampling of cores and alloys and their metallurgical products, Gravimetric and volumetric analysis, Instrumental methods: spectroscope- principle and application, colorimetric – operation and application, Quantitative analysis of silicon, carbon, sulphur and phosphorous in steel.

Material Management & Quality Control: Quality control &Inspection, Quality assurance, Material management, Inventory control, Concept of international standards,

Steel Making: Introduction and history of Steel Making, Modern Steel making process, Inclusion in Steel, Vacuum degassing of steel, Continuous casting of steel, Secondary Steel making process,

Heat Treatment Technology: Introduction & General aspects of Heat Treatment, Isothermal Transformation of Austenite, S-curve, TTT Diagram, Hardenability of Steel, Heat Treatment Process, Heat Treatment of Cast Iron, Annealing, stress reliving, malleablising, Heat treatment of high duty caste iron, SG iron, precipitation hardening of Al-Cu Alloy.

Mineral dressing: Introduction, Status of mineral beneficiation industry in India survey report of mineral dressing in the country, Sampling techniques, definition types and importance of sampling, equipments used in sampling screening sizing and classification, Gravity concentration method, jigging, tabling, heavy Media separation, Flotation: natural and artificial flotation, collectors frothers, depressors, activator and modifiers, concentration of sulfide ores.,

Industrial Engineering & Management: Productivity, Plant Layout and Material Handling, Work Study, Production Planning and Control (PPC), Material, Purchase and Stores Management, Quality Control and TQM, Managemen, Organizational Management, Human Resource Management, Financial Management, Entrepreneurship,

Advance Foundry Technology: Introduction to foundry, casting production. Sand & Non-sand Casting processes, Special Casting processes- Full mold, Shell molding, CO2, Die, Investment, Centrifugal etc. Sand molding materials, their properties, selection & testing (Grading of sand, GCS, DCS, Permeability etc) Bonding & bond mechanisms (Clay-water, Hydraulic & Organic), Selection of Foundry Clay (Bentonite Structure, Base Exchange capacity & Acceptability Test,). Additives, Mechanization of Sand Molding Process, PatternsAllowances, Types, Selection etc. Gating Design, Laws of fluid flow, Top & Gating Time, Aspiration correction, Design of gating for a plate casting. Riser Design (Modulus method, Geometry of risers, Directional solidification, Chill, Padding etc,) Complete Methoding Practice from Pattern to riser/gating design of individual castings., Solidification of -Metals, Alloys & Eutectics, (Nucleation & Growth Process, Critical nucleus size, Super cooling, G/R ratio, Cell, Dendritic & Random dendritic

structure, Segregation & Coring, Eutectics, Compositions in Cast Irons, FG & SG structures, Metallic Glass). Mold dilation, Mold-metal reactions. Structure & Section sensitivity, Cast irons-family & microstructures, Alloying effects, Cupola & its operation, nodular iron and alloy cast irons. White (Malleable) Iron, ADI, Charge calculations., Non-ferrous casting production (Silumin alloys, Liquid forging, Brass & Bronze casting), Melting furnaces (Arc, Induction, Gas & Oil fired furnaces, Fluxes). Fettling & finishing, Casting defects- Hot tears, Inclusions and porosities. NDT testing & inspection, Casting design.

Manufacturing Process: Metal Cutting, Lathe Machine and Metal Turning, Shaping. Machine, Planning and Slotting Machine, Milling Machine, Grinding Machine,

Fuel Refectory and Furnaces: Various forms of energy including non-conventional source, Definition of Fuel and its importance, Coking coal, Coke ovens, Classification and composition of gases, Classification of coal, Manufacturing of producer gas, Water gas, Carburetted water gas and Blast furnace gas, Catalytic process & hydrogenation., Natural gas, cracking and reforming of natural gas, use of natural gas in Metallurgy. Laser and its applications., Classification and uses of furnaces in metallurgy based on technology, structure and heat generation Fundamentals of heat engineering of furnaces. Heat transfer laws, Review of steady state, conduction. Transeint conduction, cartesian, cylindrical and spherical co-ordinates, solution for simple geometry and boundry conditions. Convective heat transfer and radiative heat transfer. Flow of gases in furnaces, ducts, drafts, chimney. Sample calculations, waste heat recovery, regenerators and recuperators, principle and design, Blast furnace stove. Elements of furnace design, Refractories, materials for constructions, Fuel burning devices for solid/liquid/gaseous fuel, design of roof and hearth. Principle of electric heating, Resistance heating elements, principles of induction heating, core and coreless furnaces, various types, comparison, Typical calculations. Study of few important metallurgical furnaces, Special furnaces, Plasma heating, Optical furnaces, Uses of laser.

LAB ASSISTANT SYLLABUS – MINING ENGINEERING.

Mine Surveying - I: Introduction to Surveying, Compass Surveying, Plane Table Surveying, Levelling, Contouring,

Elements of Mining Geology: General Geology, Mineralogy, Petrology, Physical Geology, Structural Geology, Coal Geology, Geological Maps,

Elements of Mining Technology: Introduction to Mineral & Important Mining Organizations, Mining Terminology & Definition, Explosives & Accessories, Shot Firing, Safety in Shot firing operation, Introduction to coal mining method,

Mining Methods – Opencast Working: Introduction to Opencast Mining, Opening Up of Deposit, Opencast Mining Machinery, Opencast Explosives, Blasting Practice in Opencast Mines, Environmental Aspects of Opencast Mining

Economics and Field Geology: Geomorphology, Paleontology, Stratigraphy, Economic Geology, Exploration & Prospecting, Engineering Geology, Geology Mapping.

Engineering Mechanics: Basic Concept, Force, Resolution & composition of forces, Equilibrium, Friction, Centroid and Center of Gravity, Simple Lifting Machines, Transmission of power by Belt and Rope, Strength oh materials, Moment of Inertia., Shear force & bending moment.

Mine Surveying – II: Theodolite, Theodolite traversing, Geodetic triangulation, Techeometric surveying, Setting out curves, Under ground surveys, Stope Survey, Advance in Mine Surveing, Dip and Fault problem.

Rock Engineering & Ground Control: Origin of Soil & its Formation, Soil as Three Phase System, Permeability and Seepage, Shear Strength of Earth Pressure Theories, Stability of Slopes, Introduction to Rock Mechanics, Rock Mass Properties, Rock Testing, Rock Brust and Bumps, Monitoring Ground Movement, Ground Control.

Mine Ventilatio: Mine Air, Mine Climate, Natural Ventilation, Artificial Ventilation, Distribution & Coursing of Air in Mines, Ventilation Survey.

Mining Machinery – I: Electric Circuit, Electrical Machine, Power Supply System, Engineering Materials, Electronic Components, Fundamental of Semi conductor, P & N Types, P N Juction, Diodes & their Applications, Special Diodes, Transistor, Amplifiers, Internal Combustion Engine, Air compressor,

Environment Studies: The Multidisciplinary nature of environmental studies, Natural Resources Renewable and non renewable resources: Eco Systems, Biodiversity and it's Conservation, Environmental Pollution, Social issues and the Environment, Human population and the environment: Field work.

Underground coal mining method: Factors influencing Choice of Mining methods, board and pillar method of coal mining, Longwall method, Mining of thick coal seam, Subsidence in coal mines, Strata Control in coal mines,

Mining Methods – Non Coal: Underground Development, Supported Stoping Methods, Supported & Caving Methods, Shaft Sinking, Different Special Methods of Shaft Sinking, Boring,

Mine Environment & Safety Engineering: Mine Fires, Sampling of Mine Atmosphere & Interpretation, Fire Damp Explosion, Coal Dust Explosion, Inundation, Mine Rescue.

MINING MACHINERY – II: Transport of Ore, Winding in Shaft, Mine Pumps, Coal Cutting Machine, Electric Power Supply, Gate End Box.

Mine Management, Legislation & Safety: Mines Act 1952, Mines Rules 1955, Coal Mines Regulations 2017, Mine Accidents, Management, Genral Safety, Inspection Procedure, Mines Rescue Rules

Mineral and Mine economics: Indian mineral industries scenario, Sampling, Salting of sample, Reserve and Grade, Valuing mining properties, Mine Taxation, Royalty, Mine leasing procedure Final mine closure plan, Inventory Control, Environment aspect of mining, Ore dressing or beneficiation.

LAB ASSISTANT SYLLABUS COMPUTER SCIENCE & ENGINEERING

Web Technologies: Web Essentials, Style Sheets, Host Objects, Representing Web Data, JSP Technology,

Object Oriented Programming: Concept of Object Oriented Programming, Objects & Classes, Constructors & Destructors, Inheritance, Polymorphism, I/O Operations and File Processing, Exception Handling,

Electronic Devices and Circuits: Semiconductor & PN Junction Diodes, Transistors, JFET & MOSFET, Small Signal Amplifiers, Feedback Amplifiers & Oscillators, Tuned Amplifier, Power Amplifiers,

Electrical Technology: Electrical Engg Fundamentals, DC Networks & Theorems: AC Fundamentals, Magnetic circuits & Transformers, D C Machines, AC Machines, Power Systems.

Data Structure & Algorithms: Basic Concepts, Linked Lists, Stacks and Queues, Sorting Algorithms, Trees & Graphs, Tables,

Computer Hardware and Peripherals: Introduction, CPU Design, Instruction Set Architecture, Control Design, Input/output Organization,

Operating System: Introduction to OS, Processes, Process Scheduling Algorithm, Memory Management, File Systems, Input/Output, Device Management, Case Studies,

Data Communication and Computer Networking: Introduction to data communication, Multiplexing & Access Techniques, Computer Network, Transmission & Network Devices, Computer Networking, Error Detection and Correction,

Database Management System: Introduction, Entity-Relationship Model, Relation Data Model, SQL & PL-SQL, Normalization, Transaction & Concurrency Control, Distributed Databases,

Computer Workshop: Basic blocks of a digital computer, Hardware Identification, Hardware Remove -Test Replace/Install, Operating System & Application Software Installation, PC

Cleaning & Hardware Troubleshooting, System Utilities and Virus Removal, User Account Customization, Windows Update, Software Installation & Device Drivers,

Microprocessor & Microcontroller: The 8085 Microprocessor, the 8086 Microprocessor,8086 System Bus Structure, I/O Interfacing, Microcontroller, Interfacing Microcontroller,

Java Programming: Introduction to Java, Classes, Object and Methods, Multithreaded Programming and Exception handling, Servlets,

Computer Graphics: Introduction to computer graphics & graphics systems, Scan conversion, transformation & viewing, transformation & viewing, Curves, Hidden surfaces,

Industrial Engineering & Management (Common Paper): Plant Layout and Material Handling, Work Study, Production Planning and Control (PPC), Material, Purchase and Stores Management, Quality Control and TQM, Management, Organizational Management, Human Resource Management, Financial Management, Entrepreneurship,

Network Security: Introduction, TCP/IP Protocols, Cryptography basics and applications, Security in Networks, Digital Signatures,

Software Engineering & Tools: Overview of System Analysis & Design, System Requirement Specification – DFD, System Design – Problem Partitioning, Coding & Documentation - Structured Programming, Web site Testing, User Interface Testing, Software Project Management – Project Scheduling, The Future Software Quality Assurance, Your Careers as a Software Tester,

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प्रयोगशाला सहायक (विज्ञान) के पद हेतु पाठ्यक्रम

SYLLABUS FOR PHYSICS

MATHEMATICAL PHYSICS: Scalar and vector fields; Differentiation of a vector. idea of line, surface and volume integrals; Gradient divergence and curl and their expressions in rectangular Cartesian co-ordinate systems, Gauss, Stokes and Green's theorems.

GENERAL PHYSICS: Elasticity; Elastic constants and their inter-relations; Calculation of torque on a cylinder, Torisional oscillations. Flexure of beams; Viscosity of gases by Rankine's method; Equation of continuity, Euler's equation of motion. Surface tension; Determination of surface tension by Quince's method. Viscosity: Viscosity of liquids by Poiseuille's method.

ACOUSITCS: Theory of vibration; Analytical treatment of free, damped and forced vibrations; Intensity and laudness of sound; bel, phon; Measurement of intensity by Rayleigh disc method. Standard and probable errors, Propagation of errors; Principle of least squares.

THERMAL PHYSICS: Laws of Thermodynamics: Carnot's engine and its efficiency; Carnot theorem; The Second law of thermodynamics; Absolute scale of temperature; Entropy, Entropy changes in reversible and irreversible processes.

Kinetic theory of gases: Maxwell's velocity distribution law and its verification by Stem's method. Mean free path; Principal of equipartition of energy (Deduction not required)

Real gases: Deviation from ideal gas equation; Vander Waals equation of state and its derivation; Critical constants, Joule-Thomson effect.

Radiation: Black body radiation; Stefan and Stefan-Boltzmann laws, Qualitative explanation of block body radiation by Planck's law; Solar constant.

Clausius inequality and principal of increase of entropy, Thermodynamic potentials, Maxwell's relations, Deduction of Clapeyran's equation, Triple point Kinetic theory: Transport phenomena, Brownian motion and Wein's displacement law; Einstein's and Debys's expressions for specific heats.

OPTICS: Interference: Interference in films; Newton's rings, Michelson's interferometer.

Diffraction: Fresnel and Fraunh offer diffraction; Half-period zones; Plane diffraction grating.

Polarization of light: Double refraction; Nicole's prism: Quarter wave plate; Production and detection of plane, circularly and elliptically polarized light; Rotary polarization.

Velocity of light: Kerr cell method for determining the velocity of light.

Resolving power, Rayleigh's criterion, Resolving power of telescope. Microscope Grating spectrometer and Prism spectrometer.

ELECTROMAGNETIC THEORY: Maxwell's field equations in vacuum, Plane wave in vacuum. Poynting vector laws of reflection and refraction.

ELECTROSTATICS: Electric polarization and displacement vectors, $D=e_o E+P$ relation (by simple method slab placed in electric field between plates); Energy density; Dielectric constant Quadrant and attracted disc electrometer.

Potential due to system of charges, Dipole and quadrupole moment of a system of charges (Multipole expansion), Poission's and Laplace's equations, Simple solutions of Laplace's equation.

Magnetism, current Electricity, Classical Mechanics, Special theory of Relatively, Atomic Physics, Quantum Physics, Nuclear Physics, Electronics, Solid-State Physics and Digital Circuits.

MAGNETISM: Gauss Law; Ampere's circuital law; Magnetic field, $B=\mu (H+M)$; Hysteresis and hysteresis loss; Dia, Para and ferro magnetic substances; Susceptibility and Permeability.

Langevin's theory of dia and para-magnetism, Weiss' theory of ferromagnetism.

CURRENT ELECTRICITY: Magnetic field due to a current carting solenoids; Theory of moving coil ballistic galvanometer and its uses; Growth and decay of currents in L-R circuits; Alternating current circuits; Power and power factor of a circuit, Vector diagram method for ac circuits; Analytical treatment of series and parallel circuits including sharpness of resonance; Transformer and its Principal by vector diagram method.

Thevenin's, Norton's Reciprocity and maximum power transfer theorems. A.C bridge De Sautee, Sobering, Anderson and their vector diagrams. Thermodynamic treatment of Seebeck. Politer and Thomson's effects. Thermoelectric diagrams.

CLASSICAL MECHANICS: Generalized coordinates and moment; Lagrange's and Hamilton's equations from D' Alembert's Principal, Applications to simple pendulum and projectiles; Motion in a central field. Keller's laws their deductions from law of gravitation.

SPECIAL RELATIVITY: Michelson Morley experiment; Postulates of Special theory of relativity; Lorentz transformations; Length contraction and time dilation; Relativistic addition of velocities, dependence of mass; Equivalence of mass and energy.

QUANTUM PHYSICS: Wave particle duality; de Broglie's relation and experimental verification of matter waves, Uncertainty principal.

NUCLEAR PHYSICS; Basic properties and structure of nuclear elementary ideas about nuclear forces; Nuclear disintegration; Geiger-Muller counter.

Bohr-Summerfield theory of hydrogen atom, Bainbridge mass spectrograph, Cyclotron, Qualitative explanation of emission of a, b and g-rays, Nuclear reactions; types, conservations laws.

SOLID STATE PHYSICS AND ELECTRONICS: p-n junction, Zener diode. Tunnel diode, Photo diode, Diode as a rectifier; Half wave and full wave rectifier circuits; Transistor and its characteristics and constants' Qualitative idea about amplitude modulation and detection; Simple transmitter and receiver through block diagram; Electron microscope, Cathode rays oscilloscope, Elementary idea about television; Basic logic gates; Boolean algebra and its application to simple logic circuits (half folder), Realization of basic logic gates from NAND gates.

Richardson's and Child-Langmuir's equations and their deductions. A. F. amplifiers (RC coupled), Feedback in amplifier, Barkhusen's conditions for oscillation in feedback amplifier, Hartley oscillator circuit (analysis not required),

SYLLABUS FOR CHEMISTRY

GROUP A: INORGANIC CHEMISTRY

Atomic Structure: Bohr's Atomic Model, Introduction to spectral lines, Hydrogen atom, Quantum numbers, Aufbau's principle, Pauli's Exclusion Principal, Hound's rule.

Modern theory of atomic structure: Elementary idea of failure of classical mechanics. Planck's quantum of H-atom by Bhor's theory, Interpretation of emission spectra of H-atom. Ryaberg constant. Dual nature of light. Photoelectric effect. De- Broglie's equation. Wave nature of particles.

Periodicity: Electronic lay-out of the periodic table Periodicity of properties e.g. lonic, covalent and Vander Wall's radii, ionization potential, electron affinity and Electro negativity

General Chemistry of Group IB, II A, II B, elements

Extraction of the following elements; Silver, Gold, Noron, Tin, and Lead.

Preparation, Properties, structure and use of the following corn pounds; Hydrogen peroxide, Ozone, Silicon, Linear-caustic, Purple of cassias, Fulminating Gold, Stannous Chloride, White Lead Bo-rax, Diborance, Red Lead.

Ionic bond: Lattice energy, Born-Haber cycle, factors favoring ionic bonds, variable valence, properties of ionic compounds.

Covalent bonds: Formation of sigma and pi bonds, hybridization and directional bonding Valence Bond Theory), structures and shapes of Ct, BF3, PC 5, SF4, Sncl2, HaO, NH3 and CH4. Properties of covalent compounds.

General discussion of group MIA and IVA elements, Preparation, properties and uses of the following Hydrazine, Hydrazoic acid, Hydroxyl amine, Phosphorous acid, Phosphoric acid. Pyrophosphoric acid, Metaphoric acid, Potassium dichromate, and potassium permanganate.

Metals: Occurrence, Metallurgy, properties and uses of chromium, manganese, cobalt and nickel and their compounds.

Co- Ordination Chemistry: Double salt and complex salt. Werner theory. Nomenclature of co-ordination compound. E. A.N. concept. V.B. Theory in complexes.

Analytical Chemistry: Principal involved in the separation of cations. Application of and Solubility product. Common iron effect. Detection and removal of interfering radicals. Principal involved in the radix titration. Uses of $KMno_4$. $K_2Cr_3O_7$, iodometry and idimetry.

Introduction to Zero Group, Group VA and VIIA. Preoaration, Properties and uses of Caro's acid. Marshall's acid, sodium thio-sulphate and chrome alum.

GROUP B ORGANIC CHEMISTRY

Introduction:

(a) Shape and structure of organic compounds. Tetra covalence of craven. Hybridization (SP_3, Sp_2 and SP.)

(b) Classification and nomenclature of organic compounds, Detections and estimation of elements, determination of molecular weight.

(c) Elementary idea of electron displacement effect; inductive effect, electrometric effect, resonance and mesmeric effect

Alcohols: Definition, Classification and Distinction between different types of alcohols. Trihydric alcohoi-glycerol: (i) Total Synthesis from C and H (ii) Reactions.

Aldehydes and Ketones: General Methods of Preparation, Properties, Electronic Nature of C=O Group

Carboxylic acids: General methods of preparation, properties of mono-carboxylic acid and their derivatives (ester, acid, chloride, anhydride, and amide). Origin of acidic properties and electronic nature of COOH acid group its derivatives.

Isomerism: Structural and stereoisomerism solution of racemic mixtures. Elements of symmetry.

Hydroxyl acids: Lactic acid, tartaric acid and citric acid-their isolation synthesis, properties, constitution, Isomerism of lactic acid and tartaric acid.

Carbohydrates: Classification, nomenclature, structure of glucose and fructose their inter-conversions, Configuration and preliminary treatment of ring structure.

Aromatic compounds: Benzene and its mono-substituted derivatives: Toluene, Nitrobenzene, Aniline, Benzene diazonium chloride, Phenol, benzal-dehyde. Benzene sulphonic acid, benzoic acid (Preparation, properties and uses) Elementary idea of electrophilic substitution in bnezenering.

Important reactions: Perkin reaction, Friedel Grafts reaction, Cannizzaro's reaction Kolbe's reaction, Sandmeyer's reaction. Reformatsky reaction, Reimer-Tiemann reaction.

Urea-preparation, Properties and its estimation. Uric acid and u re ides.

Preparation and synthetic use of (a) ethyl acetoacetate (b) ethyl malonate (c) Orignard reagent.

Dyes Trihenylmethane dyes, phithalein dyes. Azo dyes colour andconstitution.

Heterocyclic compound - 5 & 6 membered heterocyclic ring compounds. Pyrrole, Thiophen Furan, Pyridine.

Polynucleart hydrocarbon-Napthalene, anthracene and phenanthrene.

GROUP C: PHYSICAL CHEMISTRY

Gaseous State: Kinetic theory of gases- Postulates, Kinetic gas equation, Deduction of gas laws from kinetic gas.

Chemical Equilibrium: Law of mass Action and its kinetic derivation, Equilibrium constant Relation between Kp, Kc and Kx, Le-Chalelier's Principle.

Dilute Solution: Colligative properties, lowering of vapor pressure, lavation of boiling point, depression in freezing point. Osmosis and Osmotic pressure.

Thermodynamics: System & Surrounding, types of system, Heat, Work and Internal energy. First law of Thermodynamics, Enthalpy, Heat Capacities, Relation between Cp and Cv, Calculation of W, Q, E and H in iso-thermal) and adiabatic expansion of gases.

Thermo Chemistry: Hess's law, Kirchhoff's law, Bond energies and their calculation.

Chemical kinetics: Rate of reaction, order and molecularity of reaction. First and second order reaction. Determination of order of reaction Effect of temperature on reaction rate. Activation energy.

Catalysis: Characteristics of catalysts, types of catalysts, enzyme catalyst. Theory of catalysis, autocatalysis.

Colloidal Chemistry: Classification, preparation, purification and properties of colloidal solution. Peptization of colloids. Protection of colloids. Origin of charge on colloids. Electrophoresis, coagulation, dialysis, Brownian movement, Gold number.

Thermodynamics: Second law of thermodynamics. Conversion of heat into work, Carnot theorem and carnot cycle. Entropy, entropy changes in reversible and irreversible processes Entropy of expansion of ideal gases. Entropy of mixing of gases. Work function and free energy and their physical significance. Git Helmholtz equation, Clausius-Clapeyron equation and their application Criteria of equilibrium and spontaneity, Concepts of activity and activity co-efficient.

Electrochemistry: Specific, Equivalent and molecular conductivities. Effect of dilution on different types of conductivities. Experimental determination of conductivities. Conductivity cel and cell constant Ionic mobility's Kohlrausch law. Transference number. Arrhenius theory of

electrolytes. Dissociation of weak and strong electrolytes. Electrochemistry cells. Reversible electrodes, Types of reverse electrodes. Origin of electrode potential- Nernst equation. Stand electrode potential. Hydrogen electrode Calomel electrode, Commercial cells.

Crystalline State: Crystal systems. Law of crystallography Weiss and Miller indie Crystal lattice. Unit cell, Bravais lattices. Bragg's equation. Cry; Structure of NaCl, KCl, graphite and diamond.

Ionic Equilibria: Ostwald dilution law, Ionic product of water, Ka, Kb, pH, Buffer lotion, Common ion effect, Solubility product.

SYLLABUS FOR GEOLOGY

EARTH SYSTEM SCIENCE

Unit 1: Earth as a planet Holistic understanding of dynamic planet 'Earth' through Geology. Introduction to various branches of Earth Sciences. General characteristics and origin of the Universe, Solar System and its planets. The terrestrial and jovian planets. Meteorites and Asteroids Earth in the solar system - origin, size, shape, mass, density, rotational and revolution parameters and its age.

Unit 2: Interior of Earth Internal Structure of the earth. Earth's magnetic field: Convection in Earth's core and production of its magnetic field.

Unit 3: Plate Tectonics Concept of plate tectonics, sea-floor spreading and continental drift Geodynamic elements of Earth- Mid Oceanic Ridges, trenches, transform faults and island arcs Origin of oceans, continents, mountains and rift valleys Earthquake and earthquake belts. Volcanoes- types, products and their distribution.

Unit 4: Hydrosphere and Atmosphere Introduction to hydrosphere and atmosphere; Oceanic current system and effect of Coriolis force; Wave erosion and beach processes; Atmospheric circulation; Earth's heat budget.

Unit 5: Soil Soils- processes of formation, soil profile and soil types.

Unit 6: Understanding the past from stratigraphic records Stratigraphy: introduction and scope; Standard stratigraphic time scale Introduction to geochronological methods and their application in geological studies; Laws of superposition and faunal succession; Concepts of uniformitarianism.

CRYSTALLOGRAPHY & MINEROLOGY

Unit 1: Crystallography Elementary ideas about crystal morphology in relation to internal structures Crystal parameters and indices Crystal symmetry and classification of crystals into six systems and 32 point groups.

Unit 2: Crystal symmetry and projections Elements of crystal chemistry and aspects of crystal structures Stereographic projections of symmetry elements and forms.

Unit 3: Rock forming minerals Minerals - definition and classification, physical and chemical properties Composition of common rock-forming minerals Silicate and non-silicate structures; CCP and HCP structures.

Unit 4: Properties of light and optical microscopy Nature of light and principles of optical mineralogy Introduction to the petrological microscope and identification of common rock-forming minerals.

ELEMENTS OF GEOCHEMISTRY

Unit 1: Concepts of geochemistry Introduction to properties of elements: The periodic table. Chemical bonding, states of matter and atomic environment of elements. Geochemical classification of elements.

Unit 2: Layered structure of Earth and geochemistry Composition of different Earth reservoirs and the nuclides and radioactivity Conservation of mass, isotopic and elemental fractionation Concept of radiogenic isotopes in geochronology and isotopic tracers.

Unit 3: Element transport Advection and diffusion. Chromatography. Aqueous geochemistry-basic concepts and speciation in solutions, Eh, pH relations.

Unit 4: Geochemistry of solid Earth The solid Earth – geochemical variability of magma and its products. The Earth in the solar system, the formation of solar system Composition of the bulk silicate Earth. Meteorites.

Unit 5: Cosmic abundance of elements Distribution of elements in solar system and in Earth Chemical differentiation and composition of the Earth General concepts about geochemical cycles and mass balance Properties of elements. Geochemical behavior of major elements Mass conservation of elements and isotopic fractionation.

STRUCTURAL GEOLOGY

Unit 1: Structure and Topography Effects of topography on structural features, Topographic and structural maps; Importance representative factors of the map.

Unit 2: Stress and strain in rocks Concept of rock deformation: Stress and Strain in rocks, Strain ellipses of different types and their geological significance. Planar and linear structures; Concept of dip and strike; Outcrop patterns of different structures.

Unit 3: Folds Fold morphology; Geometric and genetic classification of folds; Introduction to the mechanics of folding: Buckling, Bending, Flexural slip and flow folding.

Unit 4: Foliation and lineation Description and origin of foliations: axial plane cleavage and its tectonic significance Description and origin of lineation and relationship with the major structures.

Unit 5: Fractures and faults Geometric and genetic classification of fractures and faults Effects of faulting on the outcrops Geologic/geomorphic criteria for recognition of faults and fault plane solutions.

IGNEOUS PETROLOGY

Unit 1: Concepts of Igneous Petrology Introduction to petrology: Heat flow, geothermal gradients through time, origin and nature of magma.

Unit 2: Forms Classification of igneous rocks. Textures and structures of igneous rocks Mode of occurrence of Igneous rocks.

Unit 3: Phase diagrams and petrogenesis Binary Phase diagrams in understanding crystal-melt equilibrium –An-Ab, Or-Ab, Di-An Magma generation in crust and mantle, their emplacement and evolution.

Unit 4: Magmatism in different tectonic settings Magmatism in the oceanic domains (MORB, OIB) Magmatism along the plate margins (Island arcs/continental arcs).

Unit 5: Petrogenesis of Igneous rocks Petrogenesis of Felsic and Mafic igneous rocks Komatiites, Granitoides, Basalt, Gabbros, Alkaline rocks, Kimberlites and Lamproites.

SEDIMENTARY PETROLOGY

Unit 1: Origin of sediments Weathering and sedimentary flux: Physical and chemical weathering, soils and paleosols.

Unit 2: Sediment granulometry Grain size scale, particle size distribution, Environmental connotation; particle shape and fabric.

Unit 3: Sedimentary textures, structures and environment Fluid flow, sediment transport and sedimentary structures: Types of fluids, Laminar vs. turbulent flow, Particle entrainment, transport and deposition. Paleocurrent analysis- Paleocurrents for different sedimentary environments Sedimentary structure- Primary and syn-sedimentary structures.

Unit 4: Varieties of sedimentary rocks Siliciclastic rocks: Conglomerates, sandstones, mudrocks. Carbonate rocks, controls of carbonate deposition, components and classification of limestone, dolomite and dolomitisation.

Unit 5: Diagenesis Concepts of diagenesis, Stages of diagenesis, Compaction and cementation.

METAMORPHIC PETROLOGY

Unit 1: Metamorphism: controls and types. Definition of metamorphism. Factors controlling metamorphism Types of metamorphism - contact, regional, fault zone metamorphism, impact metamorphism.

Unit 2: Metamorphic facies and grades Index minerals, Chemographic projections Metamorphic zones and isograde. Concept of metamorphic facies and grade Mineralogical phase rule of closed and open system Structure and textures of metamorphic rocks.

Unit 3: Metamorphism and Tectonism Relationship between metamorphism and deformation Metamorphic mineral reactions (prograde and retrograde).

Unit 4: Migmatites and their origin Metasomatism and role of fluids in metamorphism.

Unit 5: Metamorphic rock associations- Schists, Gneisses, Khondalites, Charnockites, Blue schists and Eclogites.

STRATIGRAPHIC PRINCIPLES & INDIAN STRATIGRAPHY

Unit 1: Principles of stratigraphy, Introduction to the concepts of lithostratigraphy, biostratigraphy, chronostratigraphy, seismic stratigraphy, chemostratigraphy, Magnetostratigraphy; International Stratigraphic Code–development of a standardized stratigraphic nomenclature. Concepts of Stratotypes. Global Stratotype Section and Point (GSSP).

Unit 2: Principles of stratigraphic analysis and Physiographic and tectonic subdivisions of India Walther's Law of Facies. Concept of paleogeographic reconstruction; Sequence stratigraphy and their subdivisions with Indian examples. Introduction to the physiographic and tectonic subdivisions of India., Introduction to Indian Shield.

Unit 3: Pre Cambrian Stratigraphy of India PreCambrian geology of Singhbhum and Karnataka; Introduction to Proterozoic basins of India; Geology of Vindhyan and Cudappah basins of India

Unit 4: Phanerozoic Stratigraphy of India Geology, Structure and hydrocarbon potential of Gondwana basins.

PALEONTOLOGY

Unit 1: Fossilization and fossil record Nature and importance of fossil record; Fossilization processes and modes of preservation.

Unit 2: Taxonomy and Species concept, Species concept with special reference to paleontology, Theory of organic evolution.

Unit 3: Invertebrates Brief introduction of important fossils groups: morphology and geological history of Trilobita, Brachiopoda, Gastropoda, Cephalopoda and Lamellibranchia.

Unit 4: Vertebrates and other fossils Evolution of horse and intercontinental migrations. Human evolution. Gondwana Flora Introduction to Ichnology.

Unit 5. Application of fossils in Stratigraphy Biozones, index fossils, correlation Fossils and paleoenvironmental analysis Fossils and paleobiogeography, biogeographic provinces Paleoecology – fossils as a window to the evolution of ecosystems.

GEOMORPHOLOGY

Unit 1: Introduction to Geomorphology, Endogenic and Exogenic processes.

Unit 2: Geoid, Topography, Hypsometry, Global Hypsometry; Major Morphological features Large Scale Topography - Ocean basins, Large scale mountain ranges (with emphasis on Himalaya).

Unit 3: Surficial Processes and geomorphology: Weathering and associated landforms, Glacial, Periglacial processes and landforms, Fluvial processes and landforms, Aeolian Processes and landforms, Coastal Processes and landforms, Landforms associated with igneous activities.

Unit 4: Endogenic- Exogenic interactions, Rates of uplift and denudation, Tectonics and drainage development, Sea-level change, Long-term landscape development.

Unit 5: Overview of Indian Geomorphology.

ECONOMIC GEOLOGY

Unit 1: Ores and gangues: Ores, gangue minerals, tenor, grade and lodes Resources and reserves- definitions; classification of economic deposits. Structure and texture of ore deposits.

Unit 2: Mineral deposits and concepts of Ore formation: Endogenous processes: Magmatic concentration, skarns, greisens, and hydrothermal deposits Exogenous processes: weathering products and residual deposits, oxidation and supergene enrichment, placer deposits.

Unit 3: Mineral exploration Exploration techniques: Geological, Geophysical and Geochemical Explorations techniques.

Unit 4: Metallic and Nonmetallic Ores Mode of Occurrence, chemical composition, uses and distribution in India of following: Metallic deposits: Ores of Iron, Aluminium, Copper, Manganese, Lead and Zinc. Non-metallic deposits: Mica, Asbestos and Limestone.

Unit 5: Metallogenic provinces and epochs; An introduction to atomic minerals and gemstones. Introduction to gemstones.

HYDROGEOLOGY

Unit 1: Introduction and basic concepts Scope of hydrogeology and its societal relevance Hydrologic cycle: precipitation, evapo-transpiration, run-off, infiltration and subsurface movement of water. Rock properties affecting groundwater, Vertical distribution of subsurface water Types of aquifer, aquifer parameters.

Unit 2: Groundwater flow: Darcy's law and its validity Intrinsic permeability and hydraulic conductivity, Laminar and turbulent groundwater flow.

Unit 3: Well hydraulics and Groundwater exploration Basic Concepts (drawdown; specific capacity etc) Surface-based groundwater exploration methods Introduction to subsurface borehole logging methods.

Unit 4: Groundwater chemistry Physical and chemical properties of water and water quality Introduction to methods of interpreting groundwater quality data using standard graphical plots Sea water intrusion in coastal aquifers.

Unit 5: Groundwater management Surface and subsurface water interaction, Groundwater level fluctuations Basic concepts of water balance studies, issues related to groundwater resources development and management, Rainwater harvesting and artificial recharge of groundwater.

ENGINEERING GEOLOGY

Unit 1: Engineering Geology and its applications, Scope of Engineering Geology; Elementary concepts of rock mechanics - Strength and Elastic properties. Engineering properties and characteristics of soils. Properties of building stones.

Unit 2: Basic concept of-Rock Quality Designation (RQD), Rock Structure Rating (RSR), Rock Mass Rating (RMR), Tunneling Quality Index (Q).

Unit 3: Dams and reservoirs: Types of Dams-masonary or concrete dams- gravity, arch and butress. Earth Dams and composite dams. Geological considerations- topography, structure and lithology. Foundation and seepage problems in dams and their treatment. Reservoir: Reservoir problems- seepage and silting.

Unit 4: Tunnels: terminology, definition, types- hard rock and soft rock tunnels. Geological considerations- topography, structure and lithology Bridge sites: Terminology, Bridge structure, types, bridge problems, and stability of bridges. Geology of bridge sites.

Unit 5: Stability of rock slopes and cutting in rocks: Classification of slopes- stable and unstable slopes - Geological parameters. Measures for stabilization of slopes. Foundation treatment; Grouting, Rock Bolting and other support mechanisms; soil stabilization.

REMOTE SENSING & GIS

Unit 1: Photogeology Types and acquisition of aerial photograph, Scale and resolution, Elements of air photo interpretation. Identification of sedimentary, igneous and metamorphic rocks and various aeolian, glacial, fluvial and marine landforms.

Unit 2: Remote Sensing Concepts in remote sensing, Sensors and scanners, Satellites and their characteristics, Data formats Raster and Vector.

Unit 3: Digital Image Processing Fundamentals of Image processing, Image Correction, Image enhancement, Image classification, FCC and Image Ratioing,

Unit 4: GIS Datum, Coordinate systems and Projection systems, Introduction to DEM analysis; GIS integration and Case studies, Indian Examples.

Unit 5: GPS Concepts of GPS and DGPS, Applications in earth system sciences. Applications in earth system sciences.

झारखण्ड राज्यपाल के आदेश से

ह0/–
(राहुल कुमार पुरवार)
सरकार के सचिव।

ज्ञापांकः–त0शि0प्र0स्था0–13/2019 /रांची, दिनांकः–

प्रतिलिपिः–अधीक्षक, राजकीय मुद्रणालय, डोरण्डा, रांची को राजकीय गजट के अगले अंक में प्रकाशनार्थ प्रेषित। मुद्रित नियमावली की 100 प्रतियां उच्च एवं तकनीकी शिक्षा विभाग, झारखण्ड को उपलब्ध कराने का निदेश दिया जाता है।

2. ई–गजट के नोडल पदाधिकारी को सूचनार्थ एवं ई–गजट में प्रकाशनार्थ प्रेषित।

ह0/–
सरकार के सचिव।

ज्ञापांकः–त0शि0प्र0स्था0–13/2019 /रांची, दिनांकः–

प्रतिलिपिः–विभागीय (मुख्य) मंत्री के प्रधान सचिव/मुख्य सचिव के विशेष कार्य पदाधिकारी/सभी विभागीय अपर मुख्य सचिव/प्रधान सचिव/सचिव/विभागाध्यक्ष, झारखण्ड को सूचनार्थ प्रेषित।

ह0/–
सरकार के सचिव।

ज्ञापांकः–त0शि0प्र0स्था0–13/2019 /रांची, दिनांकः–

प्रतिलिपिः–सचिव, झारखण्ड कर्मचारी चयन आयोग, रांची को सूचनार्थ प्रेषित।

ह0/–
सरकार के सचिव।

ज्ञापांकः–त0शि0प्र0स्था0–13/2019 /रांची, दिनांकः–

प्रतिलिपिः–कुलसचिव, झारखण्ड प्रौद्योगिकी विश्वविद्यालय, राँची/निदेशक/प्रभारी प्राचार्य, राजकीय अभियंत्रण महाविद्यालय, झारखण्ड/प्राचार्य/प्रभारी प्राचार्य, सभी राजकीय पोलिटेकनिक/राजकीय महिला पोलिटेकनिक संस्थान, झारखण्ड को सूचनार्थ प्रेषित।

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सरकार के सचिव।

ज्ञापांकः–त0शि0प्र0स्था0–13/2019–1038 /रांची, दिनांकः–07/11/2023

प्रतिलिपिः–श्री कुमार चंदन, MIS Officer, विभागीय ई–गवर्नेंस कोषांग को सूचनार्थ एवं आवश्यक कार्यार्थ प्रेषित।

6.11.23
सरकार के सचिव।